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Environmental risk in Geography schooling in Namibia: Curriculum and classroom representations

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How to cite this article: Zokka H.K. and Schudel I. (2026). Environmental risk in Geography schooling in Namibia: Curriculum and classroom representations, *Journal of Geography Education in Africa*, 9, 139-149. <https://doi.org/10.46622/jogea.v9i.7001>

Article history: 26 February 2026 | Accepted 28 July 2026 | Published 25 August 2026

ABSTRACT

This paper examines how environmental risks are presented in the Namibian Grade 9 Geography syllabus and represented by teachers' perceptions in classroom practice. Guided by an interpretive qualitative approach and informed by Beck's theory of risk society, the study focuses on socioecological framings, scientific and social rationality, and the treatment of local-to-global environmental issues. Data were generated through syllabus document analysis, focus group discussions with three Geography teachers, and classroom observations. Results indicate that while environmental risks are clearly identified in both curriculum and teaching practice, they are frequently represented through simplified cause-and-effect explanations that privilege generalised scientific explanations and factual recall. Social dimensions of risk and global interconnections tend to remain implicit, and classroom representations may involve conceptual inaccuracies or limited opportunities for critical engagement. This paper argues that these patterns reflect how environmental risk is pedagogically represented within practical demands of curriculum coverage and classroom teaching.

Keywords: Curriculum representation, Environmental risk, Geography syllabus, Risk society, Socioecological perspectives.



INTRODUCTION

Over the past three decades, consideration of environmental risks has dominated global agendas (Dunlap & Jorgenson, 2012; Kimaro, 2017; Duodu, 2018), with evidence of rapid environmental decline driven by human activities (Mmekwa & Schudel, 2021; Schudel et al., 2021). As a result, the deteriorating environment has resulted in risks such as poor human health, higher food insecurity, natural disasters, climate change, biodiversity loss, and environmental pollution (Conceição, 2022). Environmental issues in Namibia pose a serious threat to people, animals and plants (NPC, 2004). These issues include land degradation, destruction of woodland, desertification, population growth, land-use conflicts, pollution, water scarcity, declining natural resources, overstocking, overgrazing, and bush encroachment (Ruppel & Ruppel-Schlichting, 2011). Traditionally, the environment in Namibia was focused on the beauty of nature, but now it is understood to include nature, people and their impacts (MoE, 2009; Ruppel & Ruppel-Schlichting, 2011). In detail, MBEC (2005) and the Ministry of Education (MoE, 2009) identify four dimensions of environmental issues in Namibia, which are: (1) biophysical (nature as living resources and life support systems); (2) social (how and where people change the environment); (3) economic (where resource use provides economic value and impact); and (4) political (who decides how resources are used) (see Kanyimba, 2009). Considering these environmental risks, educational policymakers and curriculum developers are playing active roles in bringing these critical issues into the school curriculum.

In Namibia, environmental sustainability was established as a principle of state policy through Article 95(l) of the Constitution, which calls for the maintenance of ecosystems, essential ecological processes and biological diversity, and the sustainable use of living natural resources for present and future generations. This subsequently informed the integration of environmental education into the school curriculum (NEEN, 2004; MBEC, 2005). The school Geography syllabus positions environmental learning as a cross-curricular theme, reinforced through inquiry-driven and competency-based approaches (MoE, 2009; MEAC, 2016). However, the framing of environmental risk, its causes, scales and social dimensions, has not been systematically analysed in Geography education. The study aims to investigate (1) how environmental risks are presented in the Grade 9 Geography syllabus in Namibia; and (2) how teachers perceive and represent environmental risks in classroom practice.

FEATURES OF RISK SOCIETY IN RELATION TO ENVIRONMENTAL RISKS

Beck's (1992) theory of risk society provides the conceptual lens for this study, highlighting how modernisation and human activity generate complex, socially constructed environmental risks. This framework is applied to examine how the Grade 9 Geography syllabus and teachers construct and communicate environmental risks. The three analytical dimensions examined are: (a) risks as socioecological challenge; (b) risks assessed through scientific and social rationality; and (c) risks as border-crossing/global in scope.

Beck (1992, 2012) argues that environmental risks affect ecological, social, political, and economic spheres simultaneously (cf. Hattingh, 2004; Wimmer & Quandt, 2006; Rantanen, 2015). Climate change, for example, disrupts ecosystems, undermines political stability, threatens economic livelihoods, and impacts social well-being. This underscores that environmental risks are not merely problems of nature but social problems, inseparable from human actions and institutions.

In Beck's (1992) account, scientific rationality is associated with technical and expert assessments of risk, while social rationality concerns the questions, experiences, values and political concerns through which risks acquire social significance. While science provides data on issues such as ozone depletion or toxic waste (Pietrocola et al., 2021), its authority has been increasingly contested. Industrial risks expose the limits of scientific knowledge, creating uncertainties and 'boomerang effects' in which risks eventually affect those who generate them (Beck, 1992; Cooper & Bulmer, 2013). For Geography education, this balance is critical, as teachers must integrate factual content with learners' social contexts to foster meaningful engagement with environmental risks.

Environmental risks transcend national boundaries, cutting across local and global contexts. Beck (1992, 2006) illustrates this with the metaphor of smog that cannot be contained by a garden fence. Problems such as climate change, air pollution and biodiversity loss are global in origin and consequence (Mythen, 2004; Korstanje, 2009). Beck (1992, 2006) examined how transboundary risks become constitutive of social life and challenge nationally bounded ways of understanding environmental problems. For instance, climate-induced droughts in Africa contribute to global food insecurity, demonstrating how risks produced in one region reverberate worldwide. This thinking underscores the need for Geography education to address environmental risks as interconnected global challenges rather than isolated local issues. Together, these three dimensions provide the analytical lens through which the syllabus and classroom cases are examined. By applying Beck's theory of risk society, the study situates Namibian curriculum practices within broader debates on complexity, uncertainty and global interdependence (see also Giddens, 2000).

RESEARCH DESIGN

The Geography syllabus in Namibia makes provision for the teaching of environmental problems (MEAC, 2016, p. 3), where learners are expected to 'investigate the reasons for the deterioration of the environment and suggest possible solutions' (MEAC, 2016, p. 23). Grade 9 was selected for analysis because its Ecology theme provides the syllabus's most explicit treatment of environmental risk, requiring learners to investigate environmental deterioration and examine their causes, effects and possible solutions. A qualitative interpretivist design was used to explore how teachers interpret and represent environmental risk in classroom contexts. This approach can examine how curriculum content, pedagogical practices, and institutional policies are constructed, negotiated, and made meaningful within specific settings (Lincoln & Guba, 1985; Cohen et al., 2002).

This study draws on curriculum analysis together with empirical data generated through a focus group discussion and classroom observations. The revised MEAC (2016) Grade 8–9 Geography syllabus was analysed to examine how environmental risks are represented. Participants were three purposively selected Grade 9 Geography teachers from different schools in the Rundu circuit, serving predominantly rural and peri-urban communities. Rundu is the region capital and the largest city of the Kavango-East Region in northern Namibia. The teachers participated in a focus group discussion that explored their understandings of environmental risks and how these are represented in their teaching. With consent, the focus group discussion was audio-recorded and transcribed for content analysis. Each teacher was subsequently observed teaching two Geography lessons, with observations focused on teachers' explanations, learners' responses, classroom interactions and the use of learning tools such as worksheets. Lessons were audio-recorded and transcribed for analysis.

Ethics clearance for this study was granted by the Rhodes University Higher Degrees Committee. Permission was obtained from relevant education authorities and school principals. Teachers provided informed consent, and learners gave assent to the classroom observations. All personal identifying information was removed.

RESULTS

Environmental risks as socioecological issues

The syllabus identifies socioecological issues as a focus area for understanding environmental risks. This is evident in the syllabus definition of Geography as concerned with human and planet interdependence, by encouraging learners to 'appreciate the potentials and limitations of the physical environment for human activities. It also encourages learners to appreciate how human activities can lead to environmental problems and improvements' (MEAC, 2016, p. 2). This is reflected in the assessment objectives stated in the curriculum. The syllabus also promotes the teaching of environmental risks under learning content. In the focus group discussion, teachers connected the social and ecological dimensions of problems within the Ecology theme, suggesting an emerging socioecological understanding of environmental risk. For example:

'Environmental problems are caused by the poor relationship human beings create with the environment, by destroying the environment for their own benefits. As a result, they create problem on environments. Any ecological problem human beings created on the environment it also affects human beings.' (Teacher 1)

'Environmental problems are the problems that are created by human beings as they harvest the environment to benefit themselves. Then we end up overusing or trying to pollute the environment. [For example] water pollution or air pollution.' (Teacher 2)

In Lesson 1, Teacher 1 presented mining as a sector of the Namibian economy and explained socioecological links with respect to how mining contributes to environmental problems by depositing waste materials. The teacher further pointed out that this problem also affects the tourism sector. In Lesson 2, Teacher 1 similarly presented environmental risks as socioecological in nature through the examples of agricultural activities, burning of trees to make charcoal, logging of trees, road construction and construction of stadia. With respect to the use of medicinal plants, Teacher 1 said:

'If most of the trees are cut down and we know that some of trees provide medicine. If these trees get extinct at that specific area, then we are going to lose that specific medicine in our area, unless we go to the next village or we travel a certain distance in order to get those trees and take it to make medicine.'

Teacher 2, in both lessons on the same topic, used a worksheet for learners to identify the cause of deforestation and the effects of rapid population growth on the environment. Items listed by learners included soil erosion, deforestation, depletion of natural resources, overgrazing, overcrowding and bush encroachment, littering and desertification. This activity illustrates how environmental risk can be represented through the exploration of interacting social and ecological factors.

Environmental risks presented using social and/or scientific rationality

The syllabus encourages the assessment of environmental risks using both social and scientific rationality including 'promoting scientific knowledge about physical, environmental and human processes which form the basis for cross-curricular education' (MEAC, 2016, p. 1). Teachers acknowledged the presentation of environmental risks as assessed through scientific rationality in the Geography syllabus, and the challenges they face in using this approach to discuss environmental problems. For example, a teacher in the focus group noted:

'It is always challenging to explain some of environmental problems to learners which require a language of science to make learners understand it better. For example, when teaching global warming to learners particularly as this topic requires a scientific explanation of the phenomenon.' (Teacher 1)

Another teacher said:

'Some scientific explanations are problematic because you cannot relate them directly through experience. This is when we talk about global warming and ozone layer you just talk it in general but you cannot show it to the learners in reality.' (Teacher 2)

Teacher 1 in Lesson 1 relied on scientific rationality when discussing the environmental effects of pesticides:

'Pesticides used in agriculture have a further effect on fish and people who eat these fish, once it is washed in the river by rainwater. Human beings need some

scientific knowledge to understand how some chemical which they use in one part of their life ends up causing other effects in other aspect of their life.'

Likewise, on the same topic, Teacher 2 said:

'Due to overpopulation people use soap to wash their clothes in the river. Soap contains some chemical which causes water pollution. As a result, fish in the river will die. When people drink this contaminated water, they will become sick.'

In Lesson 1, Teacher 3 used scientific rationality to explain the greenhouse effect:

'Once the heat is trapped it will be kept between the earth surface and the atmosphere and the temperature in the atmosphere will increase and this is what the scientists call global warming.'

Environmental problems presented as local and/or global phenomena

A characteristic of Beck's theory of a risk society is the understanding that risks are no longer tied to their places of origin. The Grade 9 Geography syllabus acknowledges local diversity in which Geography raises 'awareness of the contrasting opportunities and constraints of people living in different places and under different physical and human conditions' and 'the increasing level of global interdependence' (MEAC, 2016, p. 37). In the focus group discussion, Teacher 1 recounted an implicit awareness that environmental processes connect distant places:

'When teaching global warming... I struggle to explain to the learners how the atmosphere has high temperature which causes global warming and its effect such as melting of the ice at the polar region which can cause flood.'

Teacher 3 in both lessons discussed climate change, global warming, ozone layer depletion and acid rain. These are environmental issues that can be created in one place (locally) but manifested in others (and globally) but in these lessons these environmental risks were presented primarily as local phenomena rather than as interconnected risks that transcend national and geographic boundaries.

DISCUSSION

Results of this study reveal a persistent tendency in teaching policy and practice in Namibian Geography education to separate social and ecological dimensions of environmental risk, a perspective that Beck (1992, 2012) critiques as inadequate for understanding modern challenges. For example, learners often framed deforestation and population growth in linear cause-and-effect terms, leading to singular outcomes such as soil erosion and resource depletion. This factual recall reflects a pattern of teaching that privileges surface knowledge over epistemic engagement with socioecological complexity. From Beck's perspective, separating humans from 'nature' undermines the relational understanding necessary for grasping environmental risks as embedded in social, economic and political domains.

While scientific rationality was sometimes invoked inaccurately, as in the conflation of global warming with ozone depletion, similar patterns were evident in teachers' explanations of some concepts. This suggests that, rather than confidently mobilising scientific explanatory frameworks, teachers often draw on generalised notions of 'harmful chemicals' to make sense of environmental risk. From a risk society perspective, such framings indicate the presence of partial knowledge and non-knowledge, where scientific concepts are invoked but not fully differentiated, thus potentially shaping how environmental risk is taught in classroom contexts.

While scientific rationality and the possibilities for its misrepresentation dominated teachers' explanations, social rationality remained largely implicit. This reflects a reliance on simplified cause-and-effect reasoning that risks producing narrow, technocratic responses to environmental issues. Such approaches provide limited opportunities for learners to engage with the wicked problems of climate change, inequality and contested environmental knowledge. Beck's assertion that 'scientific rationality without social rationality remains empty, but social rationality without scientific rationality remains blind' (1992, p. 30) is particularly salient here, as classroom practices tended to privilege scientific facts without fostering reflexive engagement with values, uncertainty, or multiple perspectives.

The study also shows that while cross-border dimensions of risk (e.g. air pollution, climate change) were mentioned, their global interconnections were not made explicit. Although local examples can make environmental issues meaningful, the limited attention to relations across places and scales restricts opportunities to develop a more explicitly cosmopolitan understanding of shared and transboundary risk. This suggests that the syllabus and teaching practices risk framing environmental issues as isolated local challenges rather than systemic global risks. Table 1 presents relationships between the 2016 Geography syllabus alongside classroom activities. This comparison is not intended as an evaluation of teachers' implementation of the syllabus, but whether issues in the representation of environmental risk remain relevant within the current curriculum.

Table 1. Comparative table of syllabus and classroom practice noted in this study.

Dimension	Orientations in the 2016 syllabus	Patterns identified in the classroom cases
Pedagogical approach	Promotes inquiry, critical thinking, and problem-solving around complex environmental issues	Worksheets and tasks constrained responses; linear cause-effect reasoning dominated
Socioecological rationality	Emphasises links between ecological, social, economic, and political domains	Risks presented mainly as ecological or biophysical; social dimensions implicit or overlooked
Scientific rationality	Requires accurate use of scientific concepts (e.g. greenhouse gases, ozone depletion)	Some inaccuracies (e.g. conflation of global warming and ozone depletion; conflating air and water pollution); reliance on recall
Social rationality	Encourages learners to consider diverse perspectives and societal implications of risks	Rarely made explicit; learners guided towards single-cause answers and technocratic solutions
Cross-border/global risks	Highlights boundless risks (climate change, pollution) and global interconnections	Mentioned but framed locally; global interdependence and cosmopolitan perspectives underplayed

These findings have implications for Geography education. UNESCO’s (2016) *Global Education Monitoring Report* identifies environmental and ecological literacy as critical to behavioural change, noting that formal education provides the vocabulary, historical context and scientific concepts needed to build such literacy. Although the lessons examined in this study supplied Geography learners in Namibia with some scientific vocabulary and knowledge of environmental causes and effects, their predominantly linear and technical framing offered limited support for understanding risk as interconnected, socially differentiated and contested. This also has implication in relation to epistemic risk in teaching. Open-ended socioecological questions involve uncertainty, contestation and knowledge claims that are not easily reduced to a single answer, although this may make complex environmental knowledge more manageable within classroom practice. Nevertheless, this raises questions about how classroom activities may favour measurable and examinable environmental knowledge over more contested socioecological inquiry.

CONCLUSIONS AND RECOMMENDATIONS

This study examined how environmental risks are framed in the Grade 9 Geography syllabus in Namibia and how they are represented through teacher perceptions and classroom practice. Results show that while both the syllabus and teachers acknowledged environmental issues as socioecological in scope, they were not consistently framed as interlinked problems. Scientific rationality was a dominant theme through cause-and-effect

reasoning, but a limitation is that this may be accompanied by conceptual inaccuracies, and can constrain opportunities for learners to develop more a complex understanding of environmental issues. Scientific rationality was often privileged in classroom explanations, while social rationality remained underdeveloped, limiting a critical engagement with the socioecological and sociopolitical dimensions of environmental risk. Cross-border/global dimensions of risk were also under-emphasised.

Overall, the study suggests that environmental risk is frequently transformed during classroom practice into simplified and technically-oriented knowledge. While such representations may support curriculum coverage, they also limit opportunities for learners to engage critically with the uncertainty, interdependence and contested nature of contemporary environmental challenges. Beck's (1992) theory of risk society therefore provides a useful lens for understanding not only what is taught about environmental risk, but how complexity is pedagogically managed in Geography classrooms. Extending this analysis to other curriculum areas and educational contexts can provide further insight into how complex socioecological knowledge is represented within curriculum policy and classroom practice.

In summary, teacher education and professional development should support teachers in engaging with the scientific dimensions of environmental risk, but also with its social, political and cross-border dimensions, enabling them to navigate uncertainty and competing knowledge claims. Curriculum resources could provide stronger guidance for representing environmental risks as interconnected socioecological phenomena rather than as isolated cause-and-effect relationships. Assessment practices should likewise create opportunities for learners to explain relationships, justify claims, evaluate evidence and consider alternative responses to environmental issues, thereby supporting more sophisticated environmental reasoning.

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