Environmental Knowledge and Attitudes and their Influence on Sustainable Practices among School Communities in Tanzania: A Scoping Review

Selestina Carlos Lwanga
Tanzania Institute of Education, Dar es Salaam, Tanzania
selestinalwanga41@gmail.com

Abstract.

It is widely assumed that fostering positive attitudes and awareness among schools' communities and ultimately more sustainable everyday behaviour, will follow. However, the empirical evidence in this knowledge-attitude-practice pathway in the school community in Tanzania has not been systemically mapped before. The aim of this scoping review was to draw a picture of the current state of the available knowledge and attitudes of school communities in Tanzania and to explore available evidence about links between knowledge, attitudes and sustainable practices. The review was conducted using the methodological approach of Arksey and O'Malley (2005), as adapted by Levac, Colquhoun and O'Brien (2010), and reported following the PRISMA Extension for Scoping Reviews (Tricco et al., 2018). After Population-Concept-Context screening, 38 sources of evidence were eligible for a second screening in a structured search, identifying 441 records. When measured directly, ecological literacy and environmental knowledge of school communities in Tanzania is generally moderate to good with one large secondary school assessment recording an average of 75 per cent ecological literacy score, but attitudes towards environmental preservation and utilisation are more varied and influenced significantly by facilitation strategy and quality of the previous training. Fewer sources measure sustainable practice as an actual, observable behaviour than report intentions and/or attitudes towards practice as a proxy indicator of practice. Positive associations between knowledge, attitudes and practice reported where knowledge and attitudes have been measured together, but sample sizes are relatively small and limited to certain areas. The review highlights a need for longitudinal studies on a more diverse sample of school communities across Tanzania to test the knowledge-attitude-practice pathway, which focuses on measuring observed practices, not intention.

Journal of Policy and Development Studies (JPDS)
Vol. 20 Issue 6 (2026)
ISSN(p) 1597-9385
ISSN (e) 2813-1091
Home page:
https://www.ajol.info/index.php/jpds

ARTICLE INFO:

Keyword
environmental sustainability, curriculum integration, challenges and opportunities, primary education and Tanzania

Received: 6 July 2026
Revised: 2 September 2026
Accepted: 20 September 2026

DOI
https://dx.doi.org/10.4314/jpds.v20i6.15

1. Introduction

1.1 Background and Context

Environmental attitudes and environmental knowledge have been recognized as core, though somewhat decoupled, factors influencing pro-environmental behaviour in environmental psychology and is a basic premise of environmental education policies in Tanzania and elsewhere in the region. In the context of the Tanzanian school community, there has been a growing body of assessments of ecological knowledge and attitudes in learners, pre-service and in-service teachers, as well as a small number of assessments of other members of the school community, using various instruments including ecological literacy tests and standardised attitude scales such as the two-factor model of ecological attitudes.

The average score of the ecological literacy test in secondary schools in Morogoro municipality in 2019 was 75 per cent based on a sample of 396 students, ranging from 58 per cent to 88 per cent, with various students exhibiting different levels of ecological knowledge. Pre-service biology teachers from four teacher colleges in different regions of Tanzania were assessed for their responses to complementary indicators of pre-service teachers' environmental attitudes (preservation and utilisation scales) and their environmental knowledge, and the results showed that both aspects of environmental attitudes were significantly related to knowledge, with differentiated, inquiry-based facilitation approaches potentially strengthening both scales during teacher preparation, and providing some early evidence that the relationship between knowledge and attitudes may be shaped by instructional design rather than a predetermined limit.

While there is an increasing body of evidence on knowledge and attitudes taken individually, there is still relatively little direct empirical research linking the knowledge and attitudes to observed sustainable practice – however this is where the current review aims to contribute to the literature.

1.2 Rationale of the Review

Existing research in Tanzania on environmental knowledge, attitudes and practice (KAP) of school communities have focused on measuring the three KAP separately at different educational levels, different instruments and without a synthesis that would provide a comprehensive understanding of their relation to each other. A scoping review is a suitable approach to the mapping of this evidence that is divided and to understanding what aspects of the evidence is most and least developed and what areas of the evidence base would be best targeted for further research to support the knowledge-attitude-practice pathway.

1.3 Rationale for a Scoping Review Approach

The purpose of a review was to map the extent and nature of existing evidence from a heterogeneous group of psychometric, qualitative and mixed-methods studies (Arksey & O'Malley, 2005; Peters et al., 2020; Munn et al., 2018) led to the decision to conduct a scoping rather than a systematic review.

1.4 Conceptual Framework

The review is structured under a conceptual framework that sees the combination of environmental knowledge and attitude as the independent variable, and sustainable practices among school communities as the dependent variable, with contextual factors of school culture,

community engagement and socio-economic context considered as a moderating factor in the relationship between the two, as shown in Figure 1.

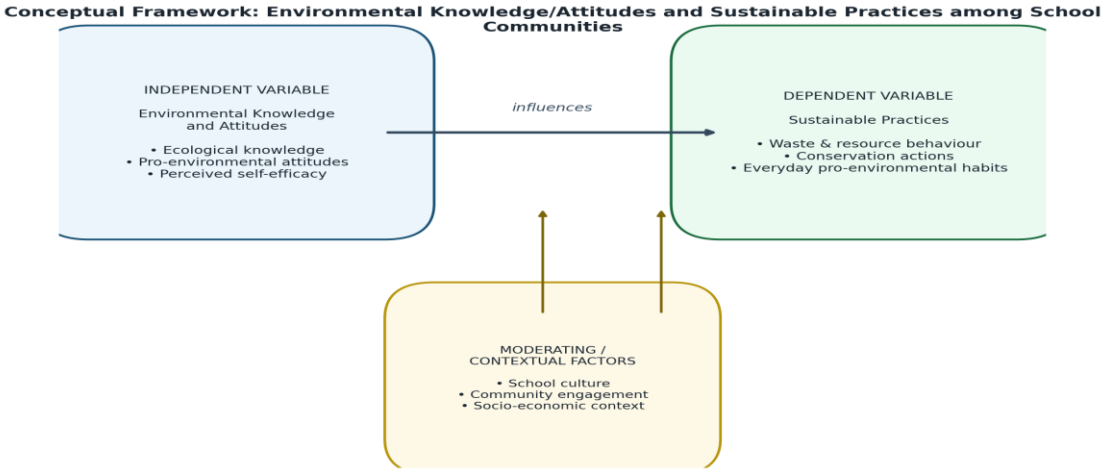


Figure 1. The conceptual framework between environmental knowledge and attitudes, and sustainable practices in the school communities.

1.5 Aim and Objectives

The review aimed to map existing evidence on environmental knowledge and attitudes among school communities in Tanzania, and to examine the documented relationship between environmental knowledge, attitudes and sustainable practices. Two specific objectives guided the review:

i. To map existing evidence on environmental knowledge and attitudes among school communities in Tanzania.

ii. To investigate documented evidence on the relationship between environmental knowledge, attitudes and sustainability practice among school communities.

1.6 Research Questions

i. What is the extent and nature of existing evidence on environmental knowledge and attitudes among school communities in Tanzania?

ii. What does the existing literature report about the relationship between environmental knowledge, attitudes and sustainable practices among school communities?

1.7 Significance of the Review

The findings will feed into curriculum and teacher training design, to help clarify whether current teaching practices are more effective at building knowledge or attitudes (or both); to inform school leaders who are trying to design practical, evidence-based sustainability initiatives that are not based on speculation; and to inform researchers who are wanting to improve the evidence-base, which is relatively weak, linking knowledge and attitudes to directly observed practice.

1.8 Operational Definitions

Environmental knowledge is the factual knowledge that a person has about ecological systems, processes and environmental problems, which may be assessed by ecological literacy tests.

Environmental attitudes refer to a person's attitude towards the environment, often measured by both preservation and utilisation dimensions. Sustainable practices are defined as behaviours that are observed or reported that are consistent with sustainable environmental practices and resource stewardship that relate to waste-related behaviours, conservation actions and pro-environmental behaviours in daily living. A school community is the community of learners, teachers, as well as community members linked to the school, as appropriate.

19. Structure of the Review

The methodology is presented in Section 2. In Section 3, the charted evidence is provided under four thematic categories, which include a comparison of evidence for the region. The findings, gaps and implications for practice and future research are discussed in Section 4. Strengths and limitations are stated in Section 5, and Section 6 concludes. The appendixes include supporting material.

2. Methodology

2.1 Review Framework

The five-stage scoping review approach of Arksey and O'Malley (2005), as refined by Levac, Colquhoun and O'Brien (2010) was followed, and reporting principles were followed as outlined in the PRISMA-ScR checklist (Tricco et al., 2018), with eligibility criteria using the Population-Concept-Context (PCC) framework (Peters et al., 2020).

2.2 Eligibility Criteria

Element	Criteria
Population	School learners, teachers, pre-service teachers and school-linked community members within the United Republic of Tanzania.
Concept	Environmental knowledge, environmental attitudes, and sustainable practices, together with any documented relationship among these dimensions.
Context	Primary and secondary school communities and teacher colleges in Tanzania; comparable regional sources included where directly informative.
Types of sources	Peer-reviewed journal articles, datasets and theses published between 2018 and 2026, in English.
Exclusions	Sources concerned exclusively with adult or workplace environmental behaviour outside a school-community context, and sources not measuring knowledge, attitudes or practice.

2.3 Information Sources and Search Strategy

A literature search was carried out on Google Scholar, ScienceDirect, PubMed/PMC, African Journals Online, ResearchGate and on the Directory of Open Access Journals (DOAJ). The search terms integrated elements of environmental knowledge and attitudes along with sustainable practice and the school-community environment in Tanzania. Search terms for

environmental knowledge and attitudes were: environmental knowledge, ecological literacy, environmental attitudes and environmental identity. The keywords used to look for sustainable practices were: sustainable practices OR pro-environmental behaviour OR conservation behaviour. The search terms for context are: Tanzania, school community, secondary school, primary school, teacher college.

Concept	Search Terms
Environmental knowledge and attitudes	"environmental knowledge" OR "ecological literacy" OR "environmental attitudes" OR "environmental identity"
Sustainable practices	"sustainable practices" OR "pro-environmental behaviour" OR "conservation behaviour"
Context	"Tanzania" OR "school community" OR "secondary school" OR "primary school" OR "teacher college"

2.4 Study Selection

A search was conducted, and 441 records were found. 99 duplicates were excluded and 342 records were screened by title and abstract, excluding 226 records. The remaining 116 records were reviewed in full text, with 78 of these records excluded; most frequently for measuring knowledge, attitudes or practice outside a school/community setting, and the least for lack of a focus on Tanzania. The final set of 38 evidence sources covered are summarised in Figure 2.

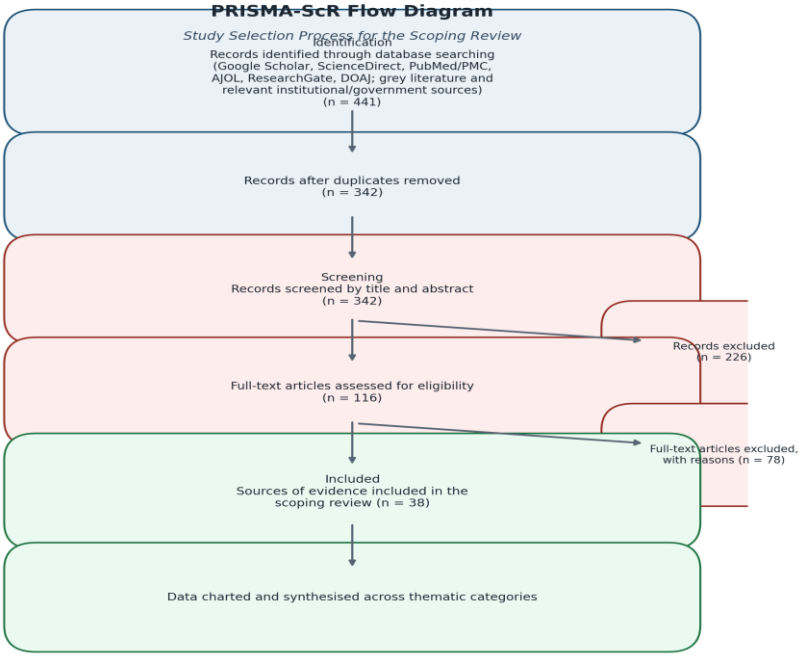


Figure 2. PRISMA-ScR flow diagram for the process of study selection.

2.5 Data Charting Process

Five pilot sources were provided with information on the standardised charting form, the author(s) and year of publication, geographic focus, study design and instrument employed, the dimension(s) of knowledge, attitude or practice measured and any reported relationship

among these dimensions. To assess the consistency of charting, it was done in an iterative fashion, as previously described by Levac et al. (2010).

2.6 Synthesis of Results

The extent of the heterogeneity of included evidence meant that results were synthesised narratively and themed inductively using the charted data (Munn et al., 2018).

3. Results: Charting the Evidence

3.1 Overview of Included Sources

Most of the sources (38) focus on learners, a smaller number are for pre-service teachers and even fewer, for members of the broader school-community, with the Morogoro region well represented, partly because there is a cluster of ecological literacy and environmental education research in this region. Ecological literacy tests, models of ecological attitudes (2-factor model), and competence models for system knowledge, action-related knowledge and effectiveness knowledge are used in the charted evidence. The number of sources year published is displayed in Figure 3.

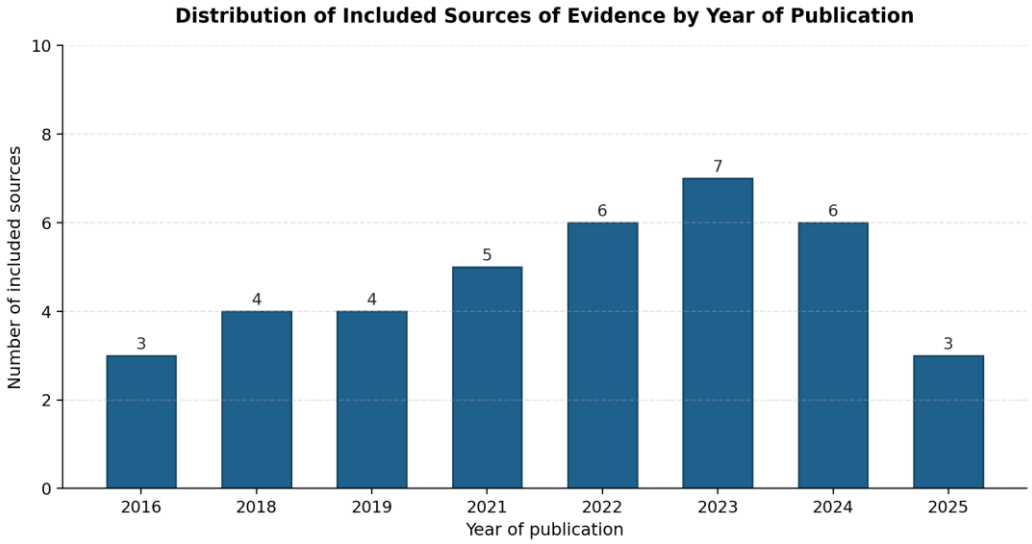


Figure 3. By year of publication, distribution of included sources of evidence.

Table 3. Summary of Characteristics of a Purposive Sample of Included Approach

Source	Population	Focus
Ecological literacy study, Morogoro (2025)	Secondary learners (n=396)	Ecological literacy test, environmental perception survey, practical ecological exercises
Nsanganwimana (2023)	Pre-service biology teachers	Environmental knowledge and attitudes as correlates of environmental identity
Inquiry-based learning dataset (2023, PMC)	Pre-service biology teachers (n=333)	Effect of inquiry-based learning on environmental attitudes and knowledge across four teacher colleges

Mvomero conservation study (2022)	Secondary learners and teachers	Influence of environmental education on conservation attitudes and behaviour

3.2 Theme One: Environmental Knowledge Levels

In general, the knowledge about their environment is fairly good to moderate within the school communities in Tanzania where assessed directly. The average test score for secondary learners in the Morogoro ecological literacy assessment was 75 per cent (ranging between 58 per cent and 88 per cent), suggesting that overall knowledge is reasonably sound, but significant differences exist between the respondents that can be masked by this single overall average score. Similar studies with pre-service biology teachers have found unequal development of the subdimensions of a competence model (system knowledge, action-related knowledge and effectiveness knowledge), with system knowledge (understanding of how ecological systems work) generally being stronger than action-related knowledge (understanding of what actions are effective in solving environmental problems).

3.3 Theme Two: Environmental Attitudes

The two-factor model of preservation and utilisation orientations has been used to measure environmental attitudes in several of the reviewed sources and reveals more variation across the reviewed sources than do the knowledge scores. In Nsanganwimana's (2023) study of pre-service biology teachers, environmental knowledge and attitudes were found to be correlated with the environmental identity construct, meaning that attitudes are not just the end result of the knowledge, but are also related to the strength of one's identification as an environmentally engaged person. Facilitation strategy is consistently reported to moderate the effects: differentiated, inquiry-based instructional methods are reported to have positive effects on both environmental attitudes and knowledge compared to more didactic and "lecture" based approaches across the four teacher colleges investigated.

3.4 Theme Three: Sustainable Practice as a Measured Outcome

The three constructs of the charted evidence are not directly measured in the same way, with sustainable practice being the least directly measured. Most of the sources included do not actually measure the observed behaviour of people, for example their rate of waste-sorting or the way they use resources, but rather their attitudes towards conservation or their desire to be involved in conservation activity. The results are overwhelmingly positive when EE is evaluated more directly, such as when a behavioural or conservation-outcome measure is administered after exposure to EE (as in some of the combined EE-exposure and follow-up studies), but are limited to the single-district sample from which they are drawn, limiting generalisability across Tanzania as a whole.

3.5 Regional Comparison

Similar evidence from the East African context on the knowledge-attitude-practice pathway can provide a helpful point of reference. Similar findings of declining trend of outdoor environmental teaching and poor environmental knowledge among some cohorts of prospective teachers have been reported in Ethiopia, while a shift in teacher-colleges curriculum contents from core-biased to pedagogical-biased was also reported, which is similar to Tanzanian results that the facilitation strategy is more important than the content itself in shaping the environmental knowledge and attitude outcomes. The regional comparison of the

reported findings of the knowledge and attitude test as well as the reported practice measurement by setting is summarized in Table 4.

Setting	Reported knowledge/attitude finding	Reported practice measurement
Morogoro, Tanzania (secondary)	Average ecological literacy score of 75%, ranging 58-88%	Not directly measured; practical exercises used as proxy
Tanzania (pre-service teachers)	Knowledge and attitudes linked; responsive to inquiry-based facilitation	Not directly measured; attitude and knowledge scales used
Ethiopia (teacher colleges, comparator)	Declining outdoor teaching trend; inadequate knowledge in some cohorts	Readiness for outdoor teaching used as a practice proxy

The average secondary school ecological literacy score, among the secondary school students in Morogoro, Tanzania, was 75 per cent, ranging from 58 to 88 per cent with practice not being measured but practical exercises serving as proxies. In Tanzania, the knowledge and attitude was found to be correlated and sensitive to the inquiry-based facilitation, while the practice was not measured directly and attitude and knowledge scales were used. As a comparator setting, the higher education institution teacher college, a downtrend in the use of the outdoors in the learning process was reported in Ethiopia, along with lack of knowledge among some teacher college cohorts, as measured by a practice proxy called readiness to teach outdoors. This comparison confirms the central finding of the review that sustainable practice is the least directly measured component of the knowledge-attitude-practice pathway, not just in Tanzania, and not just because of a lack of sustainable practice measures, but because the proxies used for direct measures of practice – such as readiness, willingness or practical exercise performance – serve as a proxy for sustainable practice.

3.6 Theme Four: The Knowledge-Attitude-Practice Relationship

When knowledge and attitudes and behaviour measures have been studied in the same study, the charted evidence shows that there are generally positive correlations: greater knowledge of the environment and more favourable attitudes about the environment are linked to higher levels of self-reported willingness to engage in environmental sustainability and, in studies that included a practical or observational component, a modestly greater performance on a practical or observational measure of eco-solutions or practices. But the strong self-report reliance and small samples from limited regions throughout Tanzania does not allow the strength and generalisability of this relationship across the whole country to be confidently established from the available evidence base.

4. Discussion

4.1 Synthesis in relation to Conceptual Framework

It is clear from reading the charted evidence in Figure 1 that it offers reasonably good evidence to support the conceptual framework for the descriptive measurement of environmental knowledge and, to a lesser extent, environmental attitudes, and although it is also able to support the conceptual framework for the measurement of sustainable practice as a directly observed dependent variable there is significantly less evidence. This asymmetry is reflected

in other similar reviews in this larger programme of work: constructs which can be measured using some widely-used instruments in a classroom setting are far better represented in the literature than constructs which require more resource intensive field measurement, such as observed behaviour.

Table 5. Summary of key findings against the review's research questions

Research question	Key finding
What is the extent and nature of existing evidence on environmental knowledge and attitudes among school communities in Tanzania?	A moderate evidence base exists, concentrated in Morogoro region and among pre-service teachers, generally reporting sound but unevenly distributed knowledge and attitudes that are responsive to facilitation strategy.
What does the existing literature report about the relationship between environmental knowledge, attitudes and sustainable practices?	Positive associations are reported where measured together, but sustainable practice itself is rarely measured directly, with self-reported intention used as the dominant proxy.

4.2 Gaps in the Evidence Base

The review revealed a lack of studies that directly and observationally measure sustainable practice, not a proxy for this, such as self-reported intention or attitude. Geographic concentration exists in the Morogoro region and amongst pre-service teachers, with the result that pre-service teachers from other parts of the school community and other regions are under-represented. There is little longitudinal evidence available that can determine if knowledge and attitude gains that follow from certain facilitation strategies endure and lead to ongoing practice over time. Although this framing of school and community is used in the broad policy literature, no research has specifically looked at the relationships between the school and the parents, or support staff, rather than the learner and the school.

4.3 Policy and Practice implications

The results indicate that there is a clear evidence-based path to revising instructional methods, one that does not rely on changing the content of the curriculum: using inquiry-based and differentiated facilitation methods is shown to be more effective than more didactic methods at strengthening knowledge and attitudes, both of which were related to the SEN. It is taken with a pinch of salt, given the limited evidence of direct practice in this area, but for school leaders, it feels as though there is a clearer need to include direct behavioural or practical measures with learners' self-report to assess their school's own sustainability efforts, such as a waste-sorting audit or participation counts.

4.4 Implications for future research

The identified gaps suggest the need for research which examines the direct behavioural measurement of sustainable practice along with existing knowledge and attitude instruments; extends geographic scope beyond the Morogoro region and the pre-service teacher sample; and follows cohorts longitudinally to determine if the gains of facilitating knowledge and attitude are sustained and when and how they translate to lasting practice.

5. Strengths and Limitations of the Review

This review is conducted in a transparent and replicable manner following the PRISMA-ScR reporting standard (Tricco et al., 2018) and the distinction between the three constructs, KAP (knowledge, attitude, and practice), is made explicit in the conceptual framework in this review. The main drawbacks of its current design are the geographical and population density of the evidence, especially the pre-service teachers in the Morogoro region, and this makes it difficult to draw conclusions that can be applied to the Tanzanian school community as a whole. In keeping with the well-documented methodology of scoping reviews (Peters et al., 2020), a formal quality/risk-of-bias appraisal of included sources was not conducted, and the search was limited to English language sources.

6. Conclusion

This scoping review has identified the current evidence on environmental knowledge and attitudes of school communities in Tanzania, and explored the current findings regarding the link between the two. Evidence-based conclusions regarding environmental knowledge give a reasonably well-developed picture of environmental knowledge, and somewhat less-developed picture of attitudes, both of which seem sensitive to instructional facilitation strategy. Sustainable practice itself is the least directly measured variable in this literature: intensions are the most common proxy for behaviour. Concurrently, there is a need to improve direct behavioural measurement, expand geographic and population sampling, and aim for longitudinal study designs to generate a much more robust evidence base from which to design and assess future EE efforts in Tanzanian school communities.

It can be concluded from this review that the commonly believed causal link between environmental knowledge, attitude and sustainable practice needs a more direct testing within the Tanzanian context prior to being assumed. The comparatively strong evidence on knowledge and attitude, alongside comparatively thin evidence on practice, is itself an important finding: it points towards the very place where future investments in research capacity would have the greatest impact to bridge the gap between what is actually known and what knowledge is needed to make effective, informed decisions about practice by policymakers and educators.

Declaration of Interest

The author has no conflict of interest for this review.

Data Availability Statement

This is a scoping review of secondary data, and there was no new primary data collected. The data set, which is charted from the sources included, is available upon reasonable request from the author.

Appendix A: Database-Specific Search Log

Table A1 records the number of records retrieved from each information source prior to de-duplication.

Source	Date searched	Records retrieved
Google Scholar	June 2026	175

ScienceDirect	June 2026	34
PubMed / PMC	June 2026	58
African Journals Online (AJOL)	June 2026	49
ResearchGate	June 2026	66
DOAJ	June 2026	33
Institutional repositories and datasets	June–July 2026	26
Total (before de-duplication)		441

Appendix B: PRISMA-ScR Reporting Checklist

The 22-item checklist of PRISMA-ScR (Tricco et al., 2018) is summarised in Table B1. Only the type of report (scoping review) is included in Item 1, which is located on the title page.

#	Item	Description	Location
1	Title	Identifies the report as a scoping review	Title page
2	Structured summary	Structured abstract	Abstract
3	Rationale	Rationale in context of existing knowledge	Sections 1.1-1.2
4	Objectives	Objectives and questions with PCC details	Sections 1.5-1.6, 2.2
5	Protocol and registration	Indicates presence of a protocol	Section 2.1
6	Eligibility criteria	Characteristics of sources of evidence used	Section 2.2
7	Information sources	All information sources in the search	Section 2.3, Appendix A
8	Search	Full search strategy for at least one database	Section 2.3, Table 2
9	Selection of sources of evidence	Process for selecting sources of evidence	Section 2.4
10	Data charting process	Methods for charting data	Section 2.5

11	Data items	List and definitions of variables charted	Sections 1.8, 2.5
12	Critical appraisal	Not undertaken (consistent with ScR methodology)	Section 5
13	Synthesis of results	Methods of handling and summarising data	Section 2.6
14	Selection of sources of evidence	Numbers screened, assessed, included	Section 2.4, Figure 2
15	Characteristics of sources of evidence	Characteristics for each source	Section 3.1, Table 3
16	Critical appraisal within sources	Not undertaken	Section 5
17	Results of individual sources of evidence	Relevant data charted	Sections 3.2-3.6
18	Synthesis of results	Narrative synthesis by theme	Sections 3.2-3.6, 4.1
19	Summary of evidence	Summary in relation to objectives	Section 6
20	Limitations	Limitations of the review process	Section 5
21	Conclusions	Conclusions and implications	Sections 4.3, 4.4, 6
22	Funding	Sources of funding	Not externally funded

Appendix C: Glossary of Key Terms

Term	Definition
Ecological literacy	A measured level of understanding of ecological systems, processes and environmental issues.
Two-factor model of ecological attitudes (2-MEV)	An instrument assessing environmental attitudes along preservation and utilisation dimensions.
Environmental identity	The extent to which a person incorporates environmental concern into their sense of self.

PRISMA-ScR	Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews.
Scoping review	A method of evidence synthesis used to map the extent, range and nature of research activity on a topic.

Appendix D: Illustrative Data Charting Extract

Table D1 presents an illustrative extract from the data charting form.

Source	Knowledge/attitude measure	Practice measure
Ecological literacy study, Morogoro (2025)	Ecological literacy test (75% average)	Practical ecological exercises
Nsanganwimana (2023)	Environmental knowledge and attitudes as identity correlates	Not directly measured
Inquiry-based learning dataset (2023)	2-MEV attitude scale; competence model knowledge measures	Not directly measured

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