

A critical analysis of western environmental knowledge as a neocolonial strategy: The case of Uganda

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ABSTRACT

To curb environmental challenges effectively, Western environmental knowledge has been adopted besides indigenous environmental knowledge system in Africa. However, the dualistic nature of knowledge integration, this paper notes, is tinted by unfair power relations where indigenous knowledge is masked by neo-colonial tenets of the West. Neo-colonialism, as argued in this paper, is the attempt of the Western societies to impose their knowledge system to micro-manage the environmental and other affairs in Africa, taking a case study of Uganda. Our central inquiry is why Africa is gradually deviating from indigenous knowledge systems in preference of Western environmental knowledge. Using a critical analytical survey method, this paper argues that there is environmental knowledge neo-colonialism in Africa today characterized by Western identity construction, language dominance, cross-cultural cloning, undermining of indigenous education patterns, academic division of labor, education as an investment, top-down distribution of knowledge, and improper contextualization of knowledge construction and application. This appeals for Africanized production of knowledge to suit the continent's environmental needs and achieve African epistemic autonomy.

Keywords: environmental knowledge, indigenous, Western, neo-colonialism, knowledge, strategy

INTRODUCTION AND BACKGROUND

Uganda and the rest of Africa have been grappling with environmental challenges which have worsened especially in the 21st century as evidenced by climate change. Palmer (1998) observes that the planet is 4.5 billion years old, while life on earth has existed for 3.5 billion years, and human life on the planet has existed for 2-3 million years. However, for almost all the times, coexistence has been harmonious with a sustainable equilibrium, until the last two centuries when human activities started having significant impact on the environment and resources. This period coincided with the era of European industrialization and imperialism in Africa, when the environment became a commodity for ruthless exploitation leading to its degradation. This argument is similar to Hansen et al. (2023), stating that from 1800s, human actions towards the environment has been detrimental leading to the accumulation of the green house gases, and the peak of this devastation is that which had not been reached in millions of years.

Different strategies were put in place to preserve the environment by different stakeholders. Previously, in order to sustain the environment, Africans relied on their indigenous knowledge (Alidri, 2016). Kwashirai (2007) narrates that, as environmental degradation worsened, different environmental campaigns were initiated. During this time, colonial masters had already set foot in Africa and brought in Western strategies of environmental management although it was geared to suit the colonialists' political and economic interests.

The different approaches included environmental education as is part of colonial education, introduced through the 1972 Stockholm Conference. The Stockholm Conference report became the first international document to recognize the rights of a healthy environment. The conference identified 26 principles and spelled the responsibilities of humanity in ensuring the protection of the rights to a healthy environment. This introduced the role of education in addressing environmental challenges and led to the widespread Western environmental knowledge leading to the coexistence of the two systems of environmental knowledge. Western environmental education is, however, based on the Global North's environmental knowledge and practices (Palmer, 1998, p. 7; Palmer & Neal, 2003, p. 12).

The data used in this article is derived from the findings of the first author's master thesis, titled "Historical evolution of environmental knowledge: Implications for environmental management practices in Amuru District (1972-2022).

Even so, Western environmental knowledge, became dominant in Africa and Africans are deviating from indigenous environmental knowledge system thus, promoting dependencies of African nations on foreign knowledge systems. These dependencies seem to align with neo-colonialism which is the use of political, economic, and social influence by former colonial and contemporary Western powers on developing countries to promote continuous dependence on them. This paper, therefore, aims to establish the nature of Western environmental knowledge and its practices, interrogate the nature of neo-colonial strategies, and analyses the nexus between Western environmental knowledge and neo-colonialism.

In an attempt to answer the question why Africa is deviating from her indigenous environmental knowledge in preference to the Western one, this paper critically looks at three things: the introduction and background, literature review, and discussions of the literature reviewed, before making conclusions and recommendations. We shall start with the background of the study, in which we shall look at the concepts; environmental knowledge, neo-colonialism, neo-colonial knowledge system, and the theoretical base of environmental knowledge.

Environmental Knowledge

Palmer (1998) mentions that environmental knowledge is the content that makes up environmental education such that, the interlink of all that is meant by education 'for' the environment, with the acquisition of environmental knowledge and personal experiences in the environment, constitutes a holistic and balanced approach to environmental understanding. This can be attained both through formal education, and informally, by living and interacting with the community. Liu et al. (2020) conceptualize this as facts and relationship that binds the natural surrounding and its ecosystems, however, it ought to embed solutions to tackle environmental problems.

Africans generated environmental knowledge informally, and this is indigenous environmental knowledge which is a product of the endeavors to master the environment and survive (Ezeanya-Esiobu, 2019). Semali and Kincheloe (1999) define indigenous environmental knowledge as the dynamic way in which residents of a specific area understand themselves in relationship to their natural environment and their organization of folk knowledge regarding flora, fauna, cultural beliefs, and history, to enhance their lives. We perceive this knowledge basically as environmental cognition stockpiled in a particular location as shaped by people's experiences, traditions, and interlaced with metaphysics. Therefore, it varies from one location to another.

Environmental knowledge is essential for the effective management of the environment. A 1976 behavioral theory by Charles E. Ramsey and Roy E. Rickson is a supposition that people who are better informed about environmental knowledge, would become more aware of environmental problems, and consequently, would be motivated to behave in an environmentally responsible manner. Akintunde (2017) also argues that environmental knowledge is important because when knowledge increases, environmentally favorable attitudes that results to responsible environmental actions are developed. Rahman (2016) supplements, environmental education, knowledge, awareness, and behavioral changes are the most important elements of solving environmental issues. Besides, environmental knowledge is the core and root of understanding the implications of human behavior and actions on the environment, as it is a mode of shaping attitudes and behavior, for environmental protection.

Okpilike (2012) observes that with foreign contacts, the indigenous people started adopting foreign environmental knowledge majorly from the Western world, dubbed Western environmental knowledge. Ellen (2000) describes Western environmental knowledge as a Western folk based with difference of being informed by science and located in different contexts; unlike indigenous environmental knowledge woven with metaphysics. Palmer (1998) mentions that the system is concerned with global and local dimensions in the past, present, and future. We acknowledge that Western environmental knowledge does claim a belonging and it is indigenous in its place of origin, however, in Uganda, it is foreign and considered 'Western' based on its place of production.

Palmer and Neal (1994) assert that Western environmental knowledge is inscribed in national school's curricula globally, but it is a central/cross curricula subject that rises in the different elements of the curriculum. Western environmental knowledge is carried out and supported by learning institutions with a broad range of teaching and learning techniques (Palmer, 1998). Thornton and Bhagwat (2021) believe that Western environmental knowledge is universal with a centralized objective in all institutions to increase public awareness regarding environmental issues, to lay foundations for informed and active participation of individuals to protect the environment and use natural resources rationally. In achieving these objectives, the approaches used are specialized. Ezeanya-Esiobu (2019) states that in administering Western environmental knowledge, the approach of transmission is through writing, and it is taught, and absorbed in abstraction.

In the Tbilisi conference, the nature of Western environmental knowledge became grounded into learning about the environment (understanding of the environment), for the environment (concerned with values, attitudes, and positive actions for the environment), and through the environment (using environment as a resource to gain first-hand experience) (Palmer & Neal, 1994).

Neo-Colonialism

In the 20th century, Africans reversed the course of colonialism earlier imposed on them by imperialists through attaining their independence. As the struggle for autonomy was on, the globe was mostly divided into pro-East and pro-West due to the cold war. This led to the formation of the non-aligned movement, a neutral umbrella for most Asian and African countries. Nonetheless, today, most African and third-world countries rely on developed countries which has resulted in neo-colonialism that undermines independence. Nkrumah (1965) observes that, once a territory has become nominally independent it is no longer possible, as it was in the last century, to reverse the process. Existing colonies may linger on, but no new colonies will be created. In place of colonialism as the main instrument of imperialism, we have today, neo-colonialism. This is a continuation of imperialism through cultural, social, economic, and political influence on developing states. Wijesinghe et al. (2017) concur that despite African

“sovereignty”, there are remnants of colonial power structure that lingers globally, to an extent that the subject of knowledge production and its dissemination being controlled by such powers has become a huge debate. This is equally an issue discussed in this paper.

Spivak (1991) mentions that neo-colonialism began after the previously colonized countries gained their independence. This was through the surviving structures of colonialism. Thereafter, the development of monopoly industrial capitalism began, and neo-colonialism seem to substitute colonialism because different policies are demanded to have control over independent nations. Olivier (2019) warns that there should not be any thought about the absence of subordination even if colonialism ceased, because in the post-colonial era, there is domination and confiscation of wealth with a duplicated structure from colonialism.

The essence of neo-colonialism is that the state, which is subject to it should, in theory, become independent with all the outward characteristics of modern sovereign states, but in reality, they are designed to remain dependent on foreign technologies, technical skills and the knowledge system. Neo-colonialism became traps by which the international community keeps control of the former colonies. In reality, its economic system and political policy is directed from outside (Nkrumah, 1965). Haag (2011) agrees with the 1961 All-African People’s Conference’s resolution on neo-colonialism as the survival of colonial system in spite of formal recognition of political independence in emerging countries. These countries become victims of an indirect and subtle form of domination by political, economic, social, military or technical means. Brouwers and Ber (2020) observe that neo-colonialism is exhibited through the exploitation of developing countries by granting them development based on the Western ideology by cultural adaptation, environmental destruction and economic dependency. Mouton and Burns (2021) continue to say, at the end of it all, there is a power divide. The practioners of neo-colonialism maintain power without responsibility while the victims suffer exploitation without redress.

Nkwocha (2008) explains that Western powers have continuously exercised an overriding influence over the political governance of many countries in Africa on account of their vested interests in these nations. It has taken the form of behind-the-scenes manipulative and controlling roles through agencies such as the International Monetary Fund, imposing leaderships favorable to, and working for the interests of western imperialism. This implies that the organizations at the center of Western environmental knowledge may seemingly be promoting European interests. This analogy of neo-colonialism becomes plausible since both concepts, imperialism and neo-colonialism have mutual characteristics including the growth of the power of monopolies and finance capital, vast growth in the export of capital and foreign cultural values, among others. Lawrence and Laybourn-Langton (2022) agree that environmental breakdown and its dynamics are consequences of power and its exploitative nature. The authors say that capitalism and profit maximization proprietors exercise brutal impunity, subsequently environmental plights. Their control forcefully overrides the interest of environmental activists, and this is an aspect of neo-colonialism.

Greco (2010) notes that the most dangerous form of imperialism is its last stage, neo-colonialism, which has held back the previously colonized states under the control of foreign powers especially through economic and monetary means. In the economic form, he further recalls how America boosted neo-colonialism in 1971 in what was termed as coca-colonization. This was when the country advertised for Coca Cola using different faces around the globe as a presentation of a perfect harmony, and the need to promote unity. However, this was to convince the people from the other parts of the world to serve the drink even when they do not practice unity, while promoting the business of the proprietors through international earnings and eventually, profit repatriation. Nguyen et al. (2009) note that the historical legacy of colonialism is such that the direction of cultural flow is from the West to the rest of the world. Haag (2011) adds that foreign aid is another form of neo-colonialism which is manifesting in a large scale and undermining the once achieved independence. Ziai (2020) mentions that neo-colonialism takes different patterns including economic, psychological, epistemological, cultural, political, and social.

This paper focuses on neo-colonialism through epistemology. To connect this view with the ongoing discussion, we need to understand that the interest of neo-colonialism is not to protect the environment of the colonized, but to exploit it for the benefit of the colonizers. To understand this better, we could look at what is termed new-colonialists’ knowledge system.

Neo-Colonialists’ Knowledge System

In this paper, we agree with Spivak’s (1991) assertion that the disguise of neo-colonialism is that it is felt less because most countries feel like they are independent. By the time neo-colonialism started, the major focus was on economic neo-colonialism, therefore, culture and production of knowledge as forms of neo-colonialism were hardly considered. Olivier (2019) acknowledges that there is still subordination through the construction of identity in different ways such as legitimizing identity (totally dependent on education, religion, and other social institutions), resistance identity (which opposes other social setups, alienates and exclude them) and project identity (through the different cultural materials and movements). Relatively, Western environmental knowledge began as a movement. Palmer (1998) mentions that the onset of this knowledge started with nature studies that developed when the nature study movement by a Scottish professor of botany, Sir Patrick Geddes (1854-1933) gained widespread attention.

Nguyen et al. (2009) note that knowledge neo-colonialism is recognized by decontextualized knowledge such that imported knowledge are ‘cross cultural cloning’. This knowledge normally lacks relevance to local realities and is at conflict with indigenous knowledge system, culture and beliefs. It also undermines the potential of educational researchers in the country that has adopted the knowledge. The adopted education may not be considered as an instrument for liberation and empowerment, rather, an investment by the innovators of the idea. Crawford et al. (2021) add that there is predominance of non-African writers on African issues in academic journals. This means that knowledge production is taken up by these writers. In most instances, the African based scholars ought to produce the empirical or raw data while the finished knowledge products are produced by the institutions in the North. With this pattern, there is generalization of context with limited social realities on the continent, and this appears like Africans are denied the status capacity as knowledge bearers and producers. Hotson and Bell (2023) comment that with this

pattern, the consumers of the knowledge only follow the pace set by the producers yet the knowledge they produce only aligns to their power.

Yalkin and Özbilgin (2022) mention that there is “Englishization of neo-colonised knowledge especially in research fields which publishers are also Western journals.” Mburu (2020) supplements that knowledge colonialism is branded by foreign language. Wa Thiong’o (1986) and Brouwers and Ber (2020) state that imperialism is not a slogan but a reality. It is packaged in different forms and methods including annihilating the colonized to believe in the colonizer’s names, language, environment, heritage of struggles, unity, capacity, and the colonizers themselves. However, in this paper, the authors agree with Achebe (1958, 1975), who believes that neo-colonialism is real and it should be fought, but the essence of the problem is not grounded on language, which is just a neutral mode of communication. Instead, the foreign languages like French, English, or Spanish, to mention some, should be used to fight the culture of neo-colonialism. Even so, Hotson and Bell (2023) believe that seeking relevance in the contemporary academic arena has been legitimized through assimilation in terms of language, teaching and learning assimilation, which is a typical continuation of colonialism at the end of colonial era, termed, academic imperialism.

Yalkin and Özbilgin (2022) identify knowledge neo-colonialism through the presence of academic division of labor in terms of the production and consumption of knowledge, and suppliers of data and theory of knowledge. Stating that, the Western world obtain data from the rest of the world, while they provide theories for the interpretations of the data obtained. Dutta et al. (2014) observes that knowledge neo-colonialism creates dependency, which is rooted in the uneven development of countries across the globe. Therefore, there is pretense to create equity and provision of this knowledge through a free market of knowledge.

Knowledge neo-colonialism may also manifest through top-down distribution of knowledge for social change, which only serve the agenda for transnational capitalism. With that, there is deployment of participation as a tool which helps the different societies to buy themselves into the knowledge programs and projects initiated, and people just get co-opted (Dutta et al., 2014). Gani and Marshall (2022) record that distribution of knowledge that contains racial civilization and imperialism approaches through research, teaching and other ways is knowledge neo-colonialism.

Ndlovu (2018) wonders that the biggest question is whether it is possible for the colonized Africans who went through the Western education to unlearn or unthink the education system that produced them, even within Africa itself. University institutions in Africa are the center of knowledge neo-colonialism since it bears researchers that produces knowledge, teachers that teach it, and students who acquire the knowledge, skills, and values. Therefore, there is a question on whether they are African or westernized universities.

Western environmental knowledge is one of the systems adopted by African countries and it is being directed from outside. Palmer (1998) acknowledges that Western environmental knowledge and its developments are captured based on the sequence of major international meetings, initiatives, and publications from the Western world, although it is inscribed in national school’s curricula globally. This is described in this work as environmental knowledge neo-colonialism.

The link between environmental knowledge and neo-colonialism shall be examined against the backdrop of the defining features of knowledge neo-colonialism, herein presented.

Theoretical Base of Environmental Knowledge

The paper adopts Kantian Copernican Revolution theory that asserts, it is the mental representation that makes the object possible rather than the object that makes the representation possible. It further depicts that the human mind is an active originator rather than just a passive recipient of perception. Therefore, human beings may not obey the law of nature but rather originate their own law and subject nature to obey.

Western environmental knowledge is herein seen as one of the human’s construction that has been adopted globally. However, what is negative about the western environmental knowledge system is its manipulative technological knowledge, which proposes that humans should manipulate natural laws in order to solve human problems. A clear example can be seen in modern science in producing rain through this manipulative technology by a process called ‘cloud seeding’. This knowledge system started with Kant’s Copernican Revolution theory and it is now widespread in terms of biotechnology, artificial intelligence, and genetic engineering systems. The results of these technologies are at times more dangerous than their purported benefits.

This theory has been supported by scholars such as John Wheeler (1990) and David Bohm (1980). They support the supposition through putting emphasis on the subject rather than looking at the subject only as a part of an object. For instance, machines and robots may be tasked to perform roles that even human beings may not perform such as lifting heavy weights and performing delicate tasks. Alles-Zermalmer, a philosopher, supports that transcendental philosophy has for its object the founding of metaphysics, whose purpose as the chief end of pure reason, is intended to lead reason beyond the limits of the sensible world to the field of the super sensible. He also critiques the theory establishing that morality presupposes responsibility and freedom; and there is no contradiction. Freedom does not prevent the same act from being a part of the natural mechanism, which to remember is the only way to organize experiences.

This paper therefore analyses and differentiates the natural mechanisms and that which is generated by human beings to manipulate the natural settings due to the innovation freedom. Freedom in this Kantian metaphysics is the ability to set ourselves free from the constraints of others including those imposed by nature; and positively to commit ourselves to self-chosen goals. In this understanding of freedom, humans become the masters of this world, including its environments, and subject nature to answering questions set by human intelligence. This is what is being encouraged in the African education system, selecting the most intelligent among them, and because of their intelligence, they think, the future of humanity should be placed in their hands. Humanity is to rely on the discoveries and knowledge generated by the human mind, completely ignoring the originator of this world, God. This diverts from the African indigenous knowledge system that places knowledge at the service of humanity,

including the environment in which people live. African knowledge system respects the role played by man and his knowledge, but does not ignore the regulative power of God, the creator. In this way, Africans respected nature and its laws and looked at nature as a mother, a womb in which human life flourishes.

LITERATURE REVIEW

In our literature review, we shall look at authors that think Western environmental knowledge system is the answer for African environmental management, those that think otherwise, and those who advocate for a balance of Western and African indigenous knowledge system.

Pro-Western Environmental Knowledge

Le Grange (2004, p. 87) notes that what makes a particular knowledge powerful is not its claim to rationality, objectivity or universality but rather its ability to move from the site and moment of its production to other places and times. The author further adds that this knowledge bears social strategies and technical devices lacking in indigenous knowledge. This implies that since Western environmental knowledge is adopted in Uganda, the knowledge surpasses indigenous environmental knowledge.

Greco (2010) recalls that during colonialism, the colonized people were majorly looked at as inferior and even in the post-colonial era, there is still urge to have cultural transformation of most indigenous races through assimilation of the Western race. It is seemingly apparent that a degree of cultural change is necessary to promote modernization. Dutta et al. (2014) highlight some of the neo-colonial strategies as the importation of agricultural biotechnologies, fertilizers and contraceptive technologies. In as much as these are seemingly neo-colonial strategies, they are modern technologies in favor of development that the indigenous knowledge lacks.

A 1965 conference on the development of environmental education at Keele University, in Staffordshire, Britain, advocated for environmental knowledge becoming an essential part of education for all citizens, to assist the emergence of scientifically literate nations. Teachers were then to take part in fundamental and operational research, to decide on the content and methodology to best suit the modern needs (Ellen, 2000; Stevenson et al., 2013). This means that Western environmental education is considered more viable to solve environmental challenges due to its scientific nature.

Pro-Indigenous Environmental Knowledge

Nguyen et al. (2009) note that other parts of the world look at the West as a model to reform education and achieve international standards, effectively inheriting Western culture and heritage. The World Bank and United Nations Educational, Scientific and Cultural Organization have often supported primary education, however, there is no strong link between education and sustainable development, and conservation of cultural and educational heritage. Therefore, adopting policies across cultures without putting into consideration the uniqueness of social cultural dimensions is actually “pseudo universalism.” This is the case for Uganda since environmental concepts in the curriculum are Westernized, indicating that the Western world is the nation’s model. However, Latulippe and Klenk (2020) emphasize that even in the face of scientific research and knowledge, indigenous knowledge deserve to flourish in the production spheres, that schools equally are a part.

Ezeanya-Esiobu (2019) notes that the institutions of learning that cover the jurisdiction of Western environmental knowledge normally prefer the Euro-centered learning over that of the local communities in which they operate. Hence, unlike indigenous environmental knowledge that is culture-specific, Western environmental knowledge is “de-cultured”. We agree with the de-cultured nature of Western environmental knowledge since it is decontextualized. Ellen (2000) agrees that imported knowledge are cultural misfits since no societies are exactly the same. This is true for the case of Uganda since every community bear distinct environmental experience. Therefore, measures to tackle environmental challenges may not be a “one size fits all.” Haag (2011) further explains that neo-colonial domination also embraces cultural and educational influence, exercised through the expatriation of teachers and cultural ambassadors, as well as through the education of the African elite in the former colonial metropolis which promotes its adoption of western values and thought patterns. It is less direct and less visible rendering neo-colonialism more dangerous than colonialism since it implies power without the need for justification for the master, and exploitation without protection for the country subject to it.

Environmental cognition is supposed to consider cultural values in the different societies. Human culture engulfs knowledge, beliefs, morals, customs, capabilities, and habits that people are to live by. Thus, determining the social groups’ thoughts, feelings, actions, and behaviors (Opilike, 2012). The best people to create environmental knowledge are those that depend on the natural resources for their economic livelihood (Rahman, 2016). Colonialism and its legacies, nationalism and globalization, may have ruptured patterns of indigenous environmentalism, particularly through the removal of indigenous communities from the places that matter to them (Mount & O’Brien, 2013). This is what Olivier (2019) equalizes to economic neo-colonialism stating that, under the present circumstances of economic neo-colonialism, many of those in periphery countries are constantly at the receiving end of the always-advancing, innovating production of commodities, exported from developed countries.

The unfortunate bit about Western environmental knowledge and its development globally is that it is meant to favor the architects of the idea. Therefore, it is unable to serve and meet the needs of the people, who are to adopt it, as the system continues to pursue goals set by the colonialists (Okpilike, 2012). Application of Western environmental knowledge is a form of universal imperialism based on European-ethnos superiority. We believe that Western environmental knowledge is meant to supplement indigenous environmental knowledge to effectively manage the environment. However, disregarding indigenous environmental knowledge and the local communities only favor the Western world (Abidogun & Falola, 2020).

Neo-colonialism identifies itself as the process of political transition through handing over sovereignty to the African people with one hand, and only to take it away with the other hand. It can best be seen as a “clientele sovereignty or fake independence”. The “clientele sovereignty” is evidenced by metropolitan powers granting a sort of flag independence to a peripheral nation with the concealed intention of making the liberated country a ‘client state’ and controlling it effectively by means other than political domination (Nkrumah, 1965).

Pro-Western and Indigenous Environmental Knowledge

Knowledge should not be judged based on *a priori* criteria but in respect to its effectiveness in line with purposes it ought to achieve. Every knowledge has a role to play in the formation of a constructive future and the multiplicity of different cultures and knowledge creates a meaningful world with different models of human-nature interactions (Mazzocchi, 2018). We agree with this perspective, since indigenous knowledge is interlaced with metaphysics and may bear shortcomings in curbing the current environmental challenges. However, as Western environmental knowledge is taken as a supplement to fill these gaps, there ought to be integration of both knowledge systems, such that one knowledge is not transformed into a raw material for the production of another knowledge. Opposing our view, Bala and Joseph (2007) assert that traditional knowledge may be exploited to advance science even without investigating the possibility of traditional knowledge being advanced. While this possibility may not be entirely dismissed, we still think, good environmental practices need to adopt the good sides of both western and indigenous knowledge systems.

In as much as Western science regarding the environment tackles both existing and future environmental issues such as climate change through technological solutions, it is essential to consider local communities and their perspectives on the different environmental policies because silencing the indigenous people reduces the effectiveness of the efforts to conserve the environment (Vogt et al., 2023; Zedler & Stevens, 2018). Jessen et al. (2021) further assert that indigenous knowledge and its rights to conserve resources does not in any case impede the application of science because both approaches can coexist. In fact, they are complimentary and exclusion of any of the systems is unnecessary.

METHODOLOGY

The paper draws data from a historical mixed method study conducted on the implications of the evolution of environmental knowledge on environmental management practices in Amuru District. Qualitative approach was dominant to explore the values, beliefs, experiences, meanings, processes, and purposes, of the phenomenon, while the quantitative approach offered a supportive role to provide statistics to validate the data. The historical and case study design were used to assess how the past influences the present and investigate the population in their real-life context.

The District of Amuru in Northern Uganda was selected due to the reported rate of environmental degradation despite the existence of both indigenous and Western environmental knowledge. To explore the indigenous environmental knowledge, 15 elders sampled through snowballing since the population is scarce and dispersed, were engaged. Therefore, a referral was made from one respondent to another and the sample size was regulated by the level of saturation. These elders are the custodians of oral tradition and history. Teachers of Western environmental subjects; biology, geography, and agriculture were considered to study Western environmental knowledge. These teachers are trained to impart this knowledge to learners and assess the learners after a particular period of time. Therefore, they were purposively sampled. In the District of Amuru, there are 11 secondary schools. However, the study considered schools that has students who have completed senior four, since environmental knowledge supposedly translate to positive environmental actions through behavioral change. Therefore, learners who must have completed senior four/ordinary level environmental courses are liable for behavioral change. Ten of the secondary schools had these learners, and 50% of the schools were considered as representative schools, pseudo-named; Buffalo, Elephant, Leopard, Lion, and Rhinoceros. Three teachers of the environmental subjects (biology, geography, and agriculture) were taken from each school, however, in two schools, the teachers of biology doubled as those of agriculture. Both the elders and the teachers were interviewed using a semi-structured interview guide. A preschool visit and later the 1967 Yamane formula determined the sample size of learners. This totaled to 281 learners who were engaged through a survey with self-reporting questionnaires. Learners are beneficiaries of both the indigenous and Western environmental knowledge. The ones already exposed to the senior four curriculum were eligible to be a part of the survey and therefore, they were randomly sampled through a lottery method since they all stood equal chances. During the survey, learners were provided with soft drinks packed in disposable bottles to observe the disposal of the bottles as an environmental management practice.

Ordinary level curricula documents were reviewed, and these are curricula of the three environmental subjects. However, at the time of the data collection there existed two curricula in the schools that is the objective-based and the competence-based curricula. The main document was the objective-based which was used by the students who were part of the survey, while the supplementary document was the competence based majorly to trace evolution of Western environmental knowledge.

Ethical consideration was observed by obtaining administrative permissions, assent and consent forms, as well as honoring confidentiality of respondents. As a data control, there was a pilot study to check validity, and use of four data collection methods to corroborate data and enhance reliability. The data collected was analyzed using content analysis for qualitative data, while descriptive statistical analysis (frequencies, percentages, and cross tabulation) and inferential analysis (correlation coefficient) using statistical package for social sciences software, which history is inclusive, was used to analyze quantitative data.

FINDINGS

The findings of this study are relayed with a presentation of that in favor of Western environmental knowledge and indigenous environmental knowledge.

Pro-Western Environmental Knowledge

Western environmental knowledge is a supplementary knowledge on indigenous environmental knowledge, to effectively curb environmental challenges. It is majorly transmitted through formal education in schools and distinguished by its experimental and scientific nature. This form of knowledge is adopted as it did not exist in this society previously.

Western environmental knowledge bears foreign content shown in the geography curriculum of 2008. These include topics such as relief and drainage of North America, natural resources in British Columbia, development of river basin: case study of the Tennessee Valley Region, the development of agriculture and industry on the cotton belt in the South, extensive wheat farming and industrial development on the Canadian Prairies.

In the 2008 curriculum of Agriculture, Western environmental knowledge presents the use of fertilizers and chemicals in agriculture. The topic of soil fertility is presented, and the different inorganic chemicals and fertilizers are handled, including their disadvantages such as inorganic fertilizers containing salt which burns plants. In the Agriculture textbook, details exemplify factory made fertilizers such as, calcium ammonium nitrate, nitrogen, phosphorus, potassium, urea, di-ammonium phosphate, and single super phosphate. When learners were asked about their application of the environmental knowledge, acquired 11.28% had not applied their knowledge because of reasons including fear of using chemical and fertilizer due to its side effects.

Elders note the adoption of genetically modified organisms including animals, birds and plants. The food crops include beans, maize, cassava, among others modified to resist harsh weather changes and boost rapid growth while the inanimate organisms include poultry eggs and dairy products. Yet the adoption of some of these genetically modified seeds were found to be non-sustainable, since farmers are to buy seeds from suppliers as they cannot preserve seeds for their next seasons' planting.

We also found out that there is systematic replacement of indigenous plants with the imported ones, yet these indigenous plants are known for their resistance in extreme weather conditions, like droughts. In the 2008 geography curriculum, the topic, natural vegetation of East Africa, highlights factors favoring forestry, including market and technology, while its importance shows employment, fuel, and forest products. Aligning to that, there is selling of trees unselectively, including the indigenous and sacred trees such as *afzelia africana*. Additionally, Western environmental knowledge has new knowledge on afforestation, especially the grafted trees. Although this practice is believed to have generated from China and Mesopotamia, major trees planted are *tectona grandis* (teak) majorly originating from Asia, *pinus palustris* (pine), and *eucalyptus globulus* (eucalyptus), even when they are easily affected by termites and fire. Students exemplify the plantation of these trees and the correlation between student's environmental management and afforestation is .000.

The tree seedlings are sold and due to unaffordability, teachers are concerned with the application of knowledge. Teacher OM of Rhinoceros school admits,

We agree on re-afforestation at school. For instance, we say, when you cut one tree, plant five. But the biggest challenge is relating theory to practice. When students share their experiences, we realize that they have cut a number of trees yet planted none.

The logic behind deforestation is the need for fuel. While such advocacy to plant trees is well taken, there are no alternatives to the use of trees as fuel, which are badly needed by the local communities. With population increase, the demand for trees will irreparably damage the environment unless alternative sources of fuel which are affordable are introduced.

There is increasing use of technology and products in relation to the environment. These include farm mechanics such as tractors for ploughing, which is also presented in the agriculture curriculum (2008) in the topic introduction to farm mechanization, farm implements and equipment, and farm tractors. Some of these machines are also used to refine agricultural output such as cereals. Additionally, there is high use of polythene bags.

There is adoption of scientifically approved measures to curb environmental degradation, which coupled with foreign contacts, religion, and modernization, has led to the drastic fall of indigenous environmental approaches including environmental rituals, preservation of sacred environmental resources, and concerted efforts towards the environment due to the distinctive environmental approaches in the communities. Elders note that in the indigenous society, environmental resources believed to be the host of ancestral spirits were preserved as sacred, and rituals would be performed whenever the community experiences environmental calamities including prolonged droughts. They also assert the difficulty of imparting indigenous environmental knowledge to children, since the younger generation exposed to the school knowledge consider it barbaric.

The language of instruction in teaching of Western environmental knowledge is English. This is a foreign and second language to the Ugandan learners and teachers. All learning materials are equally written in English. Learners were tasked to opt for a knowledge system that is easy to apply, and 53.76% of learners opted for Western environmental knowledge and their justification included understanding the language (English) during teaching and learning. On the contrary, teachers express difficulty in conceptualization of content by learners due to the English terms used. The different environmental conferences that produced the Western environmental knowledge are also foreign.

Pro-Indigenous Environmental Knowledge

Indigenous environmental knowledge is the traditional comprehensive knowledge on the environment, generated by the ancestors, and passed down to other generations, through both oral tradition such as riddles and storytelling and experientially. It is interlaced with nature, culture and beliefs. Elders' point that, environmental catastrophes befall, due to over manipulation of environmental resources, wrath of the gods, while the rewards of environmental management are blessings. When the law of nature is manipulated, nature fights back and causes environmental catastrophes.

The central difference between the two environmental knowledge systems is that African indigenous environmental knowledge is rooted in the respect of the environment and natural laws while Western environmental knowledge has no respect for the natural laws.

DISCUSSION

As seen in the previous sections, there exists new environmental knowledge different from indigenous environmental knowledge. The adoption and integration of this knowledge system produces practices that are different from those known in African traditional societies. The notion that this knowledge was not in existence before and most of it manipulates nature, indicates the invention of these knowledge and subjection of the environment to align with its concept. Applicable therefore, is the Kantian revolutionary theory that supports human creation of laws that nature ought to be subjugated to, instead of obeying the law of nature. This may have consequences on the environment that later boomerangs on human beings. The management of the environment is often linked to the actions in the environment informed by the knowledge about the environment. Therefore, the change in environmental knowledge may not leave environmental management invariant.

On the other hand, we do acknowledge the limitations of African indigenous knowledge system. This is because modern African societies cannot only rely on such indigenous knowledge because of their lack of scientific specificity. Secondly, factors such as the growing population of Africans, increase of foreign religions, like Christianity and its values, and the increasing diversity of human needs, like new modes of transportation, makes the use and application of African indigenous knowledge quite limiting. That is why we advocate for the combination of both western and African environmental knowledge system, since each system supplements the other.

Unlike the literature review that showed authors in support of indigenous environmental knowledge, and even the integration of the two environmental knowledge systems, the empirical data, majorly the reviewed curricula which embeds Western environmental knowledge disregards indigenous environmental knowledge in favor of the Western. This already indicates knowledge neo-colonialism which pinpoints the producers of the knowledge being the Western world and the consumers being Ugandans. Our view is that some relevant and useful elements of our environmental knowledge systems be integrated into our schools' curriculum. We think exemplary cases from outside Africa only re-enforces the question of knowledge neo-colonialism.

Introduction of new knowledge in terms of exports to other countries, for example, from the Western world to the rest of the global spheres including Africa may not be undermined. This stems from the history of Africans being under colonial rule and adjusting their ways to befit the colonizers. Implying that this may be a repetition of history, termed knowledge neo-colonialism. In our view, we think to reduce the negative effects of neo-colonialism, what ought to be encouraged is the spirit of cooperation in which exchange of goods and services, including exchange of knowledge should be done in terms of mutual respect for each other's independence. Africa does need new knowledge to manage its environment, but such knowledge should not be imposed. It should be exchanged in a spirit of mutual respect.

There is the adoption of genetically modified organisms. The major importation are agricultural seeds normally referred to as improved seed. Ideally, these seeds are meant to resist harsh weather/climatic changes that may exist. Its growing span is also shorter compared to the indigenous seeds and that supports farming such that the output is fast got and possibly attained in higher quantity. However, the seeds bear inorganic components like chemicals which may interfere with the agricultural ecosystem, challenging the growth of organic seeds and increasing the growth of weeds that may be resistant to herbicides. Unlike the indigenous seeds that are kept and multiplied organically without further industrial additions, the improved seeds are processed and packaged. The production of these seeds are without Africa, implying that the African consumers ought to rely on the outside market for supply. Already, this creates dependency on the foreign nations. This dependency worsens as the output of these seeds may not be procured and recycled back in farming or replanted. Notably, indigenous seeds are recycled through preservation when agricultural output is harvested. Improved seeds being the total opposite coerce the consumers to return to the markets for purchase whenever the need for use arise. This is environmental knowledge neo-colonialism which entails the economic indirect control of another country. Periphery countries are constantly at the receiving end of the always-advancing, innovating production of commodities, exported from developed countries. It further stretches to cultural neo-colonialism, as the traditional methods wears out in favor of foreign practices in agriculture.

Afforesting *tectona grandis* (teak), *pinus palustris* (pine), and *eucalyptus globulus* (eucalyptus) as fast growing and commercial trees which products may be used for log, timber, and production of charcoal is commercialization of the environment. The practice of commercializing forest cover is generalized to be non-selective including indigenous trees used for performance of rituals as they are considered sacred. This include the rain making ritual that is performed under a sacred tree or on a hill. Arguably, there is coexistence between the environment and human beings which calls for the use of environmental resources for human survival. Although this limit is exceeded since the exploitation of the environment is resulting to its devastation, which means, coexistence is being malice, and human survival compromised. The indigenous and sacred trees in Acoli include the *afzelia africana* which grows in Africa, yet its use spreads worldwide for example for ship building and manufacturing of firearms since it

resist decay and termites. Exportation of this natural and scarce type of tree to the outside world may be equated to that of other natural resources exploited and exported during colonialism. Indicating there is still a transaction of valuable resources which are primary, and later turned to secondary goods, and sold back to the suppliers of the raw materials expensively. Furthermore, this implies that there is a decline in cultural rituals as the sacred trees are cut. Implying that there is loss of culture that ruptures patterns of indigenous environmentalism. And not being in a position to solve environmental problems traditionally means there ought to be other measures to rely on including the Western environmental knowledge and practices.

Devastation of tree covers bears negative consequences such as climate change and loss of land/soil fertility due to soil erosion which is prone in bare land. Western environmental knowledge therefore improvises the use of chemicals and fertilizer to enhance the growth of crops. The sprayed chemicals are majorly for vegetable crops, which are planted around the swampy/water areas during the dry season. This means that there is not only contamination of the soil but also the water which is later consumed by animals and human beings. Additionally, plants with edible stems such as sugarcane are contaminated. This knowledge has replaced the use of organic fertilizers, application of residue fodders, and animals' waste. Increasing environmental challenges and creating solutions to curb these challenges by the application of inorganic substances is thus, cycled.

Western environmental knowledge also encourages the advancement of technology in the operation of the environment. These technologies are meant to ease the different works that would otherwise demand the high use of manpower. The operation of these machines leads to the contamination of the atmosphere due to the burning fuel that produces fumes. The link between neo-colonialism and this knowledge is overreliance on industrialized countries that manufacture these machines. Again, this creates a clear boundary of producers and consumers in the global market. Most common is the use of polythene bags for packaging. This product does not decay and its disposal on land or water is harmful to the environment, as it does not decompose making the land infertile. It also blocks the drainage systems and when burnt, leads to pollution of air.

Indigenous environmental knowledge is generated majorly based on the experiences of the community, and indigenous wisdom which is stockpiled in particular locations among a group that shares culture, traditions, practices, values, and beliefs as passed down through generations. Notably, this knowledge is intertwined with cultural beliefs and practices. Since culture differs from one group to another, different groups may bear different environmental knowledge suitable to curb their environmental challenges. Western environmental knowledge does claim belonging to a particular society where it exists as indigenous environmental knowledge. However, the exportation of this knowledge to other places mean that it is foreign due to its dislocation and that is a form of environmental knowledge neo-colonialism. Since every society generates their own environmental knowledge (indigenous) based on their own experiences, it is evident that environment is not uniform. For example, the causes of climate change in fast developing/industrialized countries may not be the same as that in a periphery country. An imported environmental knowledge may, therefore, benefit the originator of the idea instead of the community that embraces it, thus, effectiveness is not a guarantee.

In as much as knowledge translates to environmental actions and eventually environmental management, the Western environmental knowledge which is in the curriculum is decontextualized from the local settings. These are environmental content that learners may not relate to, thus, hindering its application. Non-application is also influenced by theoretical teaching and learning because practicability is stalled by the context. Which implies that foreign content may be hard to resonate with. Teaching of these foreign content aligns with the era of colonialism when European content and races were considered more "superior" than the black race, such that the foreign content are preferable over the national content. This is an aspect of neo-colonialism. Non-application also contradicts the literature which supports that environmental education, knowledge, awareness, and behavioral changes are the most important elements of solving environmental issues. Besides, environmental knowledge is the core and roots of understanding the implications of human behavior and actions on the environment, as it is a mode of shaping attitudes and behavior, for environmental protection.

Dissemination of Western environmental knowledge in English is evidence of colonial legacy in Uganda as this is inherited from the colonizers. This proves that language is not only an instrument of communication but of power as well. Before learners are introduced to Western environmental knowledge, they are introduced to the indigenous environmental knowledge. Disregarding the first language at a later stage is similar to the introduction of the new knowledge while disregarding other knowledge. This leads to a conflict between the different knowledge systems and languages. When not harmonized, it disapproves Western environmental knowledge being a supplement to indigenous environmental knowledge to achieve the same goal. It also creates a boundary between the literate and illiterate since English is majorly taught in schools, therefore, undermining concerted efforts towards environmental management.

Western environmental knowledge has been developed through series of conferences which include the 1965 conference at Keele University, Staffordshire, to include conservation in environmental knowledge. The 1965 meeting was organized by the International Union for Conservation of Nature and Education Commission of North West Europe to have environmental education in higher education, training, and land linked professions. Three years later, a United Nations Educational, Scientific and Cultural Organization (UNESCO) meeting called for the development of curriculum materials, eventually, planting Western environmental knowledge in formal education systems. In 1970, International Union for the Conservation of Nature and Natural Resources held a meeting on environmental education in the school curriculum in Nevada, United States of America, which led to the development and widespread school/formal based environmental knowledge. In 1977, the United Nations Educational, Scientific and Cultural Organization and United Nations Environment Program convened in the Union of Soviet Socialist Republics to provide framework, principles, and guidelines for environmental education at local, national, regional, and international levels. In the 1992 Rio de Janeiro Earth Summit organized by the United Nations, environmental knowledge was to incorporate development subjects. Most notably, was the Stockholm Conference of 1972, that became the first international document to recognize the rights of a healthy environment in 26 principles and spelled the responsibilities of man in ensuring the protection of

those rights. This conference is also known as the United Nations Conference on human environment. These conferences took place in the Western world, and even if organizations such as United Nations operates globally, some member countries have the veto power, implying that they bear extra power to cancel or postpone enactments. Thus, approval may mean it is advantageous for the authorizers.

CONCLUSIONS

Conclusively, there is existence of both indigenous and Western environmental knowledge. The former rely on the law of nature and the coexistence between human beings and the environment that are almost at par with each other. The latter introduces new concepts and practices of the environment to benefit human beings, thereby creating new laws that subject nature to benefit human beings. Notably, there is overarching reliance among the different environmental components for survival, indicating the need to use environmental resources for survival. However, over-exploitation of environmental resources sabotage mutual coexistence. This means that actions on the environment may not leave the environmental state static, rather cause dire consequences on nature and human beings. The objectives of these innovations may at times bear on an agenda of benefiting the trendsetters. The new environmental knowledge possesses the qualities of knowledge neo-colonialism influenced politically through the different Western conferences that established this knowledge.

Economically, there is reliance of African countries on foreign countries for the importation of knowledge, skills, and materials. Socially, there is cultural erosion in the African continent, adoption of other cultures and a sectioning of; superiority and inferiority, producers and consumers, donors and recipients. These are indicators that although Western environmental knowledge and practices are adopted to supplement indigenous environmental knowledge in order to sustain the environment and curb its challenges, it exists as a neo-colonial strategy which is a form of neo-colonialism. This knowledge is widespread globally; however, environmental knowledge and practices is not a one-size-fits-all concepts. This also applies to environmental justice as the cost and benefit of the environment may not be equally shared globally. It therefore calls for the complementarity and co-existence of existing environmental knowledge to suit the purpose.

Thus, adoption of this knowledge may not guarantee effective environmental management and different societies may diagnose their specifics environmental challenges, leading to corresponding measures. In the face of foreign contacts, international diplomatic relations and development, how Africa and the globe generate effective environmental management strategies without imposing control over another country may be another subject of discussion. This is because there is danger in bandwagon and dependency syndrome which may not be reversed.

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Ethical statement: The authors stated that, in accordance with institutional guidelines, formal ethical clearance from GUREC is not a mandatory requirement for undergraduate and Master's level research that does not involve vulnerable populations, medical procedures, or sensitive personal data, as is the case with this study. Nevertheless, the study was conducted in full adherence to established ethical principles. Permission to carry out the research was granted by the university through a letter of introduction issued by the Faculty Dean. Administrative approvals were obtained from Local Council 1 authorities in the communities where elders were interviewed, as well as from head teachers of the schools where teachers and students participated. The authors further stated that informed consent and assent were obtained from all participants, and strict measures were taken to ensure confidentiality and anonymity throughout the research process..

Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

REFERENCES

- Abidogun, J. M., & Falola, T. (2020). *The Palgrave handbook of African education and indigenous knowledge*. Palgrave Macmillan.
- Achebe, C. (1958). *Things fall apart*. Penguin Classics.
- Achebe, C. (1975). *Morning yet on creation day*. Heinemann.
- Akintunde, A. E. (2017). Theories and concepts for human behavior in environmental preservation. *Fortune Journal of Environmental Science and Public Health*, 1(2), 120-133. <https://www.doi.org/10.26502/jesph.96120012>
- Alidri, A. (2016). *Traditional wisdom in land use and resource management among the Lugbara of Uganda: A historical perspective* [Doctoral thesis, Makerere University]. <https://doi.org/10.1177/2158244016664562>
- Bala, A., & Joseph, G. G. (2007). Indigenous knowledge and western science: The possibility of dialogue. *Race & Class*, 49(1), 39-61. <https://doi.org/10.1177/0306396807080067>
- Brouwers, A., & Ber, L. E. (2020). *The neo-colonial Europeanisation of Africa* [Master's thesis, Uppsala University]. <https://doi.org/10.13140/RG.2.2.17108.63361>
- Crawford, G., Mai-Bornu, Z., & Landstrom, K. (2021). Decolonising knowledge production on Africa: Why it's still necessary and what can be done. *Journal of the British Academy*, 9(1), 21-46. <https://doi.org/10.5871/jba/009s1.021>

- Dutta, M. J., Thaker, J., & Sun, K. S. (2014). Neoliberalism, neoconialism, and communication for social change: A culture centered agenda for the social sciences. *Global Media Journal*.
- Ellen, R. (2000). Indigenous knowledge and the understanding of cultural cognition: The contribution of studies of environmental knowledge systems. In R. Ellen, P. Parkes, & A. Bicker (Eds.), *Indigenous environmental knowledge and its transformations: Critical anthropological perspectives* (pp. 406-407). The Gordon and Breach Publishing Group.
- Ezeanya-Esiobu, C. (2019). Indigenous knowledge and education in Africa. Springer. <https://doi.org/10.1007/978-981-13-6635-2>
- Gani, K. J., & Marshall, J. (2022). The impact of neocolonialism on policy and knowledge production in international relations. *Oxford Academic*, 98(1), 5-22. <https://doi.org/10.1093/ia/iab226>
- Greco, P. A. (2010). ADR and a smile: Neocolonialism and the West's newest export in Africa. *Pepperdine Libraries*, 10(3).
- Haag, D. (2011). Mechanisms of neocolonialism: Current French and British influence in Cameroon and Ghana. *SSRN*. <https://doi.org/10.2139/ssrn.2033138>
- Hansen, J. E., Sato, M., Leon Simons, L., Nazarenko, L. S., Sangha, I., Kharecha, P., Zachos, J. C., von Schuckmann, K., Loeb, N. G., Osman, M. B., Jin, Q., Tselioudis, G., Jeong, E., Lacis, A., Ruedy, R., Russell, G., Cao, J., & Li, J. (2023). Global warming in the pipeline. *Oxford Open Climate Change*, 3(1). <https://doi.org/10.1093/oxfclm/kgad008>
- Hotson, B., & Bell, S. (2023). Writing centers and neocolonialism. *The Writing Center Journal*, 41(3), 107-132. <https://doi.org/10.7771/2832-9414.2027>
- Jessen, T. D., Ban, N. C., Claxton, N. X., & Darimont, C. T. (2021). Contributions of indigenous knowledge to ecological and evolutionary understanding. *Frontiers in Ecology and the Environment*, 20(2), 93-101. <https://doi.org/10.1002/fee.2435>
- Kwahirai, V. C. (2007). Environmental history of Africa. *Encyclopedia of Life Support Systems*. http://www.unecefaoiuifro.lsu.edu/certificate_eccos/documents/2013Mar/ce13_03.pdf
- Latulippe, N., & Klenk, N. (2020). Moving room and moving over: Knowledge co-production, indigenous knowledge sovereignty and the politics of global environmental change decision-making. *Current Opinion in Environmental Sustainability*, 42, 7-14. <https://doi.org/10.1016/j.cosust.2019.10.010>
- Lawrence, M. & Laybourn-Langton, L. (2022). *Planet on fire: A manifesto for the age of environmental breakdown*. Verso.
- Le Grange, L. (2004). Western science and indigenous knowledge: Competing perspectives or complementary frameworks? *Sabinet African Journals*, 18(3), 82-91. <https://doi.org/10.4314/sajhe.v18i3.25482>
- Liu, P., Teng, M., & Han, C. (2020). How does environmental knowledge translate into pro-environmental behaviors? The mediating role of environmental attitudes and behavioural intention. *Science of the Total Environment*, 728, Article 138126. <https://doi.org/10.1016/j.scitotenv.2020.138126>
- Mazzocchi, F. (2018). Why "integrating" western science and indigenous knowledge is not an easy task: What lessons could be learned for the future of knowledge? *Journal of Futures Studies*, 22(3), 19-34. [https://doi.org/10.6531/JFS.2018.22\(3\).00A19](https://doi.org/10.6531/JFS.2018.22(3).00A19)
- Mburu, L. (2020). Knowledge creation: An imperative for Africa's decolonisation. *Afronomicslaw*. <https://www.afronomicslaw.org/print/pdf/node/1297>
- Mount, D., & O'Brien, S. (2013). Postcolonialism and the environment. In G. Huggan (Ed.), *The Oxford handbook of postcolonial studies* (1st ed., pp. 521-539). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199588251.013.0021>
- Mouton, M., & Burns, R. (2021). (Digital) neo-colonialism in the smart city. *Regional Studies*, 55(12), 1890-1901. <https://doi.org/10.1080/00343404.2021.1915974>
- Ndlovu, M. (2018). Coloniality of knowledge and the challenge of creating African futures. *Ufahamu: A Journal of African Studies*, 40(2). <https://doi.org/10.5070/F7402040944>
- Nguyen, M., Elliott, G. J., Terlouw, C., & Pilot, A. (2009). Neocolonialism in education: Cooperative learning in an Asian context. *Comparative Education*, 45(1), 109-130. <https://doi.org/10.1080/03050060802661428>
- Nkrumah, K. (1965). *Neo-colonialism, the last stage of imperialism*. International Publishers Co., Inc..
- Nkwocha, A. E. (2008). Neo-colonialism and the scandal of African poverty. *International Journal of Development and Management Review*, 3(1).
- Okpilike, F. (2012). Western education and the neglect of African cultural values in the Nigerian school system. *Journal of Education and Practice*, 3(14).
- Olivier, B. (2019). Decolonisation, identity, neo-colonialism and power. *The Scientific Electronic Library Online*, 20(1). <https://doi.org/10.25159/2413-3086/3065>
- Palmer, A. J. (1998). *Environmental education in the 21st century: Theory, practice, progress and promise*. Routledge.
- Palmer, J., & Neal, P. (1994). *The handbook of environmental education*. Routledge.
- Rahman, N. A. (2016). Knowledge, internal, and environmental factors on environmental care behavior among aboriginal students in Malaysia. *International Journal of Environmental and Science Education*, 11(12).
- Semali, L. M., & Kincheloe, J. L. (1999). What is indigenous knowledge and why should we study it? In L. M. Semali, & J. L. Kincheloe (Eds.), *What is indigenous knowledge? Voices from the academy* (1st ed., pp. 3-58). Falmer Press.
- Spivak, C. G. (1991). Neocolonialism and the secret agent of knowledge. *Edinburgh University Press*, 13(1/2), 220-251. <https://doi.org/10.3366/olr.1991.010>

- Stevenson, R. B., Brody, M., Dillon, J., & Wals, A. E. J. (2013). An orientation to environmental education and the handbook. In R. B. Stevenson, M. Brody, J. Dillon, & A. E. J. Wals (Eds.), *International handbook of research on environmental education* (1st ed., pp. 1-18). Routledge. <https://doi.org/10.4324/9780203813331-7>
- Thornton, F. T., & Bhagwat, S. A. (2021). *The Routledge handbook of indigenous environmental knowledge* (1st ed.). Routledge. <https://doi.org/10.4324/9781315270845-1>
- Vogt, K. A., De Abreu, S., & Blancas, M. (2023). Indigenous holistic storytelling to teach environmental science. *Scientia Global*. <https://doi.org/10.33548/SCIENTIA870>
- Wa Thiong'o, N. (1986). *Decolonising the mind: The politics of language in African literature*. Zimbabwe Publishing House.
- Wijesinghe, S. N. R., Mura, P., & Bouchon, F. (2017). Tourism knowledge and neocolonialism—A systematic critical review of the literature. *Current Issues in Tourism*, 22(11), 1263-1279. <https://doi.org/10.1080/13683500.2017.1402871>
- Yalkin, C., & Özbilgin, F. M. (2022). Neo-colonial hierarchies of knowledge in marketing: Toxic field and illusio. *Marketing Theory*, 22(2), 191-209. <https://doi.org/10.1177/14705931221075369>
- Zedler, J. B., & Stevens, M. L. (2018). Western and traditional ecological knowledge in eco cultural restoration. *San Francisco Estuary and Watershed Science*, 16(3). <https://doi.org/10.15447/sfews.2018v16iss3art2>
- Ziai, A. (2020). Neocolonialism in the globalised economy of the 21st century: An overview. *Momentum Quarterly*, 9(3), 128-140. <https://doi.org/10.15203/momentumquarterly.vol9.no3.p128-140>

APPENDIX

Documents Reviewed for this Study

- National Curriculum Development Center. (2008a). *Agriculture teaching syllabus: Uganda certificate of education*. National Curriculum Development Center.
- National Curriculum Development Center. (2008b). *Biology teaching syllabus: Uganda certificate of education*. National Curriculum Development Center.
- National Curriculum Development Center. (2008c). *Geography teaching syllabus: Uganda certificate of education*. National Curriculum Development Center.
- National Curriculum Development Center. (2019a). *Agriculture syllabus: Lower secondary curriculum*. National Curriculum Development Center.
- National Curriculum Development Center. (2019b). *Biology syllabus: Lower secondary curriculum*. National Curriculum Development Center.
- National Curriculum Development Center. (2019c). *Geography syllabus: Lower secondary curriculum*. National Curriculum Development Center.