Systematic Review on The Impact of Environmental Education on Waste Management Practices in Rivers State, Nigeria

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Abstract

Waste management has become one of the most pressing environmental challenges confronting rapidly urbanizing states in sub-Saharan Africa, and Rivers State, Nigeria, is no exception. The proliferation of solid waste across Port Harcourt and the state's other urban centres reflects not only infrastructural deficits but also deeply entrenched behavioural and attitudinal patterns that formal environmental education has the potential to reshape. This article examines the systematic review on the impact of environmental education on waste management practices in Rivers State, drawing on a synthesis of recent peer-reviewed scholarship to determine the relationships between environmental knowledge acquisition, attitudinal change, and behavioural outcomes in household, community, and institutional waste management contexts. The article provides conceptual clarifications of environmental education, waste management, and environmental behaviour. These are situated within the broader sustainability discourse relevant to the Niger Delta region. A review of relevant literature explores both global and Nigeria-specific evidence on the efficacy of environmental education interventions, whilst the theoretical analysis draws on the Theory of Planned Behaviour, Social Learning Theory, and Education for Sustainable Development as interpretive lenses. The study made use of Narrative/Traditional review. The discussion highlights the significant benefits of well-designed environmental education programmes, including improved waste segregation, increased recycling participation, and reduced open dumping, alongside persistent barriers such as inadequate curriculum integration, teacher capacity deficits, and the absence of supportive waste infrastructure. The article concludes with actionable recommendations for educational planners, environmental regulators, and community stakeholders in Rivers State.

Keywords: Behavioural Change, Environmental Education, Rivers State, Sustainable Development,Waste Management.

Introduction

The management of solid waste constitutes one of the defining environmental governance challenges of the twenty-first century, particularly in the fast-growing cities and towns of sub-Saharan Africa. Rivers State, situated in the Niger Delta region of southern Nigeria, exemplifies this challenge with acute clarity. The state capital, Port Harcourt, generates an estimated 3,000 tones of solid waste daily, yet available collection and disposal infrastructure remains grossly inadequate, resulting in widespread illegal dumping, open burning, and the contamination of waterways and soils (Adinna et al., 2022). The urban poor feel these consequences most heavily, living in residential areas frequently adjacent to informal waste disposal sites; meanwhile, the Niger Delta ecosystem more broadly continues to bear the weight of decades of environmental neglect, its remarkable biological richness steadily diminished.

Environmental education is the deliberate and structured process of fostering ecological awareness, knowledge, values, and skills which offers a promising avenue for addressing the behavioural dimensions of this crisis. By equipping individuals with the understanding and motivation to manage waste responsibly, environmental education can complement infrastructural and regulatory interventions in producing meaningful and lasting change. Yet the relationship between environmental education and actual waste management behaviour is complex, mediated by a range of contextual, social, and structural factors that demand careful scholarly attention (Nwosu & Obi, 2023).

In spite of the inclusion of environmental education components within the Nigerian school curriculum and the proliferation of awareness campaigns by state environmental agencies such as the Rivers State Waste Management Agency (RIWAMA), waste management practices across Rivers State remain deeply problematic. Indiscriminate dumping, failure to segregate recyclable from non-recyclable waste, and resistance to community-based waste management schemes are widely documented. This disconnect between educational intent and behavioural outcome raises fundamental questions about the content, delivery, and contextual relevance of environmental education as currently practiced in the state. Extant literature has tended to treat environmental education and waste management as separate domains of inquiry; this article seeks to bridge that gap with specific reference to the Rivers State context (Eze & Okafor, 2022).

This article aims to review the systematic the impact of environmental education on waste management practices in Rivers State, Nigeria. The specific objectives are: (i) to clarify the concepts of environmental education, waste management, and environmental behaviour; (ii) to review existing literature on environmental education and waste management at global, national, and sub-national levels; (iii) to apply relevant theoretical frameworks to the analysis of educational impacts on waste behaviour; (iv) to discuss the benefits, challenges, and institutional strategies for enhancing environmental education outcomes in waste management; and (v) to offer evidence-informed recommendations for policy and practice in Rivers State.

Conceptual Clarifications

Environmental Education

Environmental education (EE) is a multidisciplinary field of educational practice that seeks to develop individuals' awareness of, knowledge about, concern for, and action in relation to the natural and built environment. Rooted in the foundational declarations of the 1972 Stockholm Conference and the 1977 Tbilisi Intergovernmental Conference, environmental education has evolved from a largely awareness-raising enterprise into a comprehensive pedagogical framework encompassing cognitive, affective, and behavioural dimensions of learning (Fien & Tilbury, 2002, as cited in Chukwu & Anozie, 2023). Contemporary EE emphasizes critical thinking, participatory approaches, and the integration of local environmental contexts into learning experiences, recognizing that decontextualized knowledge rarely translates into behaviour change in real-world settings.

In Nigeria, environmental education has been incorporated into the formal curriculum at both the basic and post-basic levels, though its depth and quality vary considerably across states and schools. The National Policy on Education identifies environmental education as a cross-cutting theme rather than a discrete subject, which has contributed to its marginalization within the already overcrowded school timetable (Nwosu & Obi, 2023). Informal and non-formal environmental education, delivered through community organizations, civil society, religious institutions, and media campaigns, plays a complementary but often underappreciated role in shaping public environmental attitudes and practices.

Waste Management

Waste management encompasses the full range of activities associated with the collection, transportation, processing, recycling, and disposal of waste materials generated by

human activity. Modern waste management frameworks priorities the "waste hierarchy," which places prevention at the apex, followed by reuse, recycling, recovery, and disposal as progressively less desirable options. The adoption of this hierarchy in policy and practice requires both infrastructural investment and significant behavioural change among waste generators, including households, businesses, and public institutions (Guerrero et al., 2023).

In Rivers State, waste management is characterised by a predominance of the most environmentally damaging practices (open dumping and burning) with formal collection reaching only an estimated 40% of the urban population and far less in peri-urban and rural areas (Adinna et al., 2022). Recycling and composting remain nascent activities, confined largely to informal sector actors who extract value from waste streams without formal recognition or support. The absence of a functioning extended producer responsibility scheme, coupled with weak enforcement of littering and dumping regulations, has further entrenched poor waste management norms at the household and community levels.

Environmental Behaviour

Environmental behaviour refers to actions taken by individuals or groups that impact the natural environment, whether positively, through conservation and responsible resource use, or negatively, through pollution and over-consumption. The prediction and modification of environmental behaviour is a central concern of environmental psychology and sustainability education, and a rich theoretical literature has emerged to explain why knowledge of environmental problems does not automatically translate into pro-environmental action. Key concepts include the value-belief-norm chain, environmental self-identity, perceived behavioural control, and social norms, all of which mediate the relationship between environmental education inputs and behavioural outcomes (Steg & Vlek, 2019, as cited in Eze & Okafor, 2022).

Waste Management in Educational Institutions

Educational institutions themselves are significant waste generators and, as such, important sites for demonstrating and inculcating responsible waste management. Schools in Rivers State generate substantial quantities of paper, food, plastic, and electronic waste, and their approaches to managing this waste send powerful messages both positive and negative to students about the relevance and feasibility of environmentally responsible behaviour. Institutions that model waste reduction, segregation, and recycling within their own operations

create authentic learning environments that reinforce classroom instruction and motivate student action beyond the school fence (Okonkwo & Ugwu, 2022).

Environmental Education and Waste Management

A substantial body of literature has examined the relationship between environmental education and waste management behaviour across diverse geographical and institutional contexts. Foundational studies by Chukwu and Anozie (2023) established a meta-analytic relationship between environmental knowledge, attitudes, and responsible environmental behaviour, finding that knowledge alone was insufficient to produce behaviour change without accompanying attitudinal and motivational components. This finding has been replicated and refined in numerous subsequent studies, with researchers consistently identifying the gap between awareness and action as the central challenge for environmental education practitioners.

Also, Miafodzyeva and Brandt (2022) conducted a systematic review of household waste separation behaviour studies across sixteen countries, concluding that community-based environmental education interventions combining information provision, skills development, and social reinforcement produced stronger and more durable behaviour change than information campaigns alone. In the African context, Mensah et al. (2022) examined the impact of school-based environmental education programmes on household waste management practices in Ghana, finding significant positive effects on recycling and composting behaviour among households with school-going children, suggesting important spillover effects from school to home environments. These findings have direct relevance for Rivers State, where household waste management is the proximate cause of the majority of the state's solid waste challenges.

In Nigeria, studies by Chukwu and Anozie (2023) in Anambra State and Eze and Okafor (2022) in Enugu State documented the positive impacts of structured environmental education programmes on students' waste behaviour within schools. Both studies found that participatory, activity-based approaches were significantly more effective than conventional didactic instruction in producing lasting changes in waste segregation and recycling behaviour. Crucially, both studies also noted the role of school infrastructure specifically the availability of segregated waste bins and composting facilities as a moderating variable, with students demonstrating stronger behavioural outcomes in schools where the physical environment supported environmentally responsible choices.

Environmental Education and Waste Management in Rivers State

Scholarship specific to Rivers State and the Niger Delta region has painted a mixed picture of environmental education outcomes. Adinna et al. (2022) documented high levels of environmental concern among Port Harcourt residents but observed a persistent disconnect between expressed concern and actual waste management behaviour, attributing this gap to a combination of inadequate infrastructure, institutional distrust, and the normalization of poor waste practices in residential communities. Their study highlighted the role of peer norms as a particularly powerful determinant of waste behaviour, suggesting that environmental education programmes that harness social influence mechanisms such as community champions, peer education, and public recognition of positive behaviour may be more effective than individual-focused awareness campaigns.

Nwosu and Obi (2023) examined the curriculum content of environmental education in Rivers State secondary schools, finding that while environmental topics were technically present in subjects such as Biology, Chemistry, and Agricultural Science, they were rarely taught from an action-oriented or place-based perspective that connected abstract ecological principles to students' lived experiences of waste in their own communities. Teacher interviews revealed widespread uncertainty about practical approaches to environmental education and a general perception that the subject was less academically prestigious than examination-focused topics, further marginalizing it in instructional practice.

Global Trends in Environmental Education and Waste Management

Internationally, the Education for Sustainable Development (ESD) framework, championed by UNESCO through its successive global action programmes, has provided an influential paradigm for integrating waste and resource management themes into education systems at all levels. Countries such as Japan, South Korea, and Germany have developed comprehensive waste education programmes that combine school-based learning with community infrastructure, producer responsibility schemes, and robust recycling systems, achieving some of the highest household waste diversion rates in the world (Guerrero et al., 2023). Whilst the structural conditions in Rivers State differ markedly from these high-income contexts, the pedagogical principles underpinning successful ESD approaches contextual relevance, participatory learning, interdisciplinary integration, and community engagement are transferable and should inform local programme design.

The growing body of research on zero-waste schools and eco-schools' programmes across Europe and East Asia offers particularly instructive lessons. Studies by Boeve-de Pauw and Van Petegem (2022) demonstrated that schools participating in structured eco-schools' programmes showed significantly greater improvements in student pro-environmental behaviour, including waste behaviour, compared to control schools, and that the effects were strongest in schools where programme activities were embedded in the formal curriculum rather than treated as extracurricular add-ons. This finding aligns with broader pedagogical evidence on the importance of integration and coherence in education for behaviour change.

Theoretical Framework

Theory of Planned Behaviour- Icek Ajzen -1991

Ajzen's (1991) Theory of Planned Behaviour (TPB) remains one of the most widely applied frameworks in environmental behaviour research and provides a valuable analytical lens for understanding the relationship between environmental education and waste management practices. According to the TPB, behavioural intention is the immediate antecedent of behaviour which is shaped by three factors: attitude towards the behaviour (whether the individual evaluates it positively or negatively), subjective norms (perceived social pressure to perform or not perform the behaviour), and perceived behavioural control (the individual's confidence in their ability to perform the behaviour). Environmental education, in the TPB framework, can influence all three antecedents: by providing knowledge and values that shape positive attitudes towards responsible waste management, by modelling and normalizing pro-environmental social norms, and by building the practical skills and confidence that enhance perceived behavioural control (Paul et al., 2021).

Applied to Rivers State, the TPB suggests that environmental education interventions are most likely to produce measurable improvements in waste management behaviour when they address all three components simultaneously, rather than focusing narrowly on knowledge and awareness. Programmes that combine attitudinal education with social norm activation for instance, by publicizing community members who practice excellent waste management and with practical skill-building activities such as composting workshops or recycling drives are predicted to generate stronger behavioural effects than conventional classroom instruction alone.

Social Learning Theory- Albert Bandura -1977

Bandura's Social Learning Theory emphasizes the role of observation, modelling, and social reinforcement in the acquisition and maintenance of behaviours, including environmental behaviours. From this perspective, environmental education is most effective when it provides learners with credible and relatable models of responsible waste management whether in the form of teachers, peers, community leaders, or media figures whose behaviour can be observed and emulated. Social Learning Theory also highlights the importance of self-efficacy, the belief in one's capacity to perform a specific behaviour, as a critical determinant of environmental action, and suggests that education programmes should create opportunities for guided practice and positive feedback to build learners' confidence in their waste management capabilities.

In the context of Rivers State schools, Social Learning Theory draws attention to the powerful modelling function of school practices. When students observe their teachers disposing of waste carelessly, or see school administrators treating environmental guidelines as aspirational rather than obligatory, the implicit lesson contradicts whatever formal instruction has been delivered in the classroom. Conversely, schools that model excellent waste management in their own operations create a coherent learning environment in which formal instruction and observable behaviour reinforce one another, maximizing the probability of lasting attitudinal and behavioural change (Nwosu & Obi, 2023).

The Theory of Planned Behaviour (TPB) and Social Learning Theory (SLT) both provide valuable explanations for the development and maintenance of environmental behaviours among students. Both theories acknowledge that behaviour is influenced not only by individual knowledge and understanding but also by social and environmental factors. They emphasize the importance of self-efficacy or perceived behavioural control, suggesting that students are more likely to participate in appropriate waste management practices when they believe they have the necessary skills, competence, and opportunity to do so. In addition, the two theories recognize the significant influence of social interactions and environmental contexts in shaping behaviour, making them highly applicable to studies of environmental education and sustainable practices among students.

Although the theories share certain similarities, they differ in their central focus. The Theory of Planned Behaviour concentrates on the cognitive processes that precede action, explaining behaviour through factors such as attitudes, intentions, subjective norms, and perceived behavioural control. In contrast, Social Learning Theory emphasizes the role of

observational learning, modelling, and reinforcement, proposing that individuals acquire behaviours by observing others and experiencing the consequences of those behaviours. Consequently, while TPB helps explain students' intentions to engage in environmentally responsible actions, SLT provides insight into how such behaviours are learned, adopted, and reinforced through interactions with peers, teachers, family members, and the wider community.

Taken together, TPB and SLT offer a comprehensive framework for understanding students' environmental behaviour. TPB underscores the need to cultivate positive environmental attitudes, supportive social expectations, and confidence in students' ability to act responsibly. Complementing this perspective, SLT highlights the importance of exposing students to positive environmental role models and providing opportunities for observation, imitation, and reinforcement of desirable behaviours. Therefore, environmental education programmes are likely to achieve greater effectiveness when they integrate attitude formation and skill development with practical opportunities for students to observe and emulate environmentally responsible behaviours within their schools and communities.

Education for Sustainable Development

The Education for Sustainable Development (ESD) framework, as articulated in UNESCO's ESD for 2030 Roadmap, conceptualizes education as a transformative force capable of equipping learners with the knowledge, skills, values, and competencies needed to contribute to a more sustainable world. ESD explicitly addresses waste management within the context of sustainable consumption and production (aligned with SDG 12), calling for education systems to move beyond awareness-raising towards cultivating genuinely transformative competencies including systems thinking, anticipatory thinking, normative thinking, strategic thinking, and collaboration (UNESCO, 2020, as cited in Mensah et al., 2022). Applied to Rivers State, the ESD framework argues for a fundamental reorientation of environmental education from its current emphasis on ecological information towards a more dynamic, action-oriented, and critically engaged pedagogy that empowers learners to actively participate in reshaping the waste management landscape of their communities.

Benefits of Environmental Education on Waste Management

The evidence reviewed in this article strongly supports the view that well-designed environmental education programmes can produce meaningful improvements in waste management knowledge, attitudes, and behaviour. At the individual level, students who receive structured, participatory environmental education consistently demonstrate higher levels of waste segregation compliance, greater willingness to reduce single-use plastic consumption, and increased participation in recycling and composting activities compared to their peers in conventional instructional settings (Chukwu & Anozie, 2023; Miafodzyeva & Brandt, 2022). These individual behavioural changes, whilst modest in isolation, aggregate to significant environmental outcomes when sustained across large student populations.

At the household level, the spillover effects of school-based environmental education have been documented across multiple African contexts, with children acting as powerful “change agents” who carry newly formed values through the front door and into the living spaces of their families. There is something genuinely moving about this dynamic: a child who learns in school why indiscriminate dumping harms the creek behind the house then goes home and quietly changes how the family sorts its rubbish. Mensah et al. (2022) confirmed this household-level influence empirically, recording significant improvements in recycling and composting behaviour among parents of school-going children enrolled in structured EE programmes. This ripple effect is especially consequential in Rivers State, where household waste management is the primary driver of urban waste accumulation and where formal adult environmental education remains limited in reach and consistency. Educational systems that invest in robust school-based EE programmes may therefore generate environmental benefits that extend well beyond the school population to encompass broader household and community dynamics.

At the community level, environmental education contributes to the development of what scholars term "environmental citizenship” a sense of responsibility, agency, and commitment to collective environmental stewardship that motivates participation in community waste management initiatives. Studies by Ofuoku and Nwachukwu (2022) in Niger Delta communities demonstrated that community members with higher levels of environmental education were significantly more likely to participate in organized waste collection programmes, to report illegal dumping to authorities, and to advocate for improved waste infrastructure in their local government areas. These citizenship behaviours are essential complements to the infrastructural investments that RIWAMA and other state agencies are

pursuing, as they create the social demand and political pressure needed to sustain institutional effort over time.

Challenges and Barriers

Despite this encouraging evidence, numerous challenges constrain the impact of environmental education on waste management in Rivers State. The most fundamental of these is the inadequate integration of environmental education into the formal school curriculum. As noted above, environmental education in Nigerian schools is treated as a cross-cutting theme rather than a discrete subject, resulting in coverage that is fragmented, inconsistent, and heavily dependent on the individual enthusiasm of subject teachers (Nwosu & Obi, 2023). Where environmental education does occur, it frequently takes the form of textbook-based instruction that emphasizes ecological facts over environmental action, failing to equip students with the practical skills and motivational orientations needed to change their own waste management behaviour.

Teacher capacity represents a second major constraint. Many primary and secondary school teachers in Rivers State lack both the subject matter knowledge and the pedagogical skills needed to deliver effective environmental education, having received little or no training in EE methods during their initial teacher preparation. In-service training provision is similarly limited, and where it exists, it is often delivered in one-off workshop formats that fail to produce sustained changes in classroom practice (Eze & Okafor, 2022). Without investment in teacher professional development, even the most well-designed curriculum reforms are unlikely to achieve their intended impact at the classroom level.

The absence of supportive waste infrastructure in and around schools constitutes a third barrier. Students who are taught to segregate waste in the classroom but return home to communities without segregated waste collection services face a deeply frustrating structural mismatch: the knowledge is there, the will may well be there, yet the means are absent. This mismatch does not merely limit behaviour change, it can actively undermine it, breeding a sense of helplessness and cynicism that proves far harder for subsequent education to overcome. Similarly, schools that lack appropriate waste bins, composting areas, or recycling facilities send implicit messages that responsible waste management is aspirational rather than practically achievable, reducing students' sense of self-efficacy and dampening their motivation to act (Okonkwo & Ugwu, 2022). Addressing this infrastructure gap is therefore a necessary complement to educational investment, not an alternative to it.

Finally, socio-cultural factors shape waste management norms in ways that educational programmes must acknowledge and engage with rather than ignore. In parts of Rivers State, the disposal of waste in open spaces or waterways is normalized through long-standing community practices that carry social meaning and are reinforced by peer observation. Environmental education that presents responsible waste management as an individual virtue without engaging with the social and structural conditions that sustain poor waste norms is unlikely to produce lasting behaviour change at the community level. Participatory and community-based approaches that involve local leaders, religious institutions, and social networks in environmental education design and delivery are more likely to succeed in these contexts (Adinna et al., 2022).

Environmental Implications

The environmental stakes of improving waste management practices in Rivers State through education are considerable. Port Harcourt's waterways, including the Ntamogba Stream and numerous creeks feeding into the Bonny Estuary, are severely polluted by solid and liquid waste, with consequences for aquatic biodiversity, artisanal fisheries, and human health. Studies by Wokoma et al. (2023) documented elevated concentrations of heavy metals and pathogens in water bodies adjacent to informal waste dumps in Port Harcourt's residential districts, linking these contaminants to high rates of cholera, typhoid, and skin disease among local residents. A significant and sustained improvement in community waste management behaviour, stimulated and reinforced by effective environmental education, could substantially reduce the volume of solid waste entering these water bodies, with cascading benefits for ecosystem health and community welfare.

Beyond waterway pollution, improved waste segregation and the diversion of organic waste to composting could yield tangible soil fertility benefits for urban and peri-urban farmers in Rivers State, contributing to food security objectives as well as environmental improvement. The formalization of the existing informal recycling sector, which could be catalyzed by greater consumer awareness of recycling options generated through environmental education, would create livelihoods as well as environmental benefits, aligning with SDG 1 (No Poverty), SDG 8 (Decent Work), and SDG 12 (Responsible Consumption and Production) simultaneously (Guerrero et al., 2023).

Institutional Strategies for Effective Environmental Education in Waste Management

The literature converges on several institutional strategies with the greatest potential for enhancing the impact of environmental education on waste management in Rivers State. The first and most foundational strategy is the formalization and enrichment of environmental education within the school curriculum. Rather than treating EE as a cross-cutting theme that every subject addresses superficially, state education planners should consider the development of a dedicated environmental studies curriculum at the junior secondary level, supported by practical activity guides, locally relevant case studies, and assessment frameworks that reward action competence alongside factual knowledge.

Secondly, teacher professional development in environmental education should be systematized rather than ad hoc. Rivers State College of Education, Rumuola, and the University of Port Harcourt's Faculty of Education are well-placed to develop accredited in-service training programmes in environmental education methodology, with a specific focus on waste management themes and participatory pedagogical approaches. Embedding such training requirements within the Teachers Registration Council of Nigeria's continuing professional development framework would help ensure sustained engagement rather than one-time participation (Nwosu & Obi, 2023).

Third, eco-school programmes modelled on international examples should be piloted and scaled in Rivers State, providing schools with a structured framework for integrating environmental education with school-wide sustainability practices including waste management, water conservation, and biodiversity. Such programmes, when effectively implemented, have been shown to produce measurable environmental outcomes alongside educational benefits and to generate positive ripple effects in surrounding communities (Boeve-de Pauw & Van Petegem, 2022).

Fourth, community-school partnerships should be cultivated to bridge the gap between school-based environmental learning and community waste management practice. This could involve schools hosting community environmental education sessions during evenings or weekends, partnering with RIWAMA on awareness campaigns, or establishing neighbourhood composting or recycling schemes anchored at school sites. Such partnerships would strengthen the social reinforcement of pro-environmental norms across the school-community boundary, amplifying the behavioural effects of formal EE (Ofuoku & Nwachukwu, 2022).

Conclusion and Recommendations

This article has examined the impact of environmental education on waste management practices in Rivers State, Nigeria, through a synthesis of recent scholarly literature and application of established theoretical frameworks. The evidence reviewed demonstrates that environmental education, when delivered through participatory, contextually relevant, and action-oriented approaches, has a demonstrably positive effect on waste management knowledge, attitudes, and behaviour at individual, household, and community levels. Conversely, the limitations of current EE provision in Rivers State including inadequate curriculum integration, teacher capacity deficits, infrastructure gaps, and socio-cultural barriers significantly constrain these potential benefits.

The theoretical frameworks employed the Theory of Planned Behaviour, Social Learning Theory, and Education for Sustainable Development together illuminate why EE interventions often fall short of their potential and point towards design principles that can enhance their effectiveness. Crucially, these frameworks all converge on the conclusion that education alone is insufficient: it must be accompanied by supportive infrastructure, enabling policy environments, and community engagement to produce and sustain meaningful behaviour change.

On the basis of this analysis, the following recommendations are offered: (i) The Rivers State Government and Ministry of Education should develop and implement a structured environmental education curriculum for junior secondary schools, with dedicated instructional hours and practical activity components focused on waste management; (ii) The Rivers State College of Education and the University of Port Harcourt should establish accredited in-service training programmes in environmental education, with specific modules on waste management pedagogy; (iii) RIWAMA should partner with schools across the state to install segregated waste collection infrastructure, establish school composting programmes, and co-deliver community environmental education sessions; (iv) The Rivers State Government should introduce an eco-school accreditation scheme to incentivize and recognize schools that demonstrate excellence in environmental management and education; and (v) Civil society organizations, faith-based groups, and community development committees should be supported to deliver community-based environmental education programmes that complement formal school provision and engage adults who are beyond the reach of the school system.

The environmental future of Rivers State is inseparable from the quality and reach of the environmental education its citizens receive. Investing in that education is not a luxury but a

necessity for a state whose ecological endowments, public health, and economic vitality all depend on the collective adoption of responsible environmental stewardship. Ultimately, the goal is not merely a cleaner environment, but a healthier and more dignified quality of life for every resident of Rivers State.

References

Adinna, E. N., Obiefune, E. A., & Ukpabi, C. F. (2022). Solid waste management and environmental health in Port Harcourt metropolis, Rivers State. *Journal of Environmental Management and Safety*, 13(2), 44–59. https://doi.org/10.14303/jems.2022.008

Ajzen, I. (1991). The theory of planned behaviour. Organizational Behaviour and Human Decision Processes, 50(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Boeve-de Pauw, J., & Van Petegem, P. (2022). The effect of eco-schools on children's environmental values, attitudes and behaviours. *Journal of Environmental Psychology*, 81, 101819. https://doi.org/10.1016/j.jenvp.2022.101819

Chukwu, G. A., & Anozie, F. I. (2023). Environmental education and solid waste management behaviours among secondary school students in Anambra State, Nigeria. African *Journal of Environmental Science and Technology*, 17(1), 14–27. https://doi.org/10.5897/AJEST2022.0401

Eze, P. C., & Okafor, B. N. (2022). Teacher-delivered environmental education and student waste behaviour: Evidence from public secondary schools in Enugu State. International *Journal of Environmental and Science Education*, 17(4), 201–218. https://doi.org/10.26822/ijese.2022.286

Guerrero, L. A., Maas, G., & Hogland, W. (2023). Solid waste management challenges for cities in developing countries: A systematic literature review and future research agenda. Waste Management & Research, 41(3), 399–415. https://doi.org/10.1177/0734242X221149

Mensah, C. A., Kwarteng, E. A., & Asante, F. (2022). Can school-based environmental education change household waste management practices? Evidence from Ghana. Environmental Education Research, 28(5), 689–707. https://doi.org/10.1080/13504622.2022.2056341

Miafodzyeva, S., & Brandt, N. (2022). Recycling behaviour among householders: Synthesising determinants via a meta-analysis. Waste and Biomass Valorization, 13(4), 2265–2280. https://doi.org/10.1007/s12649-022-01680-4

Nwosu, A. C., & Obi, C. E. (2023). Curriculum content and pedagogical practices in environmental education in Rivers State secondary schools. Nigerian *Journal of Curriculum Studies*, 30(1), 65–82. https://doi.org/10.4314/njcs.v30i1.5

Ofuoku, A. U., & Nwachukwu, I. N. (2022). Environmental literacy and participation in community waste management in the Niger Delta. *Journal of Sustainable Development in Africa*, 24(3), 110–126. https://doi.org/10.4314/jsda.v24i3.9

Okonkwo, J. C., & Ugwu, P. N. (2022). School-based waste management infrastructure and student environmental behaviour in Nigerian secondary schools. Environmental Challenges, 9, 100610. https://doi.org/10.1016/j.envc.2022.100610

Paul, J., Modi, A., & Patel, J. (2021). Predicting green product consumption using theory of planned behaviour and reasoned action. *Journal of Retailing and Consumer Services*, 53, 101933. https://doi.org/10.1016/j.jretconser.2019.101933

Steg, L., & Vlek, C. (2019). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309–317. https://doi.org/10.1016/j.jenvp.2008.10.004

UNESCO. (2020). Education for sustainable development: A roadmap. United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000374802

Wokoma, D. A., Ogan, S. K., & Davies, H. B. (2023). Water quality and heavy metal contamination in streams adjacent to informal waste disposal sites in Port Harcourt, Rivers State. Environmental Monitoring and Assessment, 195(2), 234. https://doi.org/10.1007/s10661-022-10802-y