

The Impact of Community-Driven Science Projects in Strengthening Public Trust in Environmental Policies

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ABSTRACT

Effective environmental governance rests on two things: how willing citizens are to get involved, and how much confidence they place in the bodies that make and enforce environmental rules. Community-driven science projects, more widely known as citizen science, have become a practical way of drawing ordinary people into environmental monitoring, data collection, education, and the day-to-day work of putting policy into effect. Focusing on Jalingo, Taraba State, Nigeria, this study examined how such projects — specifically community-led water quality monitoring, air pollution monitoring, and biodiversity survey initiatives — shape public trust in environmental policy, looking specifically at whether citizen monitoring builds transparency and accountability, whether it raises environmental awareness and scientific literacy, and whether it deepens community ownership and participation. A descriptive survey design was adopted, with data drawn from 384 community members involved in these environmental projects in Jalingo through a structured five-point Likert questionnaire, analysed using descriptive statistics, Pearson correlation, and multiple regression. Transparency and accountability were found to correlate significantly and positively with public trust ($r = 0.672$, $p < 0.05$); environmental awareness and scientific literacy also had a positive influence; and together with community ownership and participation, these three factors accounted for 64.8% of the variance in public trust ($R^2 = 0.648$, $F = 117.426$, $p < 0.05$). The study concludes that community-driven science projects are a workable strategy for strengthening environmental governance through broad participation, sharper accountability, and greater public confidence, and recommends stronger government support, formal integration of citizen science into policy processes, and greater investment in community-based environmental education.

Keywords: community-driven science, citizen science, environmental governance, public trust, transparency, scientific literacy, community participation

INTRODUCTION

Community-driven science projects — commonly called citizen science — have become a recognised part of environmental governance and sustainable development practice around the world. Through them, ordinary people take an active part in monitoring, inquiry, and data collection that feeds into evidence-based policymaking, on issues ranging from climate change and biodiversity loss to air and water pollution. The United Nations Environment Programme (UNEP, 2023) observes that citizen involvement in environmental science tends to produce greater transparency, stronger accountability, higher public confidence in environmental institutions, and more environmentally responsible behaviour. Across Africa, persistent pressures — desertification, deforestation, flooding, water pollution, and unpredictable weather patterns — continue to strain livelihoods and slow sustainable development, and limited institutional capacity has pushed governments toward more participatory approaches. UNESCO (2024) reports that citizen science initiatives on the continent support environmental monitoring, aid climate adaptation, promote social inclusion, and build resilience by combining scientific method with indigenous knowledge.

In Nigeria, community-driven science is gradually taking shape as a tool for tackling problems such as oil pollution in the Niger Delta, urban flooding, waste management, and land degradation, with communities increasingly drawn into monitoring and advocacy that feeds into policy. Even so, citizen science remains

underused in the country, held back by limited funding, weak technical capacity, poor links to policymaking, and thin institutional support. Because environmental policy can only succeed with citizen cooperation and compliance, and because weak public trust in environmental institutions tends to breed resistance to implementation, community-driven science offers a channel for building that trust by drawing citizens directly into monitoring, research, and policy evaluation. This study set out to test, empirically, how far such projects contribute to strengthening public trust in environmental policy.

Purpose of the Study

This study investigated how community-driven science projects contribute to strengthening public trust in environmental policies. Specifically, it aimed to:

1. determine how transparency and accountability arising from community-driven science projects shape public trust in environmental policies;
2. establish the influence of environmental awareness and scientific literacy on public trust in environmental policies; and
3. assess how community ownership and participation affect public trust in environmental policies.

Statement of the Problem

Environmental policies exist to confront pressing environmental challenges and advance sustainable development, yet their success depends heavily on the degree of public trust and support they command. In many developing countries, Nigeria included, environmental policy is regularly hampered by public scepticism, weak citizen involvement, limited transparency, and fragile accountability structures. In numerous communities, environmental decisions are seen as handed down by government agencies with little genuine consultation — a perception that breeds distrust and dampens compliance. Gaps in environmental awareness and scientific literacy further leave many citizens without a clear grasp of environmental policy or the evidence behind it. Community-driven science projects have been proposed as one way to strengthen environmental governance and broaden public engagement, yet solid evidence of their actual contribution to public trust, particularly within Nigeria, remains scarce. This study was designed to close that gap.

Research Questions

This study was guided by the following research questions:

1. How far do transparency and accountability within community-driven science projects shape public trust in environmental policies?
2. In what ways do environmental awareness and scientific literacy influence public trust in environmental policies?
3. How does community ownership and participation affect public trust in environmental policies?

Hypotheses

The study tested the following null hypotheses at the 0.05 level of significance:

H01: Community-driven science projects have no significant influence on transparency and accountability in environmental governance.

H02: Community-driven science projects have no significant effect on environmental awareness and scientific literacy.

H03: Community-driven science projects have no significant influence on community ownership and participation.

LITERATURE REVIEW

Citizen science — the label commonly attached to community-driven science projects — brings ordinary members of the public into scientific work such as data collection, environmental monitoring, and knowledge generation, building a working relationship between scientists and the communities around them (Shirk et al., 2012). Fraisl et al. (2022) note that taking part in such projects deepens environmental awareness, strengthens community engagement, and cultivates a stewardship ethic. Public trust in environmental policy, in this context, refers to the confidence citizens hold in environmental institutions and in the processes used to craft and enforce environmental rules — confidence that shapes support, compliance, and willingness to participate (Levi & Stoker, 2000). Where citizens view policy as evidence-based, transparent, and inclusive, they tend to back conservation and sustainability efforts more readily (Stern & Coleman, 2015), and environmental governance itself — the institutions, policies, and stakeholder relationships through which environmental resources are managed — works best where transparency, accountability, participation, and collaboration are all present (Lemos & Agrawal, 2006).

This study rests on two theoretical foundations. Participatory Governance Theory (Fung & Wright, 2003) holds that citizen involvement in decision-making lends policy legitimacy, transparency, accountability, and effectiveness, though meaningful participation demands resources and knowledge that participants do not always have in equal measure, and participatory processes can be slow and unevenly representative. Social Capital Theory (Putnam, 2000) centres on how trust, social networks, and civic engagement enable cooperation and collective action; it explains how community-driven science forges bonds among citizens, scientists, and government that translate into public backing for environmental policy, though social capital itself is difficult to measure and can leave marginalised groups out. Together, the two frameworks help explain how participation and social ties combine to strengthen public trust in environmental policy.

A substantial body of empirical work supports these theoretical claims. Studies conducted across North America and Europe found that citizen involvement in environmental monitoring markedly improves transparency, data quality, scientific literacy, and public trust in environmental management (Conrad & Hilchey, 2011; Dickinson et al., 2012; Hecker et al., 2019). Reviewing the field globally, Fraisl et al. (2022) found that citizen science strengthens accountability, community engagement, and the legitimacy of environmental policy, describing it as a genuine route toward sustainable environmental governance. Within developing countries, and Africa in particular, UNESCO (2024) and Danielsen et al. (2014) reported gains in social inclusion, resilience, monitoring accuracy, and trust between communities and environmental institutions, while Bonney et al. (2016) linked citizen participation to stronger scientific knowledge and public understanding of scientific method. Much of this evidence, however, comes from developed countries or broad global reviews, leaving the specific relationship between community-driven science projects and public trust in environmental policy within a Nigerian setting largely unexamined — the gap this study addresses.

METHODOLOGY

This study adopted a descriptive survey design, chosen to capture first-hand accounts of respondents' experiences and perceptions of citizen science and environmental governance, with data collected in communities in Jalingo, Taraba State, Nigeria, where environmental monitoring activities were already under way. Specifically, respondents were drawn from three ongoing community-driven environmental projects: water quality monitoring, air pollution monitoring, and biodiversity surveys. The target population comprised community members, environmental volunteers, local leaders, and environmental agency staff directly engaged in these community-driven environmental projects. Cochran's formula for large populations yielded a sample of 384 respondents, selected through simple random sampling to give every member of the target population an equal chance of inclusion. Data were gathered using a structured questionnaire built on a five-point Likert scale (Strongly Agree = 5 to Strongly Disagree = 1); face and content validity were confirmed by experts in environmental studies and research methodology, while reliability was established through a pilot study using

Cronbach's Alpha, with a threshold of 0.70 or above taken as acceptable. Trained research assistants administered the questionnaires directly to respondents. Data were analysed using SPSS: descriptive statistics (frequencies, percentages, means, and standard deviations) summarised the responses, while Pearson correlation and multiple regression, applied at the 0.05 level of significance, tested the study's hypotheses.

RESULTS

In all, 384 questionnaire copies were administered and analysed. Of the respondents, 210 (54.7%) were male and 174 (45.3%) female, a reasonably balanced split, and the largest age group (32.6%) fell between 26 and 35 years, pointing to stronger involvement in community environmental activity among young and middle-aged adults (see Table 1).

Variable	Category	Frequency	Percentage (%)
Gender	Male	210	54.7
	Female	174	45.3
	Total	384	100.0
Age (years)	Below 18	[n]	[%]
	18–25	[n]	[%]
	26–35	125*	32.6
	36–45	[n]	[%]
	Above 45	[n]	[%]
	Total	384	100.0
Educational Level	Primary	[n]	[%]
	Secondary	[n]	[%]
	Tertiary	[n]	[%]
	Postgraduate	[n]	[%]
	Total	384	100.0
Occupation	Farmer	[n]	[%]
	Trader/Artisan	[n]	[%]
	Civil servant/Environmental agency staff	[n]	[%]
	Student	[n]	[%]
	Other	[n]	[%]
	Total	384	100.0

Years of Involvement in Project	Less than 1 year	[n]	[%]
	1–3 years	[n]	[%]
	Above 3 years	[n]	[%]
	Total	384	100.0

Table 1: Demographic Distribution of Respondents by Gender, Age, Educational Level, Occupation, and Years of Involvement

*Note: The 26–35 age-group frequency (marked *) is derived from the percentage reported in the text; frequencies and percentages for the remaining age brackets, educational level, occupation, and years of involvement (bracketed) should be completed from the authors' SPSS output before submission.*

Respondents rated all three constructs favourably. A grand mean of 4.24 for transparency and accountability shows agreement that transparency and accountability generated through community-driven science projects meaningfully strengthen public trust in environmental policy, and environmental awareness/scientific literacy and community ownership/participation were rated similarly favourably (decision rule: mean ≥ 3.00 = Agreed).

Hypothesis one held that community-driven science projects have no significant influence on transparency and accountability in environmental governance. Pearson correlation analysis found a significant, positive association between transparency and accountability and public trust in environmental policy ($r = 0.672$, $p < 0.05$), so the null hypothesis was rejected. Hypothesis two held that community-driven science projects have no significant effect on environmental awareness and scientific literacy; correlation analysis again found a significant, positive association ($p < 0.05$), and the null hypothesis was rejected. Hypothesis three held that community-driven science projects have no significant influence on community ownership and participation. Multiple regression analysis found that transparency and accountability, environmental awareness and scientific literacy, and community ownership and participation together accounted for 64.8% of the variance in public trust in environmental policy (see Table 2) ($R^2 = 0.648$, Adjusted $R^2 = 0.642$, $F = 117.426$, $p = 0.000$), and since every p-value fell below 0.05, the null hypothesis was rejected.

Statistic	r / R²	Adj. R²	F	p
H01: Transparency & Accountability (r)	0.672	—	—	0.000
H02: Environmental Awareness & Scientific Literacy	Sig.	—	—	0.000
H03: Multiple Regression (Overall Model)	0.648	0.642	117.426	0.000

Table 2: Summary of Correlation and Multiple Regression Analysis for Hypotheses One to Three (r = Pearson correlation coefficient; R^2 = coefficient of determination; significant at $p < 0.05$)

DISCUSSION

The finding that transparency and accountability significantly strengthen public trust suggests that citizens gain greater confidence in government environmental decisions once they have access to environmental information and a hand in monitoring activity, a pattern consistent with Conrad and Hilchey (2011) and Stern and Coleman (2015). The study also found that environmental awareness and scientific literacy positively shape public trust: a better grasp of environmental issues equips citizens to appreciate scientific evidence and back policy interventions, echoing Bonney et al. (2016) and Dickinson et al. (2012).

Community ownership and participation likewise emerged as a significant driver of public trust. When community members take an active role in environmental projects and decision-making, they develop a sense of

ownership that lifts both policy acceptance and compliance, a pattern that mirrors Danielsen et al. (2014). Taken together, the findings show that community-driven science projects work as an effective mechanism for advancing transparency, sharpening environmental awareness, encouraging participation, and ultimately building public trust in environmental policy, consistent with the Participatory Governance Theory and Social Capital Theory framing this study.

Illustrative Respondent Perspectives

To enrich the quantitative findings with a qualitative dimension, brief comments volunteered by respondents during questionnaire administration are noted below. These are illustrative rather than systematically coded qualitative data, and should be replaced with verbatim, consent-cleared excerpts from field notes or interview transcripts before submission:

“[Insert a brief respondent comment reflecting a perceived gain in transparency from participating in water quality monitoring.]”

“[Insert a brief respondent comment reflecting a sense of ownership or trust arising from involvement in air pollution monitoring or biodiversity surveys.]”

Limitations of the Study

This study is subject to a number of limitations that qualify the interpretation of its findings. First, the cross-sectional design captures respondents' perceptions at a single point in time and therefore cannot establish causal relationships between community-driven science participation and public trust; the associations reported should be read as correlational. Second, because data were collected through self-reported responses to a Likert-scale questionnaire, the findings may be affected by social desirability bias, with respondents inclined to present their attitudes and level of involvement more favourably than is actually the case. Third, the sample was drawn from communities engaged in citizen-science projects in Jalingo, Taraba State, so the findings may not generalise to communities elsewhere in Nigeria or to contexts where citizen science is less established. Future studies could address these limitations through longitudinal or quasi-experimental designs and by triangulating self-reported data with observational or administrative records.

Policy Implications

The findings carry direct implications for environmental governance reform in Nigeria. By demonstrating that transparency, environmental literacy, and community ownership jointly explain a substantial share of the variance in public trust, the study suggests that policymakers seeking to strengthen compliance with environmental regulations should treat citizen science not as a peripheral add-on but as a formal input into monitoring and reporting systems. Concretely, environmental agencies in Taraba State and beyond could establish clear channels for citizen-generated data to feed into official monitoring and enforcement decisions, publish regular feedback on how such data has been used, and build citizen-science participation requirements into environmental impact assessment and community development guidelines. Doing so would translate the transparency and ownership gains documented here into more durable institutional trust.

CONCLUSION AND RECOMMENDATION

This study examined how community-driven science projects contribute to strengthening public trust in environmental policies, and the findings show that citizen involvement in environmental monitoring and scientific activity plays a meaningful role in improving environmental governance. Such projects raise transparency by giving citizens a hand in data collection and environmental assessment, strengthen accountability by pressing institutions to respond more effectively to community concerns, raise environmental awareness and scientific literacy among participants, and deepen community ownership by turning citizens into active stakeholders. On this basis, the study concludes that community-driven science projects meaningfully improve public trust in environmental policy by advancing transparency, accountability, awareness, and inclusive participation.

Building on these findings, the study recommends that government and environmental agencies support community-driven science projects with adequate funding, technical tools, and institutional backing; that environmental education programmes be strengthened to raise public awareness and scientific literacy; that policymakers fold citizen-generated data into official environmental decision-making to sharpen transparency, accountability, and policy effectiveness; that community participation be fostered through regular engagement forums, workshops, and joint projects bringing citizens and government together; and that deliberate steps be taken to include women, youth, and marginalised groups in citizen science initiatives, so as to widen social equity and broaden environmental participation. The study further recommends that future research adopt longitudinal or quasi-experimental designs to examine the long-term effects of citizen science participation on environmental behaviour and policy compliance.

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