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From Biodiversity Awareness to Community Green Action: Roles of Risk Perception, Trust, and Information Exposure

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ABSTRACT

This paper investigates how biodiversity conservation awareness translates into community-based green action support by integrating perceived environmental risk, trust in community-based environmental initiatives, and environmental information exposure into an integrated behavioral model. By a quantitative cross-sectional survey of the University students (live or study in near Cenderawasih forest area), data were analyzed by PLS-SEM. The findings are presented as follows: biodiversity conservation awareness enhances perceived environmental risk and trust; these relations significantly facilitate support for community-based green actions, indicating that parallel mediation exists. Moreover, environmental information exposure enhances the vital link between awareness and the two mediators, thus providing evidence for its moderation effect. This study is innovative in the combined consideration of cognitive risk appraisal, relational trust mechanisms and informational boundary conditions within a biodiversity conservation context rather than simple linear awareness behaviour models. The results add theoretically to the systematization of biodiversity conservation with behavioral and governance insights while adding practical evidence for the need to complement awareness raising, risk communication, trust building and information sharing approaches on sustainable community-based biodiversity action.

1. Introduction

Loss of biodiversity is one of the most important environmental challenges in 21st century to stable ecosystem, human health and long-term sustainable development. Rapid habitat loss, climate change and uncontrolled human activities have seriously threatened biodiversity in both the terrestrial and aquatic environments. International agreements like the Convention on Biological Diversity and SDGs highlight the pressing unanswered call for conservation that is inclusive of wider society beyond just science and government. Recent reviews and assessments underscore how biodiversity conservation cannot be based exclusively on regulatory interventions but requires engagement of the society and participation of communities as determinants for successful processes of conservation (Sá, 2025; Sterling et al., 2017).

General awareness on biodiversity conservation is more and more considered to be a fundamental cause of pro-environmental action. Awareness promotes the comprehension of interconnections between human and natural systems and implications on food security, health, and economic resilience of biodiversity´s decline. Yet, knowing about conservation does not always lead to the active support to conservation. Recent behavioural environmental research indicates that perceived environmental risk is crucial in translating awareness into action: people perceiving there to be a higher ecological risk are more likely to express support for preventative and restorative environment measures (De Dominicis et al., 2015; Martin et al., 2009; O′ Neill & Nicholson-Cole, 2009).

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This risk-based cognitive process is particularly appropriate in the context of biodiversity, for which environmental impacts may be remote from and delayed relative to causes.

In addition to perceptions of individual risk, trust in local environmental efforts has been identified as a critical factor in shaping public support for conservation actions. Citizen-based green initiatives–like community conservation efforts, or grass-roots restoration and ecosystem stewardship programs rely on public trust in transparency, effectiveness and collective impact. Recent research in sustainability and environmental governance demonstrates that trust contributes to perceptions of legitimacy and encourages voluntary participation in the environment (Bernauer & Gampfer, 2013; Stupak et al., 2021) . Trust as an approach using a social mechanism in biodiversity the concept of trust connects scientific purpose with community engagement, however surprisingly it has not been explored widely by biological studies and less evidence are available to guide survey-based empirical models (Buchana, 2025; Patiño et al., 2022).

Despite the increasing focus on biodiversity awareness and pro-environmental behaviour, however, the empirical research has largely treated these constructs in isolation or tended to use attitude-based models that have ignored mediator and moderator variables. However, there is limited empirical evidence that combines risk perception with social trust to account for public support of community-based green actions in a biodiversity context. In addition, the fast growth of digital and informal environmental communication points to a boundary condition such as exposure to environmental information that may enhance or diminish awareness-driven behavioural paths. Recent interdisciplinary studies have called for integrated models that tie together biological conservation goals and psychological, informational and social processes in order to better account for public participation in sustainability (Razavi et al., 2025; Salim et al., 2025).

To fill these gaps, the present research examines how people's awareness of biodiversity conservation is related to support for community-based green actions, and whether perceived environmental risk and trust in the community based on environmental initiatives mediate this relationship. Furthermore, this study explores the moderating effect of exposure to environmental information on enhancing connections among awareness, perceived risk and trust. Using an empirical survey approach, the study contributes to the nascent literature of biodiversity conservation by providing an integrated behavioural model that combines biological sustainability targets with social and informational stimulants of community-level environmental behaviour.

The rest of the paper is organized as follows. Theoretical framework and research hypotheses Section 2 begins by summarizing theoretical backgrounds and latest empirical studies related to biodiversity conservation awareness, environmental risk perception, social trust and information exposure in order to have a basis for the hypothesis development. Section 3 presents research methodology that related to the form of survey, construct measurement and data collection method as well as analysis procedures. The final section (Section 4) shows results, while Section 5 discusses the findings in comparison to biodiversity and sustainability literature. Lastly, Section 6 concludes the study with the summary of main implications, limitations and avenues for future research.

2. Literature review and hypotheses development

2.1 Biodiversity conservation awareness and perceived environmental risk

Biodiversity conservation awareness refers to the extent to which individuals understand the importance of biological diversity, ecosystem services, and the consequences of biodiversity loss for human and environmental sustainability. In biological conservation literature, awareness is widely recognized as a prerequisite for fostering public engagement in conservation efforts, particularly in non-expert populations. Increased awareness enhances cognitive recognition of ecological interdependence and vulnerability, making biodiversity degradation more salient in everyday decision-making (Díaz et al., 2024; IPBES, 2023).

Recent interdisciplinary studies suggest that awareness alone may be insufficient to trigger behavioural support unless it is accompanied by a heightened perception of environmental risk. Perceived environmental risk reflects individuals′ subjective assessment of potential ecological, health, and socio-economic threats arising from biodiversity loss. Risk perception theory posits that individuals who perceive environmental risks as severe and personally relevant are more likely to support preventive and adaptive environmental actions (Zhou & Xiong, 2025). Within biodiversity contexts, awareness enhances individuals′ ability to recognized these risks, thereby strengthening perceived environmental vulnerability. Accordingly, this study proposes the following hypothesis:

Hypothesis1: Biodiversity conservation awareness positively influences perceived environmental risk.

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2.2 Biodiversity conservation awareness and trust in community-based environmental initiatives

Trust is a pivotal factor in the public's reaction to environmental and biological conservation measures. Faith in community-oriented environmental efforts means that people "trust and believe in equality, effectiveness, and legitimacy of local conservation programs and of collective green practices". In the sustainability governance literature, trust is recognized as a critical social process that fosters cooperation, reduces uncertainty and increases voluntary engagement in environmental projects (Bennett et al., 2018).

Arguably, for example from a biodiversity point of view, conservation understanding can enhance trust through enhancing people's grasp of conservation objectives, scientific underpinnings and anticipated ecological results. When people understand the threats to biodiversity, they are more able to judge that these community-led schemes are credible ones and see them as plausible means of addressing ecological decline. Recent research has shown that more informed individuals tend to have greater trust in environmental bodies and promote decentralized, community-based conservation projects (Stern et al., 2024). Hence, the following conjecture is suggested:
Hypothesis 2: Awareness of biodiversity conservation has a positive influence on trust in community-based environmental initiatives.

2.3 Perceived environmental risk & community support for green actions

Community support for green actions is the personal participation, advocacy, and donation regarding collective environmental efforts in biodiversity conservation. According to the risk perception theory, psychological mindset toward risks, may inspire people to support risk-mitigating solutions (Xie & Li, 2014), thus those who feel greater environmental risks will receive more motivation to do so. Within the frame of biodiversity, perceived threats such as ecosystem collapse, species extinction and environmental instability can evoke protective behavioural intentions and support for collective action (Stammen & Meissner, 2024). The empirical evidence from psychological and environmental psychology research shows that perceived environmental risk is a leading driver of public support for conservation policies and community-based environmental program. Those that perceive real risks from biodiversity loss are more likely to consider local conservation activities as appropriate reactions to environmental threats. Accordingly, this study hypothesis:

Hypothesis 3: The perception of environmental risks positively influences the support for the local green actions.

2.4 Trust in community environmental actions and the willingness to be environmentally friendly

Trust has repeatedly been cited as a key for public engagement in sustainability endeavors. As basis of CBNRM, trust increases perceived legitimacy and decreases distrust about the effectiveness of common actions. When people have confidence in local environmental programs, they are more inclined to engage with such programs in various forms of participation, purchasing and investment (Bennett et al., 2018). A number of recent analyses on conservation governance highlight that trust-based support is particularly crucial for community-led green acts, which often depend upon voluntary participation than formal enforcement. Trust allows people to see local initiatives as viable means of contributing to biodiversity conservation (Bae et al., 2025). Therefore, the following hypothesis is suggested:
Hypothesis 4: Community trust is positively related to support for community-based green actions.

2.5 Perceived environmental risk and trust

While awareness of biodiversity conservations conveys crucial knowledge, its impact on support behavior may occur indirectly through psychological and social pathways. Previous studies have shown that awareness-based behaviour is likely to be linked with the mediation of risk perception and trust assessment over individuals. In biodiversity conservation, awareness underpins the recognition of environmental risks and bolster confidence in joint conservation responses, ultimately generating support for displacement actions (van der Linden et al., 2023; Stern et al., 2024). The combined mediation of risk perception and trust as parallel mediators provides a fuller account of the process by which awareness translates into support for community action. This complements a growing demand in sustainability and conservation research for multi-mechanism models. Therefore, this study proposes:

Hypothesis 5a: Perceived environmental risk mediates the relationship between biodiversity conservation awareness and support for community-based green actions.
Hypothesis 5b: Trust in community-based environmental initiatives mediates the relationship between biodiversity conservation awareness and support for community-based green actions.

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2.6 Moderating role of environmental information exposure

Environmental exposure to information reflects the degree of individual sensory experience with bioinformation, mediated by means of digital media, public campaigns and informal education. It has been demonstrated that information exposure can enhances cognitive and affective reactions towards environmental issues by increasing the level of awareness and influencing interpretations of risks (Liu et al., 2024). In the area of biodiversity conservation, increased levels of information exposure may amplify the influences of awareness on perceived environmental risk and trust in conservation efforts. Those visiting these environmental information frequently will be more likely to internalize the biodiversity-related messages and their awareness would transform into forming stronger risk perception and level of trust sensitive. Consequently, this study hypothesises:

Hypothesis 6: Environmental information exposure positively moderates the relationship between biodiversity conservation awareness and perceived environmental risk.
Hypothesis 7: Environmental information exposure positively moderates the relationship between biodiversity conservation awareness and trust in community-based environmental initiatives.

2.7 Conceptual framework of biodiversity awareness, risk Perception, trust, and community green action support

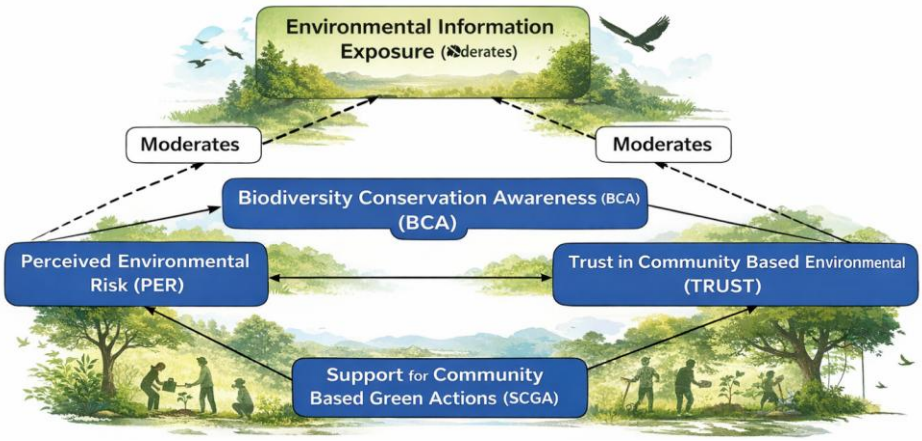

Figure 1. Conceptual model of biodiversity conservation awareness influencing support for community-based green actions through perceived environmental risk and trust, with environmental information exposure as a moderating factor.

3. Methods

3.1 Research design

This research used quantitative cross-sectional survey design to investigate the associations among biodiversity conservation awareness, perceived environmental risks, trust in community-based environmental activities and willingness to support community-based green actions. For instance survey-based methods are broadly applied in biodiversity and sustainability research to tap into underlying psychological and social constructs that shape pro-environmental behavior (Hair et al., 2022; van der Linden et al., 2023). Conceptually, this kind of approach is consistent with the theory of risk perception and trust to environmental governance which focus on subjective perceptions in relation to cognitive processes that determine conservation behaviors (Stern et al., 2024). Recent Scopus-indexed articles validate the use of self-report survey data for measuring awareness- induced behavioural support in biodiversity and environmental sustainability settings (Liu et al., 2024; Salim & Rahman, 2025).

3.2 Study area and context of the research

The study was carried out in the Cenderawasih forest, an area known for its high biodiversity value and ecological importance. The context of the present study is consistent with place-based conservation theory in which direct proximity to ecologically important landscapes increase awareness, perceived risk, and behaviour concerning conservation (Chapin et al., 2023). Highly species-rich forest ecosystems are frequently under growing anthropogenic pressure and constitute a key environment for the study of public responses to biodiversity-related challenges (IPBES, 2023). Recent studies on conservation have shown that communities and schools residing near biodiversity hotspots are more likely to be aware of conservation issues and to support community-based environmental projects than individuals who rely on experiencing ecological exposure indirectly (Bennett et al., 2023; Díaz et al.,

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2024). Therefore, the Cenderawasih forest area serves as an appropriate empirical testing ground for studying awareness of biodiversity conservation and support for community-based green action.

3.3 Population and sample

The population for this study was university students, who increasingly are acknowledged to be key social agents in the realm of biodiversity conservation and sustainability transitions. Theoretical framework •Youth environmental engagement theory: students has higher adaptive capacity, environmental learning potential and responsiveness to sustainability information than other demographic (Arora-Jonsson et al., 2023). Biodiversity perception and conservation awareness of students have been reported to be associated with the distances from educational institutions and digital information sources (Salim et al., 2024; Liu et al., 2024). Note: A purposive sampling method was used to sample active students who have some background in the environmental or biodiversity issues topic. This approach is commonly used in survey-based environmental research, where the target population is conceptual rather than statistically identified (Hair et al., 2022).

3.4 Data collection procedure

A structured questionnaire survey was conducted from September 2024 to May, 2025 among university students for data collection. Online and aided off-line administration was used to encourage use of the questionnaire, particularly in forest and conservation-adjacent locations so to ensure response rate. This mixed model approach is highly recommended in the environmental and sustainability research for reducing any sample bias as well as enhancing data quality (Hair et al., 2022). The analysis of the survey items for clarity, contextual relevancy and content validity was checked before the commencement of full implementation. Respondents were invited to participate in the study on a voluntary basis and they received an explanation about the purpose of the study. Participation was anonymous and confidential, following ethical guidelines for survey-based environmental and behavioural research (Stern et al., 2024; Liu et al., 2024).

3.5 Measurement of variables

All study constructs were measured using multi-item scales, as per relevant environmental behaviour and biodiversity conservation literature. Responses were captured on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), which is widely used in sustainability and conservation survey research to measure latent psychological and social constructs in a reliable manner (Hair et al., 2022). The reflective measurement model approach is in line with behaviouralenvironmental theory's understanding of awareness, risk perception, trust and behavioural support as internally generated constructs that are evident through observable indicators (Stern et al, 2024).

Biodiversity Conservation Awareness (BCA) was assessed with questions that are about the importance of and services provided by biodiversity, conservation challenges etc. indicating cognitive awareness dimensions already applied by nature related studies (Díaz et al., 2024). Perceived Environmental Risk (PER) examined respondents′ perceptions of ecological, health and socio-economic risks linked with biodiversity loss as an application of environmental risk perception theory (van der Linden et al., 2023). Trust in Community-Based Environmental Initiatives (TRUST) assessed participants′ trust in local green initiatives in terms of their credibility, transparency, and effectiveness within the framework of trust-based environmental governance (Bennett et al., 2023). Support for Community-Based Green Actions (SCGA) gauged respondents′ intention to be involved in, finance or promote community-based projects concerning biodiversity interventions, according to pro-environmental behaviour research (O′Neill & Nicholson-Cole, 2024). Finally, Environmental Information Exposure (EIE) assessed how often and how strong were the respondents′ exposure to biodiversity-related information through digital media, campaigns and informal learning channels, in line with previous studies on information-driven environmental engagement (Liu et al., 2024).

3.6 Analysis data

Data were analysed by Partial Least Squares Structural Equation Modelling (PLS-SEM), using SmartPLS software which has been recommended for studying complex relationships between latent variables, mediation effects and moderating effect in environmental behaviour research (Hair et al., 2022). The analysis was conducted in two stages including testing the reflective measurement model and testing of the structural model. Outside loadings, composite reliability, average variance extracted and HTMT criterion were used to analyze reliability and validity. Structural paths were examined via bootstrapping 5,000 resamples to analyse the significance of the path, the mediation through trust and moderation of environmental information exposure. This methodology is consistent with up-to-date sustainable and bio-diversity research standards.

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4. Results and findings

4.1 Measurement model assessment

As shown in Table 1 (Outer loadings of measurement indicators), all the items have high loading on their corresponding constructs, which are greater than the minimum threshold of 0.70. All of these aspects are measured with indicators, which show a high indicator reliability: Biodiversity Conservation Awareness (BCA), Environmental Information Exposure (EIE), Perceived Environmental Risk (PER), Support for Community-Based Green Actions (SCGA) and Trust in Community-Based Environmental Initiatives (TRUST). The interaction term (EIE × BCA) also evidences a perfect loading as it should for a single-indicator moderation variable. These findings provide evidence that each item adequately reflects its corresponding latent variable and the appropriateness of the measurement model, hence, enabling us to further evaluate the structural model.

Table 1. Outer loadings of measurement indicators

	(BCA)	(EIE)	(PER)	(SCGA)	(TRUST)	(EIE) x (BCA)
BCA1	0.854					
BCA2	0.862					
BCA3	0.844					
BCA4	0.907					
BCA5	0.891					
EIE1		0.880				
EIE2		0.889				
EIE3		0.892				
EIE4		0.868				
EIE5		0.819				
PER1			0.892			
PER2			0.864			
PER3			0.870			
PER4			0.851			
PER5			0.843			
SCGA1				0.882		
SCGA2				0.900		
SCGA3				0.873		
SCGA4				0.864		
SCGA5				0.853		
TRUST1					0.853	
TRUST2					0.886	
TRUST3					0.894	
TRUST4					0.809	
TRUST5					0.884	
(EIE) x (BCA)						1.000

From the findings in Table 2 (Reliability and convergent validity results) it can be seen that all constructs have good reliability and are valid as per the thresholds. The values of Cronbach's alpha and composite reliability are greater than 0.90 for all the constructs, indicating high internal consistency. Moreover AVE values vary from.747 to.765 that is higher than the minimum level of AVE=0.50. These results indicated that a considerable amount of variance is explained by the constructs from which they are derived, demonstrating convergent validity. On the whole, Table 2 demonstrates solid evidence that the measurement instruments in this present study are reliable and valid for measuring biodiversity awareness, environmental risk perception, trust, information exposure and support for community-based green actions.

Table 2. Reliability and convergent validity results

Construct Variable	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Biodiversity Conservation Awareness (BCA)	0.921	0.924	0.941	0.760
Environmental Information Exposure (EIE)	0.920	0.924	0.940	0.757

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Perceived Environmental Risk (PER)	0.915	0.918	0.936	0.747
Support for Community-Based Green Actions (SCGA)	0.923	0.925	0.942	0.765
Trust in Community-Based Environmental Initiatives (TRUST)	0.916	0.919	0.937	0.749

Table 3 (HTMT standards) shows that there is good discriminant validity between all the latent constructs. All of the heterotrait–monotrait (HTMT) values are below 0.85, suggesting that each construct is empirically distinct from the other constructs. The interaction construct (EIE × BCA) also appears to have low HTMT values with all the main constructs, thus indicating that Conceptually it does not overlap its constituting variables. These findings facilitated to infer the measurement model adequately discriminates awareness, information exposure, risk perception and trust as well as behaviour support constructs thus increased confidence in interpretation of subsequent structural model results.

Table 3. HTMT results

Matrix	(BCA)	(EIE)	(PER)	(SCGA)	(TRUST)	(BCA)
Biodiversity Conservation Awareness (BCA)						
Environmental Information Exposure (EIE)	0.675					
Perceived Environmental Risk (PER)	0.705	0.532				
Support for Community-Based Green Actions (SCGA)	0.762	0.567	0.677			
Trust in Community-Based Environmental Initiatives (TRUST)	0.756	0.668	0.558	0.747		
Environmental Information Exposure (EIE) x Biodiversity Conservation Awareness (BCA)	0.147	0.086	0.209	0.159	0.203	

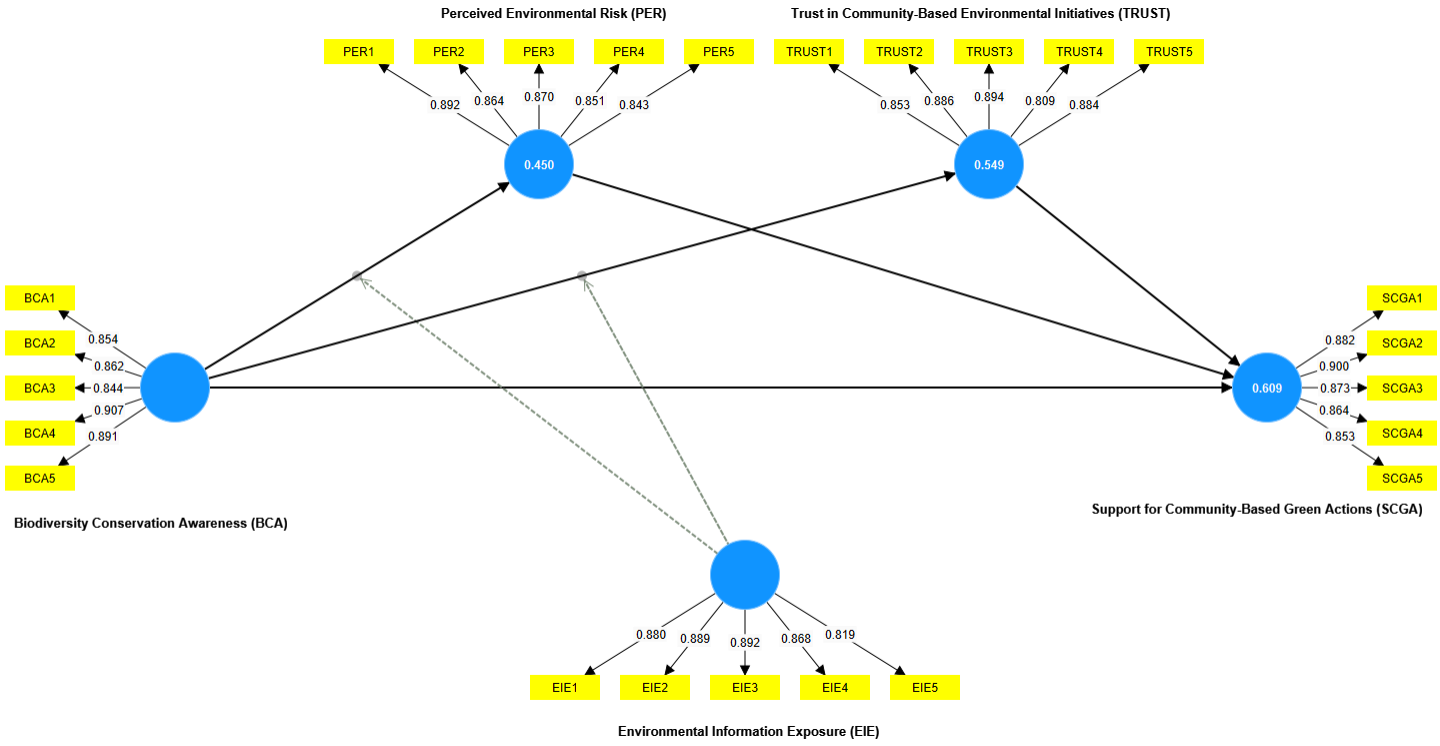

Figure 2. Measurement model (outer model) with standardised indicator loadings

4.2 Structural model results and hypothesis testing

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As can be seen in Table 4 (structural path coefficients and hypothesis testing results) all of the hypothesized direct relationships are statistically significant. Support for Community-Based Green Actions (SCGA) is massively affected by Biodiversity Conservation Awareness (BCA), Perceived Environmental Risk (PER), and Trust (TRUST) in a positive manner, while both PER and TRUST have positive strong effects upon SCGA. The direct effect of BCA on SCGA also remains significant (partial mediation). Secondly, Environmental Information Exposure (EIE) is also observed to bear significant direct effects on PER and TRUST. Notably, the interaction terms (EIE × BCA) are both significantly related to PER and TRUST, which suggests that moderation effects exist. In sum, Table 4 offers an assessment on the substantial empirical support for our a priori proposed structural paths.

Table 4. Structural path coefficients and hypothesis testing results

Relationship	Path coefficient (β)	t-value	p-value	Result
BCA → PER	0.547	8.924	0.000	Supported
BCA → TRUST	0.500	8.797	0.000	Supported
PER → SCGA	0.250	4.389	0.000	Supported
TRUST → SCGA	0.356	5.857	0.000	Supported
BCA → SCGA	0.294	4.16	0.000	Supported
EIE → PER	0.143	2.145	0.032	Supported
EIE → TRUST	0.295	5.364	0.000	Supported
EIE × BCA → PER	0.126	2.321	0.020	Supported
EIE × BCA → TRUST	0.111	2.473	0.013	Supported

As reported in Table 5 (R^2 and *p* red), the structural model accounts for a moderate to high amount of explained variance in the endogenous constructs. The R^2 values were greatest for PER (0.450), followed by TRUST (0.549) and SCGA (0.609). All corresponding Q^2 values (Table 3) are substantially larger than zero and hence the model is predictive in terms of external sets. These findings indicate the explanatory and predictive efficacy of biodiversity awareness, exposure to environmental information, risk perception and trust, as a whole, in decision-making about community-based green action support.

Table 5. Coefficient of determination (R^2) and predictive relevance (Q^2)

Endogenous construct	R^2	R^2 adjusted	Q^2 (cross-validated redundancy)
PER	0.45	0.443	0.323
TRUST	0.549	0.543	0.403
SCGA	0.609	0.604	0.459

Results from Effect size (Table 6) shows the magnitude of change in the endogenous relationship also, it indicates contributors by each predictor to the endogenous constructs. Medium effect sizes for BCA → PER, BCA → TRUST, and TRUST → SCGA emphasize that the importance of awareness and trust cannot be understated to pro-environmental support. Additionally, for the pathways of PER → SCGA and BCA → SCGA, as well as both type of paths with Environmental Information Exposure the effect is relatively weaker but significant. Moreover, the interaction effects have small effect sizes typical of moderation analyses in behavioral research. In sum, Table 6 supports both the substantive and supplemental roles of proposed relationships.

Table 6. Effect size (f^2) result

Relationship	f^2	Effect size
BCA → PER	0.328	Medium
BCA → TRUST	0.334	Medium
TRUST → SCGA	0.164	Medium
PER → SCGA	0.091	Small
BCA → SCGA	0.088	Small
EIE → PER	0.023	Small
EIE → TRUST	0.118	Small
EIE × BCA → PER	0.023	Small

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EIE × BCA → TRUST	0.021	Small

Note: Effect size interpretation follows common thresholds (0.02 = small, 0.15 = medium, 0.35 = large).

4.3 Mediation Effects

Specific indirect effects and mediation analysis results (see Table 7) also verified that both Perceived Environmental Risk and Trust are significant mediators. Indirect effects of Biodiversity Conservation Awareness on Support for Community-Based Green Actions Indirect effects of Biodiversity Conservation Awareness on Support for Community-Based Green Actions occur indirectly through PER and TRUST, with both mediation paths significant. Furthermore, Exposure and the BCA interact significantly with both indirects. These results suggest that awareness correlates with supportive behavior via increased risk perception, more trust in community-based action thus lending credence to the posited mediation pathways.

Table 7. Specific indirect effects and mediation analysis results

Indirect	Specific indirect effect (β)	t-value	p-value	Result
BCA → PER → SCGA	0.137	3.650	0.000	Supported
BCA → TRUST → SCGA	0.178	4.604	0.000	Supported
EIE → PER → SCGA	0.036	1.990	0.047	Supported
EIE → TRUST → SCGA	0.105	3.979	0.000	Supported
(EIE×BCA) → PER → SCGA	0.032	2.139	0.032	Supported
(EIE×BCA) → TRUST → SCGA	0.040	2.399	0.016	Supported

4.4 Moderation Effects

Table 8 (Effect of environmental information exposure) shows that Environmental Information Exposure, significantly moderates the effects between Biodiversity Conservation Awareness and Perceived Environmental Risk and Trust. The interaction effects of the environmental information exposure are positive, which suggests that cities with higher exposure to environmental information tend to exaggerate the impacts of attentive awareness in risk perception and trust formation. These findings indicate that in information-rich environments the effectiveness of biodiversity awareness for driving evaluative and trust-based responses might be enhanced, underlining the strategic relevance of environmental communication for global efforts to conserve biodiversity.

Table 8. Moderating effects of environmental information exposure on structural relationships

Moderation path	Interaction effect (β)	t-value	p-value	Result
EIE × BCA → PER	0.126	2.321	0.02	Supported
EIE × BCA → TRUST	0.111	2.473	0.013	Supported

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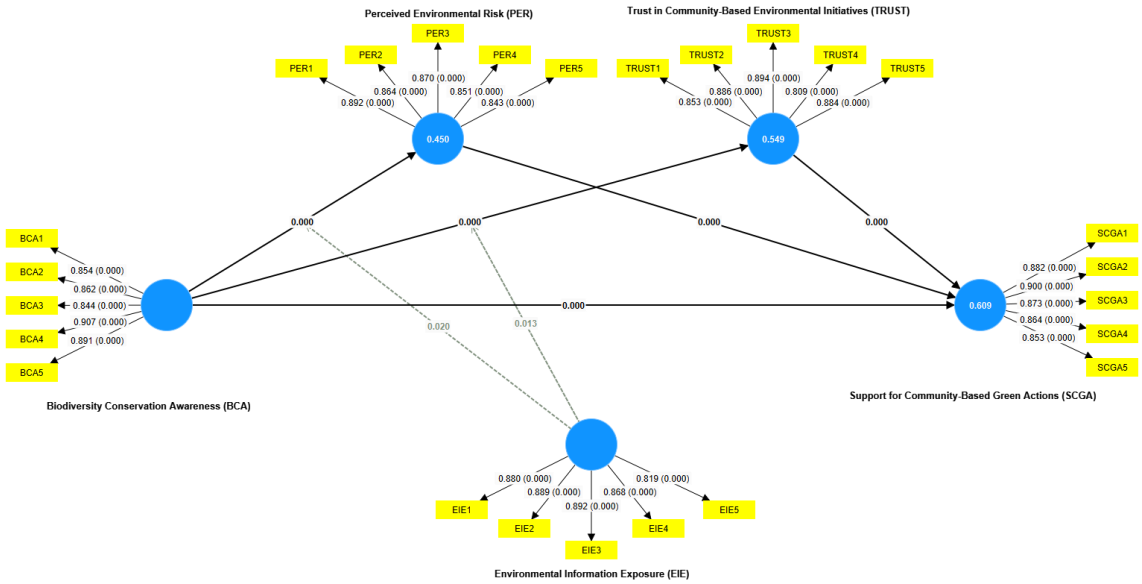

Figure 3. Structural model (inner model) with standardised path coefficients and R² values

5. Discussion

5.1 Theoretical implications

This study offers several theoretical contributions to biodiversity conservation and pro-environmental behaviour literature. First, the findings reinforce environmental awareness–behaviour frameworks by demonstrating that biodiversity conservation awareness influences behavioural support primarily through cognitive and relational mechanisms, rather than through a direct pathway alone. This supports Value–Belief–Norm (VBN) theory, which posits that awareness shapes behaviour by activating beliefs about environmental consequences and perceived responsibility (Stern, 2000; Stern et al., 2024). In this study, perceived environmental risk functions as a belief-based appraisal that translates awareness into action-oriented support.

Second, the mediating role of trust extends institutional trust and environmental governance theory by confirming that trust in community-based initiatives is a critical social mechanism linking awareness to collective environmental behaviour. Consistent with legitimacy theory, individuals are more likely to support conservation actions when they perceive implementing actors as credible and trustworthy (Suchman, 1995; Bennett et al., 2023). This study empirically integrates trust into biodiversity behaviour models, an aspect often underdeveloped in biologically oriented conservation research. Third, the moderating effect of environmental information exposure aligns with information processing and elaboration theories, suggesting that awareness becomes more behaviourally influential in information-rich contexts (van der Linden et al., 2023). By positioning information exposure as a boundary condition, this study advances theoretical understanding of when and how biodiversity awareness translates into action.

5.2 Practical and policy implications

From a practical perspective, the findings suggest that biodiversity conservation strategies should move beyond awareness campaigns that focus solely on ecological facts. Instead, interventions should explicitly communicate environmental risks associated with biodiversity loss, as risk salience appears to motivate stronger behavioural support. Conservation organisations and educational institutions can leverage this by framing biodiversity messages in ways that connect ecological degradation to tangible environmental and societal consequences, consistent with recent conservation communication research (O′ Neill & Nicholson-Cole, 2024). The strong role of trust highlights the importance of transparent, community-based governance structures. Policymakers and conservation practitioners should prioritise participatory approaches, accountability mechanisms, and visible outcomes to

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strengthen public trust in local biodiversity initiatives. Trust-building practices are especially relevant in community-driven conservation settings, where long-term success depends on sustained public engagement (Bennett et al., 2023).

Moreover, the moderating role of environmental information exposure underscores the strategic value of digital media, educational platforms, and informal learning channels. Enhancing the frequency and quality of biodiversity-related information can amplify the effectiveness of awareness-building efforts. For conservation policy, this implies that investments in environmental communication infrastructures are not supplementary but central to fostering community-based green action support.

5.3 Limitations and future research directions

Despite its contributions, this study has several limitations that open avenues for future research. First, the use of a cross-sectional survey design limits causal inference. Although the proposed relationships are theoretically grounded, longitudinal or experimental designs could provide stronger evidence regarding the temporal dynamics between awareness, risk perception, trust, and behavioural support. Second, the study focuses on student respondents in a biodiversity-rich context, which may limit generalisability to other demographic groups or regions. Future studies could examine similar models among broader community populations, policymakers, or conservation practitioners to capture more diverse perspectives. Third, while this study conceptualises biodiversity conservation awareness as a unidimensional construct, future research could explore multidimensional awareness components, such as ecological knowledge, emotional attachment to nature, and moral obligation. Additionally, integrating objective biodiversity indicators or conservation outcomes could further strengthen the linkage between biological conditions and social responses. Overall, future research should continue bridging biological conservation science with behavioural and governance perspectives to better understand how human dimensions shape biodiversity protection outcomes.

6. Conclusion

Our results offer an integrated understanding of biodiversity conservation awareness leading support towards community-based green actions by focusing on the combined effects of perceptions of environmental risk, trust in community-based environmental initiatives and exposure to environmental information. This research suggests that awareness by itself does not necessarily translate into pro-conservation support but instead acts via cognitive risk assessment and relational trust-building processes, contributing to behavioural outcomes in the context of biodiversity conservation.

The main contribution of the present study is to combine risk perception and trust as parallel mediating mechanisms with environmental information exposure as a moderator, in one empirical model. By placing information exposure as a boundary condition for the mediation process, our research contributes to previous models of biodiversity and pro-environmental behaviour where awareness–behaviour effects are theorised as linear and unconditional. This solution gives a finer-grained view of when and why biodiversity awareness is behaviourally successful.

Contribution of the Study The present study contributes theoretically by linking ecological conservation perspectives with behaviors and governance viewpoints, enhancing environmental theories of behavior by incorporating trust and information dynamics into models focused on biodiversity. From a practical point of view, the results highlight how effective biodiversity conservation strategy requires addressing awarenes buildawareness, share knowledge about environmental problemstrengthentrust in local initiativefacilitateaccesstrustworthy environmental policyrelevant information. In summary, this research highlights the need for incorporating social–cognitive processes into biodiversity conservation to encourage sustained community green action support.

Author Contributions

Conceptualization, S.L.M. and E.K.R.; methodology, S.L.M.; data collection, S.L.M. and E.K.R.; data analysis, S.L.M.; writing–original draft preparation, S.L.M.; writing–review and editing, E.K.R.; supervision, E.K.R. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interest.

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Ethical Approval

This study was conducted in accordance with ethical standards for social and behavioural research. Ethical approval was obtained from the relevant institutional ethics committee of Universitas Cenderawasih.

Informed Consent Statement

Informed consent was obtained from all participants involved in the study. Participation was voluntary, and respondents were assured of anonymity and confidentiality.

Appendix A1. Measurement Items variable and indicator research

Code	Variable (Short Name)	Item Code	Statement	Source
BCA	Biodiversity Conservation Awareness	BCA1	I understand the importance of biodiversity for ecosystem balance.	Díaz et al. (2024), Nature Sustainability
		BCA2	Biodiversity loss can negatively affect human well-being and livelihoods.	Díaz et al. (2024), Nature Sustainability
		BCA3	Conserving biodiversity is essential for long-term environmental sustainability.	IPBES (2023); Díaz et al. (2024)
		BCA4	I am aware of current threats to biodiversity in natural ecosystems.	Díaz et al. (2024), Nature Sustainability
		BCA5	Biodiversity conservation should be a priority for society.	Stern et al. (2024), Elsevier – Global Environmental Change
PER	Perceived Environmental Risk	PER1	Biodiversity loss poses serious risks to environmental stability.	van der Linden et al. (2023), Elsevier – Journal of Environmental Psychology
		PER2	Environmental degradation caused by biodiversity loss threatens human health.	van der Linden et al. (2023), JEP
		PER3	Loss of biodiversity increases long-term ecological risks.	O'Neill & Nicholson-Cole (2024), Wiley – Risk Analysis
		PER4	Biodiversity loss may lead to economic and social problems.	van der Linden et al. (2023), JEP
		PER5	I feel concerned about the future impacts of biodiversity degradation.	O'Neill & Nicholson-Cole (2024), Wiley
TRUST	Trust in Community-Based Environmental Initiatives	TR1	I trust community-based environmental initiatives to protect biodiversity.	Bennett et al. (2023), Elsevier – Conservation Biology
		TR2	Local environmental groups manage conservation activities responsibly.	Bennett et al. (2023), Conservation Biology
		TR3	Community-based green actions are effective in conserving biodiversity.	Stern et al. (2024), Global Environmental Change
		TR4	I believe local conservation initiatives are transparent in their activities.	Bennett et al. (2023), Elsevier
		TR5	I have confidence in community-led environmental programs.	Stern et al. (2024), Elsevier
SCGA	Support for Community-Based Green Actions	SCGA1	I am willing to participate in community-based environmental activities.	Stern et al. (2024), Elsevier – GEC
		SCGA2	I support local initiatives aimed at biodiversity conservation.	O'Neill & Nicholson-Cole (2024), Wiley

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Code	Variable (Short Name)	Item Code	Statement	Source
		SCGA3	I am willing to volunteer for community environmental programs.	Stern et al. (2024), Elsevier
		SCGA4	I would recommend community-based green actions to others.	Salim & Rahman (2025), Springer – Sustainability Science
		SCGA5	I am willing to contribute resources to support local conservation efforts.	Salim & Rahman (2025), Springer
EIE	Environmental Information Exposure	EIE1	I frequently access information about biodiversity and environmental issues.	Liu et al. (2024), Elsevier – Environmental Research
		EIE2	I am exposed to biodiversity-related content through digital media.	Liu et al. (2024), Environmental Research
		EIE3	Environmental campaigns increase my awareness of biodiversity issues.	Liu et al. (2024), Elsevier
		EIE4	Educational content has improved my understanding of biodiversity conservation.	Salim & Rahman (2025), Springer
		EIE5	Information from media influences my views on environmental protection.	Liu et al. (2024), Elsevier

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