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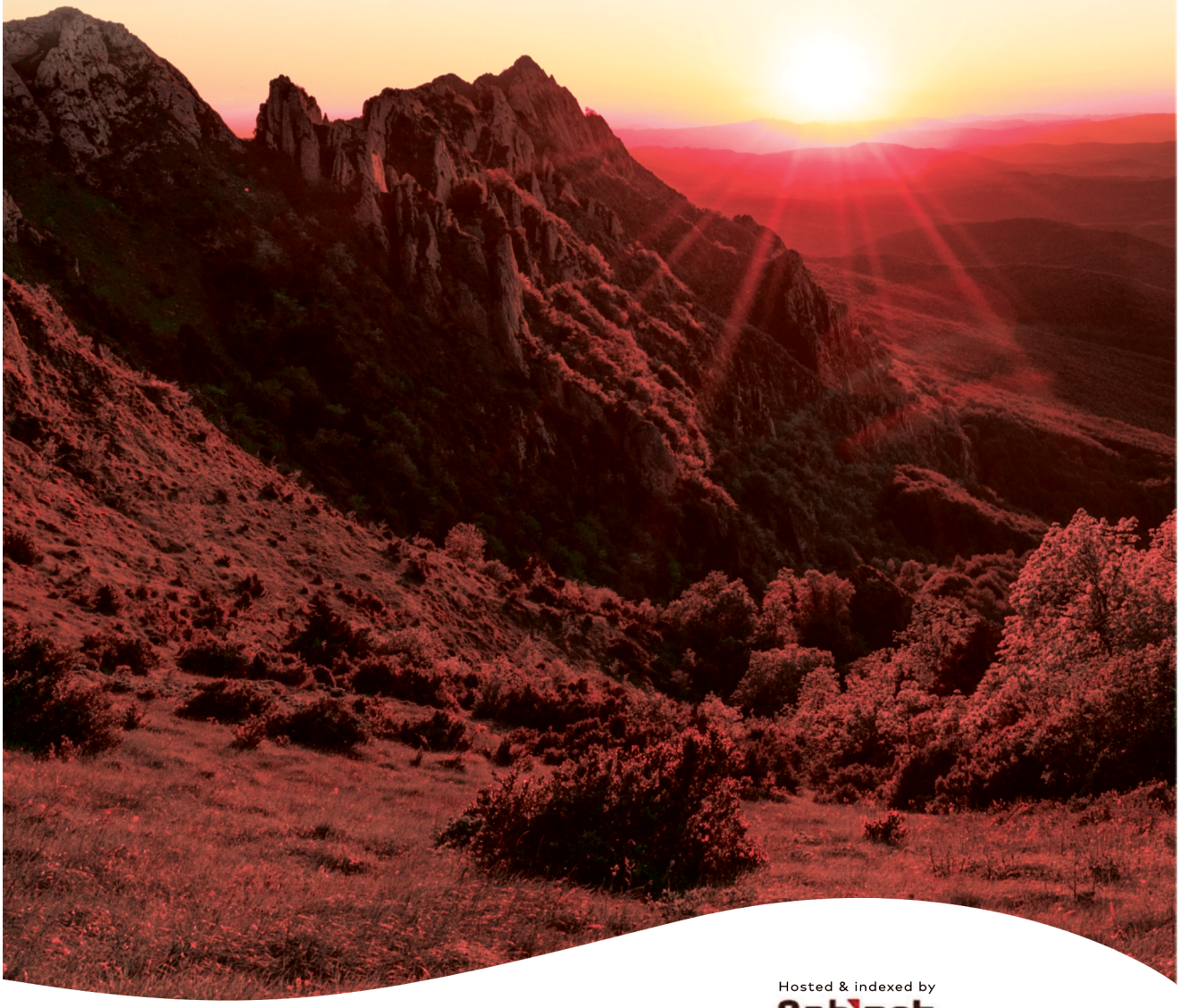

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Decolonising the teaching of weather and climate-related disasters through secondary school Geography: Lessons from Zimbabwe.

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Abstract

This paper explores how education on weather and climate-related disasters can be made more relevant to indigenous communities in Zimbabwe by moving beyond the prevailing Western pedagogical framework. This reorientation is critical, as the majority of hazards and resultant disasters affecting Zimbabwe are climate-related. Consequently, effective disaster prediction, adaptation, and mitigation are essential components of education. The study addresses four key research questions: (1) What is the role of Indigenous Knowledge Systems (IKS) within scientific discourse? (2) How is indigenous knowledge incorporated into official geography syllabuses? (3) To what extent is indigenous knowledge applicable to the explanation of geographical phenomena, particularly those linked to weather and climate disasters? (4) How can indigenous knowledge be meaningfully integrated into the Zimbabwean geography curriculum? The paper recommends the infusion of IKS into the curriculum and advocates for the dissemination of such knowledge from schools to communities through the Outcome Mapping (OM) strategy. This approach aligns with Zimbabwe's broader objective of establishing a relevant, heritage-based education system.

Key words: hazards, decolonisation, disasters, Indigenous Knowledge Systems, Outcome Mapping, climate change

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Introduction

Zimbabwe's formal education system has retained a predominantly Western orientation, having been shaped by missionary initiatives from the 1890s and later formalised under colonial governance up to 1979. During the colonial period, formal education for indigenous Africans was largely confined to mission stations, whereas settler education was state-controlled. Following independence in 1980, a unified education system was introduced, governed by the same Act of Parliament and curriculum framework. Learners are now able to sit for either locally administered national examinations by the Zimbabwe School Examinations Council (ZIMSEC) or externally administered assessments such as those from Cambridge International Examinations (CIE) or the University of London. However, regardless of the examination board chosen, the curriculum has remained fundamentally Eurocentric.

This paper explores potential strategies for decolonising the teaching, for instance, of weather and climate in Zimbabwe's secondary schools through the integration of Afrocentric approaches in geographical education. This process involves recognising and incorporating diverse indigenous perspectives and knowledge systems, particularly those of marginalised groups whose cultural heritage and worldviews are typically omitted by curriculum designers and textbook authors. While a comprehensive deconstruction of colonial influences on environmental knowledge lies beyond the scope of this paper, it is nonetheless essential to interrogate the enduring legacies of colonial power structures that shape our understanding of the natural world.

Indigenous communities possess extensive ecological knowledge, derived from generations of close interaction with their environments. This accumulated wisdom represents a rich educational resource, particularly in the teaching of weather and climate. However, colonial legacies have marginalised this knowledge through selective or non-inclusive language, perpetuating stereotypes and reinforcing Eurocentric educational dominance. The use of inclusive language is therefore vital to dismantling these legacies and advancing epistemic justice.

Climate change, central to studies of weather and climate, is far from a neutral phenomenon. It disproportionately affects marginalised communities, making them the most vulnerable to its impacts. As such, it is crucial that teaching about climate change reflects the lived realities of these communities. Lessons should

be delivered in learners' own languages, incorporating indigenous knowledge and locally relevant examples. Indigenous Knowledge Systems (IKS) are increasingly recognised as a legitimate alternative paradigm for understanding reality (Mapira & Mazambara, 2013).

There is an urgent need to employ local models and epistemologies in geography education, particularly as geography is currently classified as a science subject under Zimbabwe's Competency-Based Curriculum (CBC).

This classification aligns it with traditionally Western science subjects, despite the existence of rich, albeit undocumented, scientific knowledge and practices within Zimbabwean communities. Although curriculum reviews occur periodically, the geography curriculum continues to reflect a Eurocentric bias, both in content and pedagogy. Indigenous knowledge remains undervalued, despite its demonstrated efficacy in predicting and responding to weather and climate-related disasters, as evidenced through oral traditions and local geographical knowledge.

Unpacking the concepts '*Decolonisation*', '*Heritage Based Education*', weather and other climate related disasters

Decolonising geography education necessitates a shift from dominant Eurocentric paradigms towards models grounded in local heritage, knowledge systems, and lived experiences. According to McGregor and Park (2019), decolonisation is a process that challenges the Eurocentric mindset by exposing its systematic exclusion of indigenous theories and scholars. This exclusion has historically denied indigenous knowledge, practices, and resources equal status with colonial epistemologies. Curriculum decolonisation enables the inclusion of historically marginalised knowledge systems into formal education (Chimbunde & Kgari-Masondo, 2021).

In the Zimbabwean context, decolonising education cannot be discussed meaningfully without reference to Heritage-Based Education (HBE) and, by extension, the African philosophical principle of *Ubuntu*. HBE offers a framework that emphasises the integration of indigenous knowledge, cultural heritage, and local environments into teaching, particularly in geography. *Ubuntu*, a philosophy rooted in African communalism, is described by Khoza (2018) as encompassing shared networks, norms, values, and understandings that foster collective identity and cooperation. Within the HBE curriculum, *Ubuntu* is central to how knowledge is defined, transmitted, and valued, reinforcing the notion that knowledge is a social construct. Chimbunde and Kgari-Masondo

(2020) summarise this by highlighting that *Ubuntu* is grounded in concepts such as sharing, collaboration, group cohesion, and communitarianism.

Unsurprisingly, Zimbabwe's introduction of the Heritage-Based Curriculum (HBC) in 2024 seeks to prepare learners for active citizenship by fostering appreciation for the philosophical tenets of *unhu/ubuntu* and by preserving the cultural, historical, and traditional knowledge systems of the country (Chitamba & Chitamba, 2025).

Against this backdrop, the geography curriculum plays a vital role in utilising indigenous knowledge to support societal adaptation to climate-induced disasters, which have increased in both frequency and intensity due to global climate change. This article, therefore, presents arguments for decolonising geography education through HBE, situating geography as a subject capable of advancing community resilience and environmental stewardship.

Climate change is not only a key thematic concern in geography but also a cross-cutting issue across all levels of education in Zimbabwe. Eight core cross-cutting themes span the entire curriculum, from primary to advanced level, and include:

- *Environmental issues*
- *Safety and health*
- *Disaster risk management*
- *Enterprise*
- *Sexuality, HIV and AIDS*
- *Heritage*
- *Climate change*
- *Financial literacy*

Of these, *environmental issues*, *disaster risk management*, and *climate change* are most directly addressed through geography education. Every geographical environment possesses its own set of climate-related hazards which may develop into risks when certain socio-environmental conditions prevail.

A *hazard* is defined as any event or phenomenon with the potential to cause harm to people, property, or the environment (ISDR, 2010; Roos et al., 2010). Weather- and climate-related hazards include floods, droughts, snowfalls, and lightning, among others. However, hazards can also be biological, chemical, or technological in origin. Wisner et al. (2014a) further classify hazards by location,

intensity, frequency, and probability. Risk, therefore, refers to the likelihood of a hazard occurring and the severity of its potential impact (Haimes, 2009).

Importantly, when a hazard causes significant disruption to the functioning of a community and exceeds its capacity to respond using its own resources, it becomes a *disaster* (IFRC, 2016). It is important to clarify that the term *natural disaster* is a misnomer (Benson, Twigg, & Myers, 2001; Blaikie et al.,1994), disasters are not natural but the result of pre-existing vulnerabilities. In teaching weather and climate, it is, thus, essential to focus on common weather-related disasters such as floods, droughts, veld fires, lightning, and pest infestations.

Disasters, according to the IFRC (2016), are fundamentally a function of community vulnerability and lack of capacity to withstand or recover from hazards. This understanding aligns with broader frameworks that include concepts such as *vulnerability* and *resilience*, both of which are crucial to disaster risk reduction education (Abarquez & Murshed, 2004).

Possible strategies to decolonise the teaching of weather and climate-related disasters.

Indigenous communities have long developed diverse strategies for adapting to climate change, with these approaches varying across time and local contexts. Teaching these traditional adaptation strategies enables learners to appreciate the resilience, innovation, and resourcefulness that characterise indigenous responses to environmental challenges. Students often gain deeper insights when they engage directly with members of indigenous communities, who can serve as primary sources of knowledge. Inviting such individuals to participate as resource persons in classroom activities can enrich geography lessons, offering students first-hand perspectives on local environmental changes and traditional coping mechanisms.

This engagement not only enhances students' understanding but also fosters a reciprocal and respectful relationship between schools and the communities they serve. However, it is essential to recognise that decolonising the teaching of weather and climate, particularly in relation to climate-induced disasters, is not a one-off initiative. Rather, it is an ongoing, iterative process that requires educators to remain open-minded, critically reflective, and willing to question entrenched conceptual frameworks often perpetuated through imported textbooks and curricula.

Methodology

This qualitative research was guided by the constructivist - interpretivist paradigm and was meant to understand the possible role of IKSs in explaining geographical concepts as an alternative view to what has always been regarded as scientific. Policy and official documents from the public domain were analysed to understand how IKSs were accommodated, and these official documents included the Education Act, Geography 'O' and 'A' level syllabuses, the Zimbabwe curriculum framework, as well as textbooks. Research questions guiding the study, among others, involve what the place of indigenous knowledge systems in science is, how indigenous knowledge systems are included in the official geography syllabuses, and to what extent is indigenous knowledge relevant in explaining geographical concepts particularly disasters related to weather and climate? Further, how can indigenous knowledge systems be infused or integrated in the Zimbabwean Geography curriculum?

Indigenous Knowledge Systems (IKSs) and the school curriculum

A recurring question in curriculum development is why Disaster Risk Management (DRM) was incorporated as a cross-cutting theme across all educational levels in Zimbabwe. Several compelling reasons justify its inclusion. Foremost among these is the role of the school as the most influential socialising agent after the home. While the home shapes early behaviour and values, it does so in varied ways, depending on family background.

Schools, on the other hand, provide a common platform for standardising knowledge acquisition and behavioural norms. This standardisation is critical for ensuring a consistent understanding of disasters and enables the systematic development of climate adaptation and mitigation strategies, particularly important in Zimbabwe, where school-aged children represent a significant proportion of the population. This is in line with UNICEF Zimbabwe (2023)'s official manual on Disaster Risk Management and Resilience in Schools which views schools as key sites for standardizing DRM knowledge, building capacity, coordinating stakeholders, and inculcating resilience skills in learners and communities.

Secondly, children are among the most vulnerable groups during disasters, alongside women and persons with disabilities (Lunga et al 2019). Disasters affect children not only directly through physical harm but also indirectly through trauma and disruption to their learning environments. For example, floods caused by cyclones often damage schools or lead to their conversion into

temporary shelters. Furthermore, children lack the legal agency, psychological readiness, and material resources to respond effectively during crises. Education, therefore, equips them with vital life skills, fosters resilience, and empowers them to cope with, and recover from, adverse events, both in the present and later in life.

The geography curriculum in Zimbabwe already covers weather and climate, along with the mitigation of associated hazards. It enables learners to understand and predict hazards based on their spatial and temporal occurrence. However, it also teaches that while some disasters can be anticipated, their occurrence cannot always be prevented. The educational focus then becomes how to reduce damage and facilitate recovery. Despite these strengths, the curriculum and textbooks predominantly rely on multi-dimensional scientific forecasting models, with minimal inclusion of local perspectives or traditional forecasting systems used by indigenous communities.

This gap underscores the need for IKS to offer context-specific insights into local weather variability and environmental cues, helping students relate abstract concepts to their lived experiences. Integrating IKS into the geography curriculum provide learners with a more holistic understanding of climate systems, enhance community adaptation strategies, and foster resilience to climate-induced disasters.

Traditional climate prediction methods offer notable examples of this knowledge. Indigenous communities often observe seasonal temperature patterns, wind direction shifts, and correlations with rainfall. In Zimbabwe, for instance, it is widely recognised among elders that when strong north-westerly winds alternate with south-easterly winds every two to three days between mid-October and early January, rainfall is imminent. Conversely, infrequent or absent wind patterns may signal a drought. Although traditional explanations lack scientific terminology (e.g., the interaction of the Inter-Tropical Convergence Zone and thermal equator), the empirical accuracy of such observations is notable.

Animal behaviour also serves as a predictive tool. For example, when birds nest higher in trees, it is often considered a sign of forthcoming floods; lower nesting predicts drought. Among the Shona people, the frequent call of the *Haya* (Jacobin Cuckoo) signifies an upcoming season of above-average rainfall. Similarly, the appearance of *Ndororo* (Mole Crickets) far from wetlands indicates impending floods. Additionally, fruiting patterns of indigenous trees such as *mazhanje* (wild

loquat), *matamba* (snot apple), and *hute* have long been used to anticipate rainfall levels. Despite their continued relevance, such indigenous practices are neither formally documented nor included in geography instruction, diminishing the relevance and applicability of the current curriculum.

Outcome Mapping as a Strategy for Decolonising Disaster Education

Outcome Mapping (OM) provides a structured and participatory framework for integrating IKS into the teaching of weather- and climate-related disasters. As proposed by Earl, Carden, & Smutylo (2001), OM conceptualises change through a logical progression from inputs and activities to outcomes and long-term impact. Applied to curriculum reform, OM encourages clear planning around four guiding questions:

i) *Why is indigenous knowledge being integrated?*
ii) *Who are the stakeholders or "boundary partners"?*
iii) *What outcomes indicate progress?*
iv) *How will the implementation be carried out?*

In OM terminology, stakeholders are referred to as *boundary partners*, whose involvement varies by level of control and influence. These relationships can be illustrated using nested concentric circles (see Figure. 1), adapted from the Outcome Mapping framework.

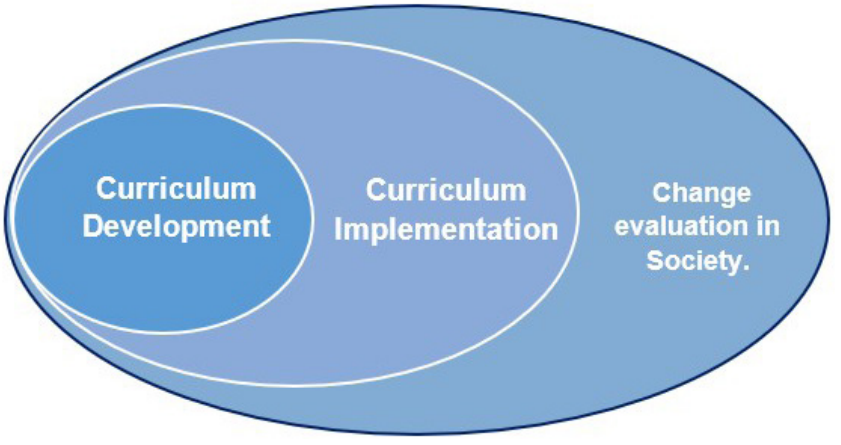

Figure 1: Boundary Partner Influence Model

(Adapted from Earl, Carden, & Smutylo, 2001 p.42)

In the educational context, curriculum developers have direct control over syllabus content and structure. They are accountable to policymakers (e.g.,

politicians) and interact closely with teachers, who implement the curriculum in classrooms. Teachers, in turn, adjust implementation based on institutional, pedagogical, and community-specific factors. Through learners, teachers exert direct influence on the broader community. Consequently, while developers have indirect influence on the public, they indirectly affect knowledge systems such as agricultural planning and local weather preparedness. Figure 2 represents these dynamics in terms of influence and control.

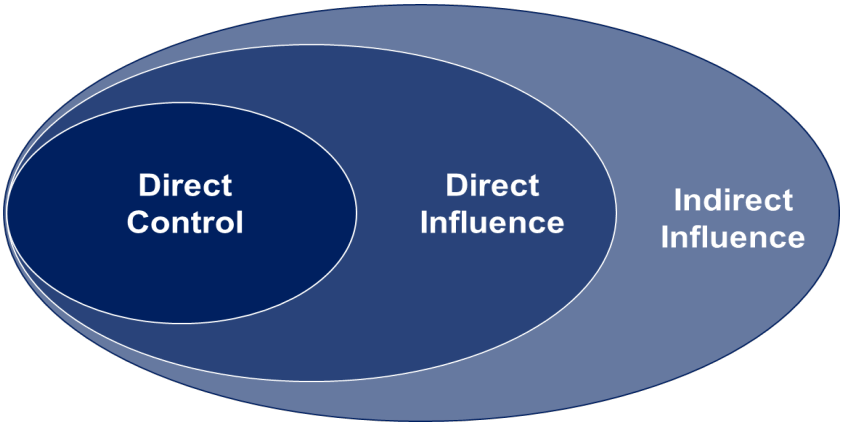

Figure 2: Levels of control by boundary partners

(Adapted from Earl, Carden, & Smutylo, 2001 p.42)

The framework (Figure 2) highlights how schools can directly influence learners, curriculum, and pedagogy, offering a critical opportunity to introduce IKS meaningfully. Though teachers operate under curricular guidelines, they are positioned to make strategic pedagogical decisions. However, IKS is often excluded from both pre-service teacher education and in-service training, largely due to claims that it lacks scientific rigour. Nevertheless, it is precisely within this *sphere of direct control*, the school, that the most substantial gains in decolonisation can occur.

Moreover, schools hold direct influence over learners' parents and guardians. Learners can share heritage-based knowledge acquired at school with their families, who may then transmit it more broadly within the community. This domino effect facilitates cascading knowledge flows, enabling skills and resilience strategies to move from schools to homes and into wider society. Ultimately, educators influence classroom knowledge, socialisation in the home, and disaster preparedness in the community, making school-based decolonisation central to sustainable disaster risk education.

Possible challenges associated with the incorporation of IK into HBE Geography Curriculum.

The Heritage-Based Curriculum HBC) was introduced in 2024, replacing the Competences-Based Curriculum (CBC) that had earlier been introduced in 2015. Thus, it could be speculation if one were to discuss associated challenges. Nevertheless, structural and implementation challenges are still evident. Firstly, there is perceived lack of scientific rigour within IK. Its content and skills are more qualitative, unmeasurable and unstandardised such that replication is not possible. IK varies with communities hence what can be important in one community may not necessarily be important in the other. This position is affirmed by Battiste, (2019), who discusses disagreements between scientific or western academic structures and Indigenous epistemologies saying that IK prioritizes holistic, spiritual, and place-based understanding, whereas Western geography emphasises quantifiable data and universality. Thus, IK does have spatial and temporal variations hence its lack of appeal. This could also make HBE questionable.

Secondly, a localised curriculum as it were, has challenges associated with Teacher Education and resource allocation. Many educators lack training in IK methodologies, cultural protocols, or local Indigenous contexts, leading to misrepresentation or avoidance. In multicultural settings of which many Zimbabwean schools are like, teachers may struggle to equally represent multiple IK traditions. In addition, in Zimbabwe, there has been lack of coordination between the Ministry of Primary and Secondary Education, and the Ministry of Higher Education Science and Technology Development. Teachers are trained by the Ministry of Higher Education but are employed by the Ministry of Primary and Secondary Education. In other words, one ministry should train teachers that will fit into the expectations of another ministry. The interesting aspect is that the school curriculum has often been changed first without such changes being implemented in the ministry that train teachers. This misnomer has resulted in the production of newly qualified teachers who cannot handle the new curriculum well. This is true of both the CBC and the HBC which ironically, where launched in rapid succession such that some stakeholders like book publishers were caught unawares. Thus, this had an impact on resources availability.

Thirdly, Sundberg, (2014) points out to another negative aspect associated with incorporation of IK into the curriculum, which is that of curriculum overload or

lack of curriculum space. A crowded curricula may force IK to be infused in to syllabus topics rather than have its own core content, and thus this marginalizes its significance. This could be the reason why there is no concerted effort to make IK more visible in Geography syllabuses. The unique and localised nature of IK also affirm that resources cannot be standardised and mass produced hence making the whole process fragmented and expensive. Lastly, HBE needs specialised assessment procedures something which may not be possible due to its uniqueness and specialist skills needed. IK is often oral, experiential, and community-specific thus making it difficult to assess using conventional examination techniques or rubrics. Simpson, (2017). By its nature, lack of standardised assessment inhibits group performance comparison, year on year performance comparison and comparison by exam centres.

Conclusion

Despite this article being more of an opinion paper, it brought out the several observations. Although indigenous knowledge is not a hard science, it is relevant to society's adaptation to certain weather hazards and climate induced disasters. Knowledge is experiential but what is lacking is documenting those experiences so a permanent record is available for future reference. Traditional societies have always been adapting and surviving climate induced disasters such that the disasters are now regarded as a normal occurrence. Secondly, the concept of HBE is slowly leading to the acceptance of indigenous knowledge systems included in the official geography syllabuses? HBE is education for service and survival and not education for employment, thus it quite relevant if Zimbabweans are to innovate and industrialise.

What also came out is that indigenous knowledge quite capable and relevant in explaining geographical concepts particularly disasters related to weather and climate. There are traditional signs that signify the start or end of the rainy season, convergence of air masses, early warning systems for imminent dangers like droughts and floods etc. Though these processes lack scientific names, they equally made weather forecasting accurate, and reliable over the decades. Lastly, if IK is to be successfully incorporated in to the school geography curriculum, then there is a need of a wholesome approach which addresses curriculum planning, resource mobilisation, teacher education and teacher continuous improvement programmes, assessment procedures and stakeholder engagement such as engaging professional geographers' associations. Currently it is not clear as to what extent they are involved in curriculum development.

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