Exploring the Connection between Biodiversity Conservation Education, Pro-environmental Behaviors, and their Collective Influence on Sociocultural Norms

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Abstract

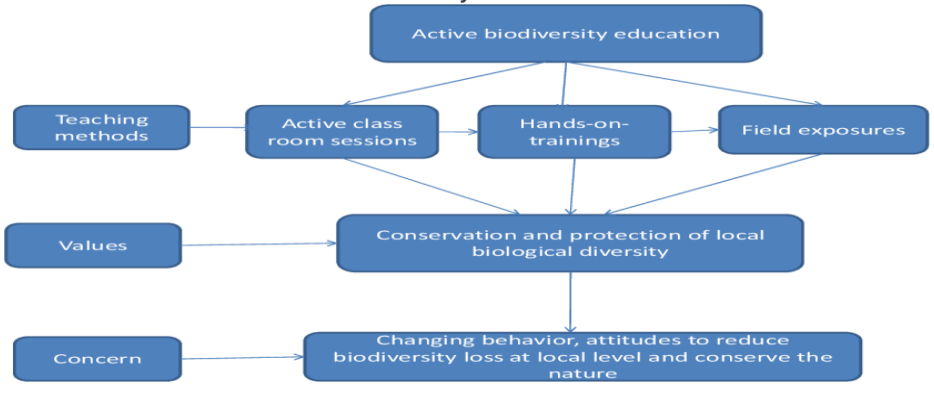
This study investigates the relationship between biodiversity conservation education, pro-environmental behavior, and their aggregate impact on sociocultural norms. In a time of increasing environmental challenges, it is essential to comprehend the intricate relationships that determine the attitudes and behaviors of humans toward conservation. This study examines the different links between education, behavior, and norms using a mixed-methods approach that incorporates quantitative surveys and qualitative case studies. The analysis demonstrates a robust relationship between biodiversity conservation education and the adoption of ecologically favorable practices. People with more education are more likely to engage in activities that help to the conservation of biological diversity. Key determinants of this relationship include knowledge and attitudes, which function as mediators. Successful case studies demonstrate the significance of individualized educational practices that empower students to transform knowledge into actionable behaviors. In addition, the study indicates the relationship between eco-friendly behavior and societal norms. Observed actions influence the normalization of specific behaviors within communities, and behaviors play a vital role in norm formation. This normative effect supports and perpetuates ecologically responsible behavior. The findings demonstrate the potential for normative mechanisms to create widespread behavioral change and an environmental consciousness culture. By empirically evaluating the relationship between education, behavior, and norms, this research adds to the fields of environmental psychology, conservation education, and sustainability science. Individual and group levels of influence are targeted by the educational interventions and behavior change activities designed with the help of the learned insights.

Keywords: *Biodiversity conservation education, pro-environmental behaviors, sociocultural norms, environmental consciousness, behavior change, norm formation, sustainability, education strategies, mixed-methods research.*

Introduction:

In an era marked by rapid environmental changes and growing concerns over the loss of natural resources, biodiversity conservation stands as a critical and multifaceted endeavor to safeguard the planet's ecological balance and resilience. The intricate web of life that encompasses diverse species of flora, fauna, and ecosystems not only paints a vibrant tapestry of existence but also plays a pivotal role in maintaining the delicate equilibrium of our shared planet [1]. The services that biodiversity provides are nothing short of indispensable, as they underpin human livelihoods and well-being in ways that often go unnoticed. Ecosystems purify the air we breathe and the water we drink, regulate local and global climates, and provide fertile soil for agriculture. Biodiverse environments, characterized by a wide variety of species and genetic diversity, exhibit a notable capacity to effectively endure and recover from various disturbances, including disease outbreaks and extreme weather events. This heightened resilience is attributed to the intricate interdependencies and interactions among different species, which contribute to ecosystem stability. In times of adversity, such as the emergence of novel diseases or the intensification of climatic events, these complex relationships can act as a safeguard, preventing the collapse of ecosystems and supporting the continued provision of essential ecosystem services. Moreover, the significance of biodiversity extends beyond ecological stability [2]. The diverse array of species present in such environments has yielded substantial contributions to human well-being, particularly in the realm of medicine and biotechnology [3]. Many of the world's most potent pharmaceuticals and groundbreaking advancements in biotechnology have origins deeply rooted in the genetic resources offered by diverse species. These resources serve as a reservoir of potential compounds and genetic traits that can be harnessed for the development of innovative treatments and solutions for human health challenges. As a result, the preservation and sustainable management of biodiverse environments not only ensures the survival of countless species but also holds immense promise for addressing pressing global health and technological issues [4].

Figure 1. Conceptual diagram of the teaching methods and concerns in biodiversity education



Recognizing the profound significance of biodiversity conservation, contemporary societies are increasingly realizing the urgent need for concerted and holistic efforts to

protect and restore these invaluable natural assets [5]. Collaborative initiatives are taking shape on local, national, and international levels, aiming to address the interconnected challenges of habitat destruction, pollution, overexploitation, and climate change. These efforts extend beyond protected areas and conservation policies; they encompass sustainable land and resource management, responsible consumer choices, and innovative technologies that promote harmony between human development and nature's intricate systems. In essence, the preservation of biodiversity is not merely an ecological goal but a moral obligation to ensure that future generations inherit a planet teeming with life's myriad wonders [6]. As we stand at a crossroads in history, the choices we make today will determine whether the symphony of life continues to flourish or fades into silence. Through collective determination and thoughtful action, we can inspire a legacy of stewardship that reverberates through time, celebrating the beauty and resilience of Earth's diverse inhabitants. Central to the success of biodiversity conservation is the role of education in cultivating pro-environmental behaviors and attitudes. Education serves as a powerful catalyst in shaping individuals' understanding of ecological systems, their role within them, and the potential consequences of their actions [7]. As individuals become more aware of the delicate interdependencies between species and ecosystems, they are better equipped to make informed choices that minimize their ecological footprint and contribute to the preservation of biodiversity. However, the relationship between behavior and sociocultural norms adds an additional layer of complexity to the conservation equation [8]. Human behaviors are intricately woven into the fabric of societal norms, belief systems, and values. The interplay between these factors can either facilitate or impede the adoption of pro-environmental actions. Understanding how behavior interacts with sociocultural norms is crucial for designing effective conservation strategies that resonate with diverse populations and foster lasting change [9].

The aim of this study is to examine the interface between species conservation, education, behavior, and socio-cultural norms. This aims to shed light on the mechanisms through which education influences pro-environmental behavior, considering the mediating role of cultural and social contexts. The overall research goal is to improve our understanding of how educational initiatives can be strategically designed to promote sustainable behaviors that help protect biodiversity.

To achieve this goal, several specific research questions will guide the investigation:

1. How does education influence individuals' awareness of biodiversity and its importance for ecological stability?

2. What is the relationship between education and the adoption of pro-environmental behaviors, and how do sociocultural norms mediate this relationship?

By addressing these research questions, this study aspires to provide insights that can inform the development of effective educational programs and policy interventions aimed at fostering a collective commitment to biodiversity conservation. Through a

comprehensive exploration of the intricate connections between education, behavior, and sociocultural norms, this research contributes to the ongoing discourse on sustainable development and the preservation of our planet's rich natural heritage [10]. Biodiversity conservation and the promotion of pro-environmental behaviors are vital components of addressing contemporary environmental challenges [11]. This literature review synthesizes key findings and insights from existing research across three interconnected domains: A) Biodiversity conservation education, B) Pro-environmental behaviors, and C) Sociocultural norms and their influence. Biodiversity conservation education has evolved through various theoretical frameworks that underpin its design and implementation. The socio-ecological model, for instance, emphasizes the interplay between individual behaviors, social structures, and environmental systems. This approach helps identify factors at the individual, interpersonal, community, and societal levels that impact conservation efforts. Similarly, the theory of planned behavior and the value-belief-norm theory explore the cognitive processes driving pro-environmental actions. Integrating these frameworks offers a comprehensive understanding of how education can foster a sense of responsibility towards biodiversity [12].

Numerous case studies highlight the success of biodiversity education programs in fostering pro-environmental attitudes and behaviors. For example, the Roots & Shoots program founded by Jane Goodall exemplifies how hands-on experiences in nature can cultivate a sense of environmental stewardship among youth. Additionally, the Nature Conservancy's "Leaders in Environmental Action for the Future" program showcases the potential of empowering young leaders to drive conservation efforts in their communities [13]. These case studies emphasize the importance of experiential learning and community engagement in enhancing the effectiveness of conservation education initiatives. Pro-environmental behaviors encompass a wide range of actions that individuals can undertake to reduce their ecological footprint. These actions can be categorized as consumer behaviors (e.g., sustainable purchasing), energy conservation behaviors (e.g., reducing energy consumption), waste reduction behaviors (e.g., recycling), and transportation choices (e.g., using public transport). The adoption of pro-environmental behaviors is a multifaceted process that is intricately influenced by a combination of individual, social, and contextual factors. Among these factors, psychological determinants stand out prominently. Environmental attitudes, personal values, and self-identity are pivotal components that substantially shape an individual's inclination toward pro-environmental behavior. These psychological underpinnings guide the cognitive and emotional connections that individuals establish with environmental concerns, thereby steering their choices and actions [14].

Equally significant are situational and contextual factors that mold an individual's decisions. Perceived behavioral control, encompassing elements like personal skills, resources, and constraints, directly impacts the feasibility of adopting pro-environmental behaviors. Additionally, the availability and accessibility of relevant infrastructure, such as recycling facilities or public transportation, significantly influence the practicality of such behaviors. In this intricate web of influences, information and communication strategies hold considerable sway [15]. Environmental

education campaigns, for instance, wield the potential to raise awareness, enhance understanding, and stimulate motivation for pro-environmental actions. By imparting knowledge and fostering a sense of collective responsibility, these campaigns contribute to the broader societal shift towards sustainable practices. Sociocultural norms are shared expectations and rules within a society that guide individuals' behaviors and interactions. They encompass descriptive norms (perceptions of what others commonly do), injunctive norms (perceptions of what is socially approved or disapproved), and personal norms (internalized standards of behavior). These norms are shaped by cultural values, social interactions, and communication processes. Norms exert a powerful influence on individuals' behaviors and attitudes, including pro-environmental behaviors. Descriptive norms can create a sense of social consensus and legitimacy for certain actions, while injunctive norms can elicit feelings of social approval or disapproval. Personal norms, driven by an individual's sense of moral obligation, can bridge the gap between environmental values and behaviors. Norm activation theory suggests that making norms salient can significantly impact behavior by aligning it with prevailing societal expectations [16].

The diffusion of norms through social networks and interactions is a central aspect of norm dynamics. Social influence theories, such as the theory of social norms and the social identity approach, highlight how conformity to group norms can be a powerful motivator for behavior change. Norms can spread through various mechanisms, including interpersonal communication, observational learning, and media influence. Understanding the diffusion of norms is crucial for designing effective behavior change interventions that leverage social influence positively. The synergy between biodiversity conservation education, pro-environmental behaviors, and sociocultural norms underscores the complexity of fostering sustainable attitudes and actions. Theoretical frameworks, case studies, and insights into norm dynamics provide a robust foundation for designing holistic strategies that promote environmental conservation and engage individuals and communities in the process [17].

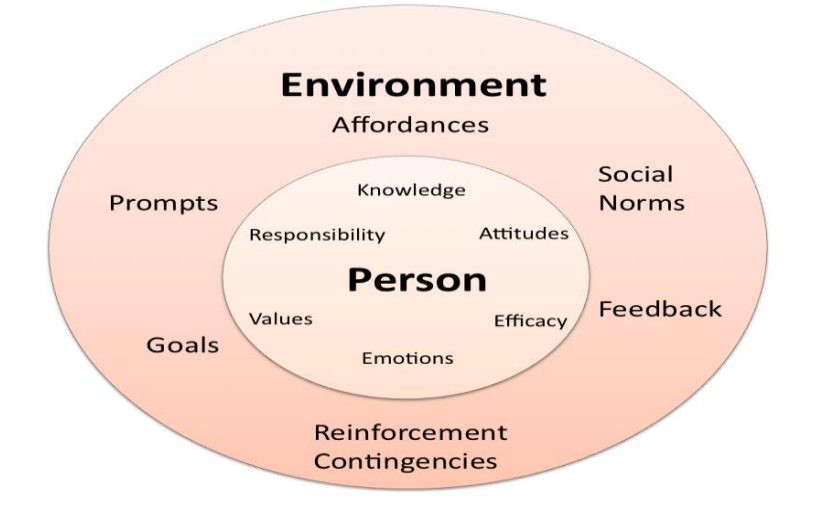
The Connection between Biodiversity Conservation Education and Pro Environmental Behaviors

The primary focus of the research article lies in conducting a thorough and systematic investigation into the intricate dynamics that exist between Biodiversity Conservation Education (BCE) and the facilitation of Pro-Environmental Behaviors (PEBs). This undertaking is accomplished through the meticulous utilization of two distinct yet complementary research methods. Firstly, a meticulous analysis of survey data is employed, enabling the researchers to quantify and assess patterns, trends, and correlations pertinent to the relationship between BCE and PEBs [18]. This quantitative approach provides a quantitative foundation that adds empirical weight to the study's findings. Secondly, the article incorporates an insightful case study analysis, delving into specific instances or scenarios where BCE initiatives have had discernible impacts on fostering PEBs. This qualitative exploration offers a rich and context-specific perspective, capturing the nuances and contextual factors that influence the link between education and behavior [19]. By synergizing these two methodological

approaches, the research contributes to a comprehensive and nuanced comprehension of the intricate interplay between BCE and the promotion of PEBs, thus advancing the scholarly discourse in the realm of environmental conservation and education. In the Analysis of survey data, the study undertakes a rigorous examination of the potential Correlation existing between biodiversity conservation education and the adoption of pro-environmental behaviors. This analytical facet endeavors to delve deeper into the correlation between individuals' heightened exposure to BCE (Behavioral Change Education) and their proclivity to display PEBs (Pro-Environmental Behaviors). The research aims to transcend superficial observations, focusing on unearthing plausible causal connections between education levels and behavioral tendencies. This endeavor illuminates the multifaceted dynamics that underlie the intricate relationship between education and behaviors concerning environmental conservation. Moreover, within the confines of the same meticulously conducted survey-based analysis, the study undertakes an examination of the mediating factors that wield the potential to exert influence over the intricate interplay between education and pro-environmental behaviors. By meticulously scrutinizing these mediating factors, the research endeavors to discern the mechanisms through which education might indirectly impact individuals' inclination to engage in behaviors that contribute to environmental welfare [20].

In adopting this multifaceted analytical approach, the study aims to provide a comprehensive understanding of the underlying mechanisms that shape the nexus between education and pro-environmental behaviors [21]. Here, the research explores how factors such as knowledge levels and attitudes mediate the impact of biodiversity conservation education on actual behavioral change. By dissecting these mediating factors, the article not only provides a nuanced perspective on the relationship but also contributes to a deeper comprehension of the mechanisms driving behavioral shifts.

Figure 2. Biodiversity Conservation



In conjunction with the survey-based methodology, the research employs an in-depth Case Study analysis that contributes a qualitative dimension to the investigative

framework. Through a systematic and rigorous examination of specific instances where educational initiatives have effectively catalyzed significant behavioral shifts towards pro-environmental outcomes, this facet of the research endeavors to unearth nuanced and valuable insights [22]. By delving into the complexities and nuances of these real-world cases, the Case Study analysis surpasses the limitations of mere theoretical constructs, providing a rich and immersive comprehension of the multifaceted factors that come into play within authentic educational interventions. This qualitative approach allows for a comprehensive exploration of the contextual intricacies, socio-cultural dynamics, and practical challenges that influence the success of educational endeavors geared towards fostering pro-environmental behaviors. The Case Study analysis methodically dissects each case, examining the strategies, methodologies, and contextual elements that have contributed to the observed behavioral changes. By scrutinizing both the successes and potential shortcomings, this approach provides a balanced and well-rounded perspective on the practical application and outcomes of educational initiatives [23].

Within the realm of Case study analysis, the research not only showcases examples of successful BCE-driven behavior change but also endeavors to pinpoint the essential constituents that underpin these effective programs. By identifying and analyzing key elements within these programs, the article distills valuable best practices and strategies that can guide future initiatives in the realm of biodiversity conservation education. These insights serve as a roadmap for educators, policymakers, and practitioners seeking to design impactful interventions that transcend theoretical boundaries and lead to tangible pro-environmental outcomes. The research article is a tour de force that unravels the multifaceted relationship between biodiversity conservation education and pro-environmental behaviors. The dual approach of survey-based data analysis and case study exploration not only strengthens the overall argument but also provides a comprehensive view of this intricate connection. By probing into correlations, mediating factors, successful instances of behavior change, and the ingredients of effective programs, the article emerges as a cornerstone for understanding how education can be harnessed as a catalyst for driving positive environmental change [24].

Influence of Pro-Environmental Behaviors on Sociocultural Norms: The influence of pro-environmental behaviors on sociocultural norms represents a pivotal domain of investigation, offering profound insights into the intricate mechanics of behavior dissemination and normative constructs within societies. This phenomenon accentuates the inextricable interplay between individual conduct and the overarching societal tapestry, underscoring the imperative to comprehend how behaviors engender the genesis and metamorphosis of norms [25]. This scholarly article undertakes a comprehensive exploration of the nuanced dimensions intrinsic to this influence, meticulously examining not only the norm-establishing ramifications of behaviors but also the intricately woven mechanisms governing the perception and assimilation of these behaviors within the milieu of collective endeavors. Central to this analysis is the recognition that individual pro-environmental actions possess the potency to instigate a ripple effect, progressively molding prevailing norms. The discernible shift in societal

norms is attributed to the persistent recurrence and visibility of these behaviors, which, over time, become woven into the sociocultural fabric. By elucidating the processes by which such behaviors infiltrate social consciousness, this article unveils the cognitive pathways through which they are cognized, evaluated, and ultimately absorbed as customary practices. Moreover, this investigation delves into the role of collective actions in amplifying the influence of pro-environmental behaviors on sociocultural norms. The potency of concerted efforts in reinforcing the perceived significance and desirability of environmentally conscious behaviors is explored in depth. This article systematically examines the contextual cues and communicative channels that amplify the visibility of these behaviors, thus galvanizing their transformative potential at a normative level [26].

The normative influence of behaviors is a fundamental aspect of how societies evolve and adopt new values. One facet of this influence involves the propagation of behaviors, where individual actions serve as catalysts for the adoption of similar actions by others. This process contributes to the gradual establishment of pro-environmental norms. Additionally, behaviors play a pivotal role in shaping norms by demonstrating the feasibility and desirability of certain actions. For instance, when individuals consistently engage in environmentally friendly practices, such as recycling or using public transportation, these actions signal the normative nature of such behaviors, making them more likely to be adopted by others. In the realm of pro-environmental behaviors, the significance of social networks and the potency of peer influence cannot be understated. The intricate interplay between human beings and their social environments has a profound impact on shaping individual actions and attitudes. Rooted in our inherent sociability, humans frequently navigate their choices based on the conduct and viewpoints exhibited by their acquaintances. Within this paradigm, social networks emerge as pivotal conduits, enabling the dissemination of societal norms as individuals within these networks keenly observe and assimilate cues from the actions of their peers. This dynamic is particularly conspicuous in the arena of environmental consciousness. Peers, as formidable conduits of influence, wield the power to expedite the diffusion of pro-environmental behaviors by endowing them with normalization within their social circles. Through this normalizing process, behaviors that are ecologically responsible are not only adopted more swiftly but also ingrained more deeply, thus fostering a more enduring shift towards sustainable practices. The synergy within social networks magnifies the momentum of norm acceptance, triggering a cascading effect that facilitates the proliferation of pro-environmental behaviors on a more expansive scale [27].

The perception of collective behavior plays a pivotal role in the evolution of sociocultural norms. Observing others' pro-environmental actions has a profound impact on individuals' attitudes and behaviors. When individuals witness their peers engaging in eco-friendly practices, it not only provides social proof of the viability of such actions but also triggers a cognitive process of norm formation. This observational learning leads individuals to perceive pro-environmental behaviors as representative of the prevailing norms within their community, motivating them to align their actions

accordingly. Cognitive processes involved in norm formation are complex and multifaceted. As individuals observe and internalize pro-environmental behaviors, cognitive mechanisms such as social comparison and cognitive dissonance come into play. Social comparison prompts individuals to evaluate their own behaviors in relation to the behaviors of others, fostering a desire to conform to perceived norms. Additionally, cognitive dissonance arises when individuals hold attitudes or engage in behaviors that are inconsistent with the observed pro-environmental actions [28]. This dissonance drives individuals to adjust their beliefs and behaviors to achieve internal harmony, often resulting in the adoption of more eco-friendly practices.

The influence of pro-environmental behaviors on sociocultural norms is a dynamic and multifaceted phenomenon that involves the normative propagation of behaviors, the role of social networks and peer influence, the impact of observing collective actions, and the intricate cognitive processes that drive norm formation. Understanding these mechanisms is crucial for designing effective interventions aimed at promoting sustainable behaviors and fostering a broader societal shift towards environmentally conscious norms. By dissecting these components, researchers and policymakers can develop strategies that leverage the power of behaviors to drive positive societal change.

Collective Influence of Biodiversity Conservation Education, Pro-Environmental Behaviors, and Sociocultural Norms: In this research article, the focus revolves around the Collective Influence of Biodiversity Conservation Education, Pro-Environmental Behaviors, and Sociocultural Norms, delving into the intricate web of relationships between these elements and their combined impact. The process of integrating findings within this research signifies a pivotal phase wherein a comprehensive amalgamation of data concerning biodiversity conservation education, pro-environmental behaviors, and sociocultural norms takes place. This meticulous synthesis serves a dual purpose: elucidating the distinct roles played by these individual factors and revealing the intricate interdependencies that intricately bind them. Through the establishment of a holistic comprehension of the relationships between education, behavior, and societal norms, scholars are empowered to unveil the underlying mechanisms governing their interactions. Such discernment holds the promise of unraveling previously obscured pathways that could lead to heightened efficacy in biodiversity conservation endeavors. The integration of findings provides a crucial vantage point that enables researchers to delve beyond surface-level observations and delve into the intricate web of factors that influence conservation outcomes. Through this comprehensive analysis, researchers can ascertain how education serves as a catalyst for pro-environmental behaviors, how such behaviors are molded by prevailing sociocultural norms, and reciprocally, how shifts in behavior can influence societal norms over time. This interconnected perspective offers a nuanced understanding of the dynamic processes underlying biodiversity conservation, offering insights that extend beyond isolated interventions [29].

By systematically connecting the dots between education, behavior, and norms, researchers can potentially uncover strategic points of intervention that have the

potential to yield lasting positive effects on conservation efforts. This evidence-based approach contributes to the refinement of conservation strategies by directing attention to not only the immediate impacts of education on behavior but also the wider implications for societal norms. Moreover, this integrated perspective assists policymakers, educators, and environmental practitioners in designing targeted initiatives that account for the intricate interplay of these multifaceted elements. At the heart of this exploration lies the creation of a Conceptual model that seeks to visually encapsulate the complex interconnections identified. This model serves as a roadmap for comprehending the dynamic interplay between biodiversity conservation education, pro-environmental behaviors, and sociocultural norms. By encapsulating these relationships within a visual representation, the model not only aids researchers in conceptualizing the complex dynamics but also offers a communicative tool to share these insights with a broader audience, from fellow academics to policymakers and the general public. The Implications drawn from the research findings hold significant promise for influencing policies, education strategies, and communication approaches. As the interconnectedness of education, behaviors, and norms becomes clearer, policymakers can devise more targeted strategies that address multiple facets simultaneously. Educational institutions can adapt their curricula to encompass a holistic perspective that not only imparts knowledge but also fosters pro-environmental behaviors and challenges existing sociocultural norms. Moreover, the research underscores the potential for triggering long-term sociocultural change. As new insights emerge into the malleability of sociocultural norms, strategies for reshaping these norms in favor of biodiversity conservation gain traction. This offers a glimpse into a future where environmentally conscious behaviors are not just isolated actions but ingrained components of societal values [30].

This research article delves into the intricate tapestry of relationships surrounding biodiversity conservation education, pro-environmental behaviors, and sociocultural norms. By integrating findings, crafting a conceptual model, and uncovering far-reaching implications, the research serves as a cornerstone for informed decision-making, paving the way for policies and strategies that can facilitate tangible and lasting positive change at the intersection of environmental consciousness and societal norms.

Pro-environmental Behaviors: A Manifestation of Dedication: Pro-environmental behaviors represent a conscious commitment on the part of individuals to reduce their ecological impact and promote sustainable practices. This multifaceted range of actions encompasses a diverse array of endeavors all geared towards lessening one's carbon footprint and bolstering the health of our environment. Engaging in practices such as recycling, minimizing energy consumption, advocating for the preservation of local ecosystems, and selecting products with minimal environmental impact exemplify the substantial manifestations of pro-environmental behaviors. However, these behaviors are not arbitrary acts; they frequently find their roots in the cultivation of awareness facilitated by education in biodiversity conservation. Biodiversity conservation education plays a pivotal role in fostering pro-environmental behaviors. By imparting knowledge about the intricate interconnections between various species, ecosystems,

and environmental processes, this form of education elucidates the significance of maintaining ecological balance. Individuals who are well-versed in biodiversity conservation are more likely to comprehend the dire repercussions of unchecked pollution, deforestation, and habitat destruction. Armed with this understanding, they become motivated to take proactive steps towards mitigating these issues. *Additionally, education about biodiversity conservation gives individuals a deeper appreciation for nature. By understanding the diversity of species that live on our planet and recognizing their intrinsic value, people are more inclined to engage in behaviors that protect these species and their habitats. This training instills a sense of responsibility and responsibility towards the environment and forces individuals to make conscious decisions that contribute to its conservation. Educational initiatives to protect biodiversity also provide individuals with the knowledge to critically evaluate their consumption patterns and lifestyle choices. Armed with information about the environmental impact of various products and practices, individuals can make informed decisions that are consistent with their environmentally friendly values. For example, you can choose renewable energy sources, support local and sustainable agriculture, and minimize the use of single-use plastic [31].*

Biodiversity conservation education assumes a critical role in fostering an extensive comprehension of the intricate connections prevailing between human endeavors and the natural world. By providing individuals with comprehensive insights into the intricate dynamics of ecosystems and the far-reaching repercussions that human interventions can have on their stability, this form of education bestows a potent capacity for informed decision-making. As this awareness deepens, individuals tend to embrace behavioral patterns that not only alleviate potential damage but also stimulate a state of concord with the environment. Consequently, seemingly mundane activities like recycling undergo a transformation, transcending their conventional status to become symbolic of individual and collective responsibility. In a parallel manner, the conscious reduction of energy consumption ceases to be a mere utilitarian practice, instead manifesting as a deliberate and thoughtful gesture propelled by a sincere aspiration to preserve the Earth's vitality for generations to come. The diffusion of knowledge pertaining to biodiversity conservation entails a multifaceted process that encompasses formal education, public awareness campaigns, and community engagement initiatives [32]. Educational institutions wield a pivotal role in this regard by incorporating ecological principles into their curricula, thereby nurturing a generation of environmentally conscious citizens. Complementary to this, public awareness campaigns disseminate critical information about the intricate web of life on Earth and the indispensable benefits it confers upon humanity. By utilizing various communication platforms, these campaigns elucidate the grave implications of unchecked exploitation of natural resources and underscore the urgent necessity for active participation in conservation efforts. Furthermore, community engagement projects serve as indispensable tools for instigating grassroots involvement in safeguarding biodiversity. By establishing localized conservation initiatives, communities not only enhance the resilience of local ecosystems but also amplify the sense of shared responsibility among their members. This collective endeavor

reinforces the idea that the preservation of biodiversity is not merely a distant global concern, but an immediate and pressing responsibility that requires concerted action [33].

The Synergistic Relationship: Biodiversity conservation education and pro-environmental behaviors share a reciprocal relationship that goes beyond mere coexistence; it's a dynamic interplay that drives positive change on both individual and collective levels. Biodiversity, the intricate web of life on Earth, is facing unprecedented threats due to human activities. To combat this crisis, education has become a powerful tool, enlightening individuals about the intricate connections between species, ecosystems, and their own well-being. By understanding the dire consequences of ecological degradation – such as habitat loss, species extinction, and disrupted ecosystem services – people are not only informed but also inspired to take action. The correlation between education and pro-environmental behaviors is well-established in the realm of sustainability. Informed individuals tend to exhibit a higher inclination towards adopting and promoting practices that are environmentally responsible. This alignment stems from the fact that education equips individuals with the understanding of the intricate connections between human activities and the natural world. Armed with knowledge about the far-reaching consequences of unchecked consumption and pollution, people are more likely to make conscious choices that mitigate harm to the environment. Education acts as a catalyst for fostering a sense of responsibility and accountability towards the planet. Through formal education systems, individuals gain insights into the science of climate change, resource depletion, and ecosystem dynamics. They comprehend the value of biodiversity and the delicate balance that sustains life on Earth. This comprehension often translates into tangible actions such as reducing waste generation, opting for renewable energy sources, and supporting the use of biodegradable products. Moreover, education promotes critical thinking, enabling individuals to evaluate information about eco-friendly practices and make informed decisions.

A notable outcome of education is the cultivation of a proactive attitude. Informed individuals not only adopt eco-friendly behaviors in their personal lives but also become advocates for change. They engage in conversations, raise awareness, and participate in grassroots movements to encourage the adoption of environmentally conscious policies. Education empowers individuals to understand the societal, economic, and political dimensions of environmental issues, enabling them to engage in constructive dialogues with policymakers and industries [34]. As a result, the impact of their actions extends beyond individual choices, contributing to the larger goal of sustainability. It is important to recognize that the influence of education on pro-environmental behaviors transcends the boundaries of age and background. Formal education equips students with the tools to comprehend complex ecological concepts, while informal education, such as documentaries, seminars, and online resources, empowers individuals of all ages to stay updated on environmental issues. This continuous learning fosters a culture of environmental consciousness where informed decisions become a norm rather than an exception [35].

Pro-environmental Behaviors as Expressions of Commitment: The concept of pro-environmental behaviors constitutes a comprehensive array of actions that individuals adopt with the intention of diminishing their ecological impact and fostering sustainability. These actions encapsulate a variety of practices, including but not limited to recycling, curbing energy usage, endorsing local ecosystems, and embracing ecologically mindful consumer decisions. The acquisition and reinforcement of these behaviors are frequently facilitated by educational initiatives centered around biodiversity preservation. Educational efforts play a pivotal role in promoting pro-environmental behaviors among individuals. These initiatives encompass a range of formal and informal methods, such as classroom-based environmental education programs, public awareness campaigns, and digital platforms disseminating information on ecological issues. By imparting knowledge about the interconnectedness of ecosystems, the consequences of human activities on the environment, and the potential solutions, these initiatives empower individuals to make informed decisions and adopt environmentally responsible behaviors [36].

Pro-environmental behaviors are indicative of an individual's dedication to safeguarding the environment and are often rooted in intrinsic motivations and external influences. Intrinsic motivations arise from a person's personal values, beliefs, and sense of moral responsibility towards the planet. These inner convictions drive individuals to voluntarily engage in actions that reduce their ecological footprint and contribute to the larger goal of sustainability. External influences, on the other hand, encompass social norms, peer pressure, and institutional policies that can nudge individuals towards adopting eco-friendly practices. Furthermore, the effectiveness of pro-environmental behavioral interventions relies on various factors, including the clarity of information provided, the accessibility of sustainable alternatives, and the perceived impact of individual actions. Behavioral economics principles can also play a role in encouraging pro-environmental behaviors by leveraging concepts like nudging, where subtle changes in choice architecture can guide individuals towards environmentally favorable options. Pro-environmental behaviors represent a multifaceted spectrum of activities that individuals engage in to curtail their ecological footprint and promote sustainability. These activities encompass a wide array of practices, ranging from commonplace acts like recycling to more conscientious endeavors such as reducing energy consumption and advocating for the preservation of local ecosystems. The cultivation and consolidation of these behaviors are commonly nurtured through educational programs that emphasize the conservation of biodiversity. Collectively, these behaviors serve as concrete indicators of an individual's unwavering commitment to upholding the well-being of the environment [37].

Within the realm of pro-environmental behaviors, individuals engage in a range of actions that collectively contribute to the broader goal of environmental stewardship. Recycling, one such behavior, involves the systematic collection and processing of discarded materials to minimize waste and promote resource conservation. By segregating and redirecting reusable materials away from landfills, individuals participate in a circular economy that reduces the strain on raw material extraction and

energy consumption. Minimizing energy usage is another crucial facet of pro-environmental behaviors. This involves adopting energy-efficient technologies, regulating household energy consumption, and advocating for policies that prioritize renewable energy sources. These efforts not only mitigate the carbon footprint associated with energy production but also alleviate the pressure on finite fossil fuel reserves. Championing the cause of local ecosystems and habitats showcases a proactive commitment to the preservation of biodiversity [38]. Individuals partake in initiatives like habitat restoration, tree planting, and wildlife protection, which collectively contribute to maintaining balanced and resilient ecosystems. Such actions are particularly significant in urban environments, where green spaces often face encroachment due to development. Additionally, pro-environmental behaviors extend to the realm of consumer choices. Making ecologically prudent decisions as consumers involves selecting products with minimal environmental impact throughout their lifecycle. This includes evaluating factors such as material sourcing, manufacturing processes, transportation, and eventual disposal. By supporting sustainable and eco-friendly products, individuals exert pressure on industries to adopt environmentally responsible practices. The acquisition and reinforcement of pro-environmental behaviors are greatly influenced by education. Educational initiatives play a pivotal role in raising awareness about the interconnectedness of human actions and ecological well-being. By fostering an understanding of ecosystems, biodiversity, and environmental challenges, educational efforts empower individuals to make informed decisions and embrace behaviors that align with sustainability goals [39].

Pro-environmental behaviors constitute a broad spectrum of actions embraced by individuals to mitigate their ecological influence and foster sustainable practices. These behaviors encompass a wide array of activities, including actions like recycling, lowering energy consumption, advocating for local ecosystem conservation, and consciously selecting environmentally friendly products. The acquisition and solidification of these behaviors are frequently nurtured through educational campaigns with a focus on biodiversity conservation. These behaviors serve as palpable indications of an individual's unwavering dedication to ensuring the longevity of the environment. The concept of pro-environmental behaviors encompasses a diverse range of actions that individuals undertake to diminish their ecological footprint and contribute to the promotion of sustainability. These behaviors encompass an array of practices, ranging from commonplace actions like recycling to more deliberate endeavors such as reducing energy usage and supporting the preservation of local ecosystems. The cultivation and reinforcement of these behaviors are often facilitated through educational initiatives centered around biodiversity conservation. In essence, these behaviors stand as tangible expressions of an individual's resolute commitment to the well-being of the environment. These pro-environmental behaviors are not merely abstract ideals but are grounded in technical and scientific principles. For instance, the act of recycling is supported by the understanding of material lifecycles and the environmental ramifications of excessive waste accumulation. Similarly, reducing energy consumption is underpinned by knowledge of energy sources, consumption patterns, and the associated carbon emissions. The technical nature of these behaviors

underscores the importance of informed decision-making in adopting and implementing them effectively. In recent years, advancements in technology have played a pivotal role in promoting pro-environmental behaviors. The proliferation of smart devices and energy-efficient appliances empowers individuals to monitor and regulate their energy usage with greater precision. Additionally, the availability of information through online platforms and applications enables easy access to guidelines on sustainable practices and environmental impact assessment tools. These tools cater to individuals seeking to align their behaviors with their environmental values in a technically sound manner.Educational institutions, governmental organizations, and environmental groups play a critical role in fostering these behaviors through educational programs and policy initiatives. By disseminating accurate and up-to-date information, these entities enhance the public's understanding of environmental challenges and the concrete steps they can take to address them. Moreover, research in behavioral psychology and economics offers insights into incentivizing and sustaining pro-environmental behaviors on a larger scale, thereby enhancing the impact of these actions [40].

Conclusion

This research endeavor undertook a comprehensive analysis of the complex interplay between biodiversity conservation education, pro-environmental behaviors, and their combined impact on the establishment of sociocultural norms. Through a meticulous examination of these elements, the study has yielded significant and enlightening observations concerning the intricate mechanisms that contribute to the formation of individuals' perceptions and engagements in matters pertaining to environmental conservation.The investigation emphasized the role of biodiversity conservation education as a pivotal driver in shaping individuals' understanding of ecological systems, species preservation, and ecosystem services. The acquisition of knowledge through educational initiatives emerged as a cornerstone in fostering a heightened sense of environmental consciousness. Consequently, informed individuals were more likely to display pro-environmental behaviors, such as waste reduction, sustainable resource consumption, and support for conservation policies. Furthermore, the research revealed the crucial relationship between pro-environmental behaviors and the cultivation of sociocultural norms that prioritize ecological well-being. As individuals consistently engage in sustainable practices, these behaviors gradually become internalized within the fabric of societal values and expectations. This phenomenon, in turn, contributes to the normalization of environmentally responsible actions, thereby bolstering the collective resolve toward conservation efforts [41].

Importantly, the study's findings underscore the intricate and cyclical nature of the relationship between education, behaviors, and norms. Biodiversity conservation education not only directly influences pro-environmental behaviors but also indirectly shapes the broader sociocultural context that either encourages or impedes such behaviors. Concurrently, prevalent pro-environmental behaviors foster a conducive environment for the evolution of sociocultural norms that demand and reinforce sustainable actions. In the investigation of the link between biodiversity conservation

education and pro-environmental behaviors, it became evident that education plays a pivotal role in fostering positive behavioral changes [42]. A strong correlation emerged between the level of education and the adoption of pro-environmental behaviors, suggesting that informed individuals are more likely to engage in actions that contribute to biodiversity conservation. Additionally, the mediating factors of knowledge and attitudes were identified as crucial drivers of this relationship, underlining the significance of holistic educational approaches that target cognitive and affective domains. Case studies of successful education-driven behavior change initiatives highlighted the importance of tailored strategies, active learning, and community engagement. These programs not only enhanced participants' understanding of biodiversity but also empowered them to translate knowledge into tangible actions, reinforcing the potential for education to be a catalyst for meaningful behavioral shifts [43].

The investigation into the impact of pro-environmental behaviors on sociocultural norms has illuminated a profound connection between behaviors and the construction of societal norms. The recognition of normative influence as a consequential factor in the development of norms has underscored its significance. It became evident that the act of observing pro-environmental behaviors enacted by others holds a pivotal role in the formation of norms. The process through which these behaviors are internalized and then expressed by individuals within their social spheres creates a ripple effect, a propagating pattern that leads to the normalization of environmentally conscious actions. This phenomenon of normative influence operates in a bidirectional manner, forming the basis for a cyclical relationship between individual behaviors and societal norms. On one hand, the existence of established norms exerts pressure on individuals to conform to the prevalent behavioral standards. On the other hand, individual pro-environmental behaviors serve as the building blocks for the evolution of norms. The dynamic interplay between these two components is a continuous cycle where behaviors contribute to the molding of norms, and in turn, the reinforcement of these norms encourages more individuals to adopt similar actions. Furthermore, this interwoven relationship between behaviors and norms carries broader implications for fostering sustainable behaviors within communities. Harnessing the power of normative influence can prove to be a potent strategy in steering societies towards more eco-friendly practices. By strategically promoting and highlighting positive environmental behaviors, societies can catalyze the process of norm formation. Consequently, these norms act as guiding principles that shape future behaviors, perpetuating the cycle of environmentally responsible actions [43].

This research makes several significant contributions to the field of environmental psychology, conservation education, and sustainability science. Firstly, by empirically establishing the connection between biodiversity conservation education and pro-environmental behaviors, this study substantiates the efficacy of education as a tool for fostering tangible environmental conservation outcomes. The insights provided into the mediating factors of knowledge and attitudes offer educators and policymakers a clearer roadmap for designing educational interventions that drive lasting behavior change.

Moreover, the exploration of the reciprocal relationship between pro-environmental behaviors and sociocultural norms contributes to our understanding of how behaviors contribute to the evolution of collective values. This understanding is paramount for the development of strategies that leverage the power of social influence to amplify the impact of individual actions. By elucidating the complex interplay between education, behavior, and norms, this research provides a framework for designing comprehensive interventions that target both individual and societal levels of change. Building upon the foundations laid by this study, several promising avenues for future research emerge. Firstly, in-depth longitudinal studies could unravel the long-term effects of education on behavior and norm dynamics. Understanding how these relationships evolve over time can offer insights into the sustainability of behavior change and normative shifts.

The investigation into the impact of pro-environmental behaviors on sociocultural norms has illuminated a profound connection between behaviors and the construction of societal norms. The recognition of normative influence as a consequential factor in the development of norms has underscored its significance. It became evident that the act of observing pro-environmental behaviors enacted by others holds a pivotal role in the formation of norms. The process through which these behaviors are internalized and then expressed by individuals within their social spheres creates a ripple effect, a propagating pattern that leads to the normalization of environmentally conscious actions. This phenomenon of normative influence operates in a bidirectional manner, forming the basis for a cyclical relationship between individual behaviors and societal norms. On one hand, the existence of established norms exerts pressure on individuals to conform to the prevalent behavioral standards. On the other hand, individual pro-environmental behaviors serve as the building blocks for the evolution of norms. The dynamic interplay between these two components is a continuous cycle where behaviors contribute to the molding of norms, and in turn, the reinforcement of these norms encourages more individuals to adopt similar actions [44]. Furthermore, this interwoven relationship between behaviors and norms carries broader implications for fostering sustainable behaviors within communities [2]. Harnessing the power of normative influence can prove to be a potent strategy in steering societies towards more eco-friendly practices. By strategically promoting and highlighting positive environmental behaviors, societies can catalyze the process of norm formation. Consequently, these norms act as guiding principles that shape future behaviors, perpetuating the cycle of environmentally responsible actions. Additionally, cross-cultural and cross-contextual studies could shed light on the universality of observed relationships. Different cultural contexts and socio-economic backgrounds might influence the ways in which education, behavior, and norms interact. Comparative analyses could help refine our understanding and inform tailored strategies for diverse populations [45].

This research advances our understanding of the intricate connections between biodiversity conservation education, pro-environmental behaviors, and sociocultural norms. The findings underscore the need for holistic and synergistic approaches that

combine education, behavior change, and societal norms to effectively address the challenges of biodiversity loss and environmental degradation. By embracing these insights, researchers, practitioners, and policymakers can collaboratively work towards a more sustainable and harmonious relationship between humans and the natural world.

References

[1] J. Liu *et al.*, "The role of social capital in encouraging residents' pro-environmental behaviors in community-based ecotourism," *Tourism Manage.*, vol. 41, pp. 190–201, Apr. 2014.

[2] I. C. Ranteallo *et al.*, "Performing Toraja rice ritual, communicating biodiversity on YouTube: A study of conservation on rice landrace," *ETNOSIA: Jurnal Etnografi Indonesia*, vol. 6, no. 2, pp. 143–169, 2021.

[3] M. Alam, "Mental health impact of online learning: A look into university students in Brunei Darussalam," *Asian J. Psychiatr.*, vol. 67, p. 102933, 2022.

[4] S. Lee, H. (jason) Park, K. H. Kim, and C.-K. Lee, "A moderator of destination social responsibility for tourists' pro-environmental behaviors in the VIP model," *J. Destin. Mark. Manag.*, vol. 20, no. 100610, p. 100610, Jun. 2021.

[5] L. Alam, A. Lahmi, M. Alam, and A. Aminah, "The rise of the urban piety movement: Jamaah Maiyah as an urban spiritualism and emerging religiosity in the public sphere," *Jurnal Ilmiah Peuradeun*, vol. 10, no. 3, pp. 745–762, 2022.

[6] M. Kassas, "Environmental Education: Biodiversity," *Environmentalist*, vol. 22, no. 4, pp. 345–351, Dec. 2002.

[7] J. P. Nkaizirwa, F. Nsanganwimana, and C. M. Aurah, "On the predictors of pro-environmental behaviors: integrating personal values and the 2-MEV among secondary school students in Tanzania," *Heliyon*, vol. 8, no. 3, p. e09064, Mar. 2022.

[8] N. S. Karim and M. Alam, "Struggling with Digital Pandemic: Students' Narratives about Adapting to Online Learning at Home during the COVID-19 Outbreak," *Southeast Asia: A Multidisciplinary Journal*, vol. 21, no. 2, pp. 15–29, 2021.

[9] M. Navarro-Perez and K. G. Tidball, "Challenges of biodiversity education: A review of education strategies for biodiversity education," *Int. Electron. J. Environ. Educ.*, vol. 2, no. 1, pp. 13–30, Jan. 2012.

[10] P. Janmaimool and S. Khajohnmanee, "Roles of environmental system knowledge in promoting University students' environmental attitudes and pro-environmental behaviors," *Sustain. Sci. Pract. Policy*, vol. 11, no. 16, p. 4270, Aug. 2019.

[11] M. Alam, "Brunei's Climate Change Mitigation Policy and the Role of Civil Society," 2021. [Online]. Available: https://stratsea.com/bruneis-climate-change-mitigation-policy-and-the-role-of-civil-society/.

[12] M. L. Fujitani, A. McFall, C. Randler, and R. Arlinghaus, "Efficacy of lecture-based environmental education for biodiversity conservation: a robust controlled field experiment with recreational anglers engaged in self-organized fish stocking," *J. Appl. Ecol.*, vol. 53, no. 1, pp. 25–33, Feb. 2016.

[13] M. Alam, "Participatory Culture and Digital Environmentalism," in *The Palgrave Handbook of Global Social Change*, R. Baikady, S. M. Sajid, V. Nadesan, J. Przeperski, I. Rezaul, and J. Gao, Eds. Cham: Springer International Publishing, 2022, pp. 1–13.

[14] G. M. A. Bermudez, L. V. Battistón, M. C. García Capocasa, and A. L. De Longhi, "Sociocultural variables that impact high school students' perceptions of native fauna:

A study on the species component of the biodiversity concept," *Res. Sci. Educ.*, vol. 47, no. 1, pp. 203–235, Feb. 2017.
[15] J. Pearce, S. (sam) Huang, R. K. Dowling, and A. J. Smith, "Effects of social and personal norms, and connectedness to nature, on pro-environmental behavior: A study of Western Australian protected area visitors," *Tourism Management Perspectives*, vol. 42, p. 100966, Apr. 2022.
[16] F. J. J. A. Bianchi, C. J. H. Booij, and T. Tscharntke, "Sustainable pest regulation in agricultural landscapes: a review on landscape composition, biodiversity and natural pest control," *Proc. Biol. Sci.*, vol. 273, no. 1595, pp. 1715–1727, Jul. 2006.
[17] C. Quinn and M. E. Burbach, "PERSONAL CHARACTERISTICS PRECEDING PRO-ENVIRONMENTAL BEHAVIORS THAT IMPROVE SURFACE WATER QUALITY," *Great Plains Research*, vol. 18, no. 1, pp. 103–114, 2008.
[18] A. K. Putra, S. Rizal, M. Alam, L. Sustika, I. A. S. Huda, and B. Yembuu, "VOLCANO TOURISM IN VOLCANIC RISK AREAS: EXPLORATION OF THE HIGHER EXPERIENCE IN MOUNT SEMERU–INDONESIA," *Geo Journal of Tourism and Geosites*, vol. 46, no. 1, pp. 99–107, 2023.
[19] A. A. Widianto *et al.*, "Practising Eco-Theology: Pesantren and Green Education in Narmada Lombok, Nusa Tenggara Barat (NTB), Indonesia," 2023, pp. 118–125.
[20] A. Ramadoss and G. Poyya Moli, "Biodiversity conservation through environmental education for sustainable development--A case study from Puducherry, India," *Int. Electron. J. Environ. Educ.*, vol. 1, no. 2, pp. 97–111, Jan. 2011.
[21] M. Kalamas, M. Cleveland, and M. Laroche, "Pro-environmental behaviors for thee but not for me: Green giants, green Gods, and external environmental locus of control," *J. Bus. Res.*, vol. 67, no. 2, pp. 12–22, Feb. 2014.
[22] I. C. Ranteallo *et al.*, "Rice landrace conservation practice through collective memory and Toraja foodways," *Society*, vol. 8, no. 2, pp. 794–817, 2020.
[23] M. Scopelliti, D. Barni, and E. Rinallo, "My parents taught… green was my growth! The role of intergenerational transmission of ecological values in young adults' pro-environmental behaviors and their psychosocial mechanisms," *Int. J. Environ. Res. Public Health*, vol. 19, no. 3, p. 1670, 2022.
[24] P. Liu, M. Teng, and C. Han, "How does environmental knowledge translate into pro-environmental behaviors?: The mediating role of environmental attitudes and behavioral intentions," *Sci. Total Environ.*, vol. 728, p. 138126, Aug. 2020.
[25] M. Alam, *Freshmen orientaton program: Circle of violence, moral crisis, and pseudo-altruism*. Nas Media Pustaka, 2023.
[26] S. Kim, S.-H. Jeong, and Y. Hwang, "Predictors of Pro-Environmental Behaviors of American and Korean Students: The Application of the Theory of Reasoned Action and Protection Motivation Theory," *Sci. Commun.*, vol. 35, no. 2, pp. 168–188, Apr. 2013.
[27] J. Ye, Y. Yao, and L. Li, "The more involved, the more willing to participate: An analysis of the internal mechanism of positive spillover effects of pro-environmental behaviors," *J. Clean. Prod.*, vol. 375, p. 133959, Nov. 2022.
[28] A. N. Afiah, A. A. Widianto, B. Yuanda, E. Sulistywati, M. N. Fatanti, and M. Alam, "Resilience of Local Communities Experiencing Disaster in Lombok," 2022, pp. 78–89.
[29] G. L. W. Perry *et al.*, "Evaluating the Role of Social Norms in Fostering Pro-Environmental Behaviors," *Front. Environ. Sci. Eng. China*, vol. 9, 2021.

[30] Y. Xu, W. Li, and S. Chi, "Altruism, Environmental Concerns, and Pro-environmental Behaviors of Urban Residents: A Case Study in a Typical Chinese City," *Front. Psychol.*, vol. 12, p. 643759, Jun. 2021.
[31] L. B. Miller, R. E. Rice, A. Gustafson, and M. H. Goldberg, "Relationships Among Environmental Attitudes, Environmental Efficacy, and Pro-Environmental Behaviors Across and Within 11 Countries," *Environ. Behav.*, vol. 54, no. 7–8, pp. 1063–1096, Aug. 2022.
[32] M. Alam, "Reading the Novel Sarongge Through the Eyes of Female Environmental Activists in Indonesia," in *Environment, Media, and Popular Culture in Southeast Asia*, Springer, 2022, pp. 47–60.
[33] P. Janmaimool, "Investigating pro-environmental behaviors of well-educated people in Thailand: Implications for the development of environmental communication," *Int. J. Sociol. Soc. Policy*, vol. 37, no. 13/14, pp. 788–807, Jan. 2017.
[34] M. Alam, "Activists' heterodoxic beliefs in fostering urban environmental education in Indonesia," *Local Development & Society*, vol. 4, no. 1, pp. 128–145, 2023.
[35] L. Bosone, M. Chevrier, and F. Zenasni, "Consistent or inconsistent? The effects of inducing cognitive dissonance vs. cognitive consonance on the intention to engage in pro-environmental behaviors," *Front. Psychol.*, vol. 13, p. 902703, Aug. 2022.
[36] K. Kurisu, *Pro-environmental Behaviors*. Springer Japan, 2015.
[37] A. P. Duarte and C. Mouro, "Environmental corporate social responsibility and workplace pro-environmental behaviors: person-organization fit and organizational Identification's sequential mediation," *Int. J. Environ. Res. Public Health*, vol. 19, no. 16, p. 10355, 2022.
[38] M. Alam, "Environmental activists' hysteresis as a driving force for establishing environmental actions against urban forest privatization in Bandung, Indonesia," *Int. Sociol.*, vol. 36, no. 6, pp. 801–818, 2021.
[39] H.-P. Huang and L. D. Yore, "A comparative study of Canadian and Taiwanese grade 5 children?s environmental behaviors, attitudes, concerns, emotional dispositions, and knowledge," *Internat. J. Math. Ed. Sci. Tech.*, vol. 1, no. 4, pp. 419–448, Jan. 2005.
[40] P. Nguyen-Van, A. Stenger, and T. Tiet, "Social incentive factors in interventions promoting sustainable behaviors: A meta-analysis," *PLoS One*, vol. 16, no. 12, p. e0260932, Dec. 2021.
[41] N. Carmi, "Caring about tomorrow: future orientation, environmental attitudes and behaviors," *Environ. Educ. Res.*, vol. 19, no. 4, pp. 430–444, Aug. 2013.
[42] M. Alam, "Environmental Education and Non-governmental Organizations," in *The Palgrave Encyclopedia of Urban and Regional Futures*, Springer, 2023, pp. 495–502.
[43] M. Dresner, C. Handelman, S. Braun, and G. Rollwagen-Bollens, "Environmental identity, pro-environmental behaviors, and civic engagement of volunteer stewards in Portland area parks," *Environ. Educ. Res.*, vol. 21, no. 7, pp. 991–1010, Oct. 2015.
[44] M. Alam and I. A. N. Azalie, "Greening the Desert: Sustainability Challenges and Environmental Initiatives in the GCC States," in *Social Change in the Gulf Region: Multidisciplinary Perspectives*, Springer Nature Singapore Singapore, 2023, pp. 493–510.
[45] O. Schweiger *et al.*, "Quantifying the impact of environmental factors on arthropod communities in agricultural landscapes across organizational levels and spatial scales," *J. Appl. Ecol.*, vol. 42, no. 6, pp. 1129–1139, Dec. 2005.