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# Spiritual transformation model for ecological responsibility in christian religious education

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**ABSTRACT**

This study developed and examined a spiritual transformation-based Christian Religious Education (CRE) learning model to strengthen students' socio-ecological awareness at SMA Negeri 2 Sentani. The model was conceptually designed by integrating biblical reflection, spiritual experience, contextual ecological issues, collaborative action, habituation, and Papuan Christian responsibility for creation. Five teachers and fifty students participated through classroom observations, in-depth interviews, and pre- and post-implementation assessments. Because the manuscript does not report a validated assessment instrument, reliability coefficients, numerical pre-post scores, intervention duration, or a named qualitative coding framework, the findings are presented as qualitative indications rather than statistically verified effects. Evidence from interviews and observations showed recurring changes in four domains: students increasingly interpreted nature as God's creation, expressed stronger moral concern about environmental degradation, reported responsible practices such as waste reduction and plant care, and connected ecological responsibility with community well-being and future generations. The study proposes a transformative sequence Word of God, reflection, awareness, action, habituation, and socio-ecological responsibility as its distinctive contribution, positioning spiritual transformation as the internalization mechanism linking Christian faith with ecological practice within secondary-school religious education in Papua.

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## Introduction

The accelerating ecological crisis has transformed environmental degradation from a predominantly technical problem into a moral, social, and educational challenge. Contemporary scholarship describes the Anthropocene as a period in which human activities increasingly destabilize Earth systems and threaten the ecological conditions required to sustain human societies (Fletcher et al., 2024; Foster, 2017; Waring et al., 2024). Biodiversity loss and species decline further demonstrate that ecological deterioration is not limited to isolated environmental events but involves interconnected consequences for ecosystems and human well-being (Dirzo et al., 2022; Warwer et al., 2024). Importantly, these problems cannot be explained solely by inadequate technology, environmental regulation, or infrastructure. Patterns of consumption, economic expansion, and everyday human behavior also contribute to ecological overshoot (Merz et al., 2023). The ecological crisis therefore has an ethical dimension because human decisions concerning consumption, resource use, and environmental care reflect underlying values and judgments about the relationship between people and the natural world.

This study approaches that ethical dimension through an integrated framework of environmental ethics, transformative learning, and Christian ecotheology. Environmental ethics provides the moral basis for evaluating human responsibilities toward ecosystems and future generations, while transformative learning explains why education must move beyond the transmission of environmental information toward changes in interpretation, values, and practice. Moral education is relevant within this framework because environmental responsibility requires learners to judge not only what is environmentally harmful but also why particular actions should be regarded as morally responsible (Lee & Taylor, 2013). Christian ecotheology extends this ethical framework by interpreting creation as possessing value before God and by construing environmental care as a form of stewardship rather than merely compliance with institutional rules (Le Roux, 2020; Zhang, 2024). These perspectives do not imply that education can replace environmental policy or technological intervention. Instead, they address a different component of ecological sustainability: the moral orientations and internal motivations through which individuals decide whether environmental knowledge becomes responsible practice.

This theoretical distinction is important because environmental interventions often emphasize regulation, scientific literacy, infrastructure, or technical management, whereas the persistence of environmentally harmful behavior indicates that knowledge and external rules alone may be insufficient to produce sustained behavioral change. Spirituality and value orientation have been associated with environmental responsibility, suggesting that ecological behavior can be strengthened when individuals interpret care for nature as meaningful within their moral or religious worldview (Csutora & Zsóka, 2014; Hedlund-de Witt, 2013; Leal Filho et al., 2022). Similarly, environmental education research shows that experiential, action-oriented, and contextually grounded learning can strengthen environmental awareness and engagement (Birdsall, 2010; Lin et al., 2022; O'Neil et al., 2020). The conceptual problem, therefore, is not simply how to increase environmental knowledge, but how to connect knowledge, moral reflection, internal motivation, and repeated ecological action within a coherent learning process.

This problem is particularly relevant to Christian Religious Education (CRE), whose educational purpose includes character formation, moral orientation, and the practical expression of faith. A CRE process dominated by doctrinal transmission or memorization may increase religious knowledge without necessarily connecting theological understanding to environmental responsibility. Existing Christian education studies have shown that learning can become more transformative when Christian values are connected with students' lived circumstances and practical action (Br Hombing & Yanti, 2023; Supit, 2023; Tri Pudji Rahayu & Rode Sri Rahayu, 2024). Environmental ethics can be incorporated into this formative process because responsibility for nature may be understood as part of Christian stewardship. Imelda Butarbutar et al., (2025) for example, connect environmental ethics in CRE with experiential and project-based activities, while Lewis, (2025) emphasizes ecological empathy in religious education. These studies suggest that religious learning can support ecological formation, but they do not yet provide a single pedagogical sequence explaining how theological interpretation becomes moral awareness, action, habituation, and socio-ecological responsibility.

Christian ecotheology strengthens this pedagogical foundation by reinterpreting the human–nature relationship. Rather than viewing the natural environment primarily as a resource for human use, ecotheological approaches locate creation within a theological and moral relationship between God, humanity, and the created world. Zhang, (2024) emphasizes the moral value of creation within ecological theology, while Le Roux, (2020) links biblical stewardship with Christian environmental education. Studies in Indonesian Christian contexts similarly demonstrate the relevance of ecotheological principles for environmental responsibility (Panggarra et al., 2025). In this study, stewardship is therefore not treated merely as environmental knowledge. It functions as a theological basis through which learners may interpret environmental preservation as part of faithful Christian living.

The empirical context of Sentani, Papua, provides a particularly relevant setting in which to examine this relationship because ecological degradation is not an abstract issue for local learners. Lake Sentani, its watershed, and the Cycloops Mountains are subject to multiple environmental pressures associated with domestic and solid waste, agricultural activities, water transportation, mining, aquaculture, sedimentation, and land-use change (Keiluhu & Ohee, 2021; Morin et al., 2024; Ngutra et al., 2024; Ohee, 2013; Suyatno et al., 2024). Water-quality assessment has classified the average condition of Lake Sentani as heavily polluted, with several indicators reported above applicable quality standards (Suyatno et al., 2024). Forest degradation and land-use change have also intensified erosion, sedimentation, and ecological-disaster risks within the broader Sentani–Cycloops landscape (Morin et al., 2024; Ngutra et al., 2024; Yanthy et al., 2025). Sentani was therefore selected not merely because it represents an environmentally degraded location, but because it provides a contextually bounded educational setting in which students encounter ecological problems that can be directly related to religious reflection, moral judgment, and everyday environmental practice.

The selection of SMA Negeri 2 Sentani further reflects this contextual logic. The school provides a secondary-school CRE setting located within the ecological realities described above, allowing environmental problems to be treated as part of students' lived social environment rather than as distant case examples. The study focuses on five teachers and fifty students as the participant group through which the development and classroom implementation of the proposed model are examined. Because the research is qualitative, this participant group is not intended to provide statistical representation of all secondary-school students in Sentani or Papua. The manuscript does not document a statistical sample-size calculation, formal theoretical-saturation procedure, or specific participant-selection technique; consequently, the study should be interpreted as a bounded school-based inquiry rather than a population-level evaluation. Detailed participant-selection procedures should be specified in the Method section if they can be verified from the original research records.

The conceptual gap addressed by the study is consequently more than geographical. Existing scholarship has examined several relevant elements independently: spiritual transformation and Christian character formation (Br Hombing & Yanti, 2023; Tri Pudji Rahayu & Rode Sri Rahayu, 2024), environmental ethics in Christian education (Imelda Butarbutar et al., 2025), ecological empathy (Lewis, 2025), ecotheology and stewardship (Le Roux, 2020; Panggarra et al., 2025; Zhang, 2024), and spiritually informed environmental education (Rosales, 2024). However, these approaches do not fully explain how theological meaning is translated through reflection and moral internalization into repeated ecological practice and socio-ecological responsibility within secondary-school CRE. The present study addresses this conceptual gap by treating spiritual transformation as an internalization mechanism linking theological interpretation with environmental action rather than treating spirituality, ethics, environmental knowledge, and behavior as separate educational outcomes.

The proposed model therefore integrates Christian theological meaning, environmental ethics, contextual reflection, ecological experience, social responsibility, and habituation. Its theoretical logic begins with engagement with the Word of God and Christian stewardship, proceeds through reflection on locally experienced environmental problems, and moves toward ecological moral awareness, concrete action, and repeated environmentally responsible practices. The model further connects ecological responsibility with Christian concern for other people because environmental degradation affects health, community safety, livelihoods, disaster vulnerability, and future generations. Socio-ecological awareness is thus operationalized qualitatively through four interconnected domains: students' interpretation of nature and the human–nature relationship, moral sensitivity toward environmental degradation, reported or observed ecological practices, and recognition of the social consequences of environmental behavior.

Methodologically, the study adopts a qualitative, school-based model-development and implementation approach rather than a quasi-experimental design. The design is appropriate because the central analytical interest is the process through which students and teachers interpret spiritual, moral, and ecological change rather than the statistical estimation of intervention effects. Classroom observations, in-depth interviews, and assessments conducted before and after implementation are used to examine the proposed model and participants' experiences. However, because the present manuscript does not specify a validated quantitative instrument, reliability coefficients, or inferential statistical procedures, pre- and post-implementation evidence is interpreted qualitatively and should not be treated as experimental proof of causal effectiveness.

Accordingly, this study aims to develop and examine a spiritual transformation-based CRE learning model for strengthening socio-ecological awareness at SMA Negeri 2 Sentani. It addresses three questions: how the model can be conceptually structured, how its stages are enacted in classroom practice, and what qualitative changes participants describe or display in ecological worldview, moral awareness, environmentally responsible practice, and social responsibility. The study's novelty lies not simply in applying environmental education in Papua, but in proposing a spiritual ecological transformation sequence Word of God, reflection, awareness, action, habituation, and socio-ecological responsibility that positions spiritual internalization as the mechanism connecting Christian faith with environmental praxis. The Sentani context strengthens this contribution by testing that conceptual relationship within a setting where ecological degradation is part of students' immediate lived environment rather than an abstract curricular topic.

## Method

This study used a qualitative, school-based model-development and implementation design to examine how a spiritual transformation-based CRE model was developed, enacted, and interpreted at SMA Negeri 2 Sentani. The study focused on five teachers and fifty students who participated in the CRE learning process. These numbers were not determined through statistical power analysis because the study did not test population-level effects. Instead, the participant group was treated as a bounded, role-focused sample that provided two complementary perspectives: teachers contributed information on model design, pedagogical feasibility, and

classroom implementation, while students contributed information on learning experiences and perceived socio-ecological change. The available manuscript record does not identify a named recruitment technique or a formal saturation stopping rule; therefore, the study does not claim statistical representativeness or formally demonstrated theoretical saturation. Sample adequacy is interpreted in terms of role coverage and information richness within the single-school context, and the findings should be transferred to other settings only with attention to contextual similarity.

Data were collected through classroom observation, in-depth semi-structured interviews, and structured qualitative assessments conducted before and after model implementation. The observation protocol focused on four areas derived from the study framework: integration of biblical or spiritual reflection into CRE lessons, contextualization of local ecological issues, student participation in discussion and collaborative ecological activities, and observable environmentally responsible practices such as waste management, plastic reduction, plant care, and maintenance of school cleanliness. The interview guide was organized by participant role. Teacher interviews addressed model design, implementation procedures, pedagogical feasibility, contextualization of Christian teaching, and perceived student responses; student interviews addressed interpretation of nature as God's creation, moral sensitivity toward environmental degradation, ecological practices, and recognition of consequences for other people, communities, and future generations. The manuscript does not document the exact number or duration of observation and interview sessions or a formal pilot-validation procedure for these guides; consequently, no unsupported claims about session frequency, expert validation, or instrument validity are made.

The pre- and post-implementation assessment was qualitative and descriptive rather than a psychometric or quasi-experimental measure. It examined the same four domains used throughout the study: ecological worldview, moral-spiritual awareness, environmentally responsible practice, and social orientation. Evidence of change was interpreted from participants' statements and observed practices before and after implementation, including how students described the human-nature relationship, expressed responsibility for environmental degradation, reported or demonstrated actions such as proper waste disposal and reduced plastic use, and connected ecological care with community well-being and future generations. Because the study did not use a validated numerical scale, it does not report Cronbach's alpha, construct-validity coefficients, mean-score changes, significance tests, or effect sizes. The pre-post component therefore does not convert the study into a quantitative or mixed-methods design and should not be interpreted as experimental evidence of causal effectiveness.

Data were analyzed through an inductive thematic procedure across teacher interviews, student interviews, observation records, and the qualitative pre-post assessments. Analysis proceeded through repeated reading and familiarization, initial coding of statements and observed practices, grouping related codes into categories, comparison of patterns across participant groups and data sources, and development of higher-order themes concerning theological meaning, reflection, ecological awareness, action, habituation, and socio-ecological responsibility. Credibility was strengthened by comparing teacher accounts with student accounts and by examining whether interview themes converged with classroom observations and pre-post qualitative evidence; divergent accounts were retained rather than forced into consensus. The manuscript does not document independent double-coding or a second coder, so no inter-rater reliability coefficient is reported. Reproducibility is therefore supported by explicit reporting of the analytic sequence and evidence sources, while future replication should additionally document recruitment procedures, session numbers and duration, instrument piloting, an audit trail, and independent coding where feasible.

## Results and Discussions

### Design of a Spiritual Transformation-Based CRE Model for Fostering Students' Socio-Ecological Awareness

The findings reveal that the design of the spiritual transformation-based CRE learning model at SMA Negeri 2 Sentani is grounded in the understanding that faith education should not be limited to the acquisition of religious knowledge but should also lead to changes in students' perspectives and behaviors toward the environment. Teachers understand spiritual transformation as a process of inner change that becomes visible through the development of environmentally responsible attitudes, concern for school cleanliness, and willingness to protect nature as God's creation.

Spirituality is positioned as an important foundation for developing ecological awareness rather than as a domain separated from social and faith values are translated into concrete actions in students' everyday lives. Spirituality encourages a deeper contemplation of reality and self, which can lead to a greater awareness of the implications of human actions on the environment and a drive to adjust behaviors for sustainable development

(Csutora & Zsóka, 2014; Leal Filho et al., 2022; Mishra & Muddgal, 2022). It is described as a means of reconnecting with the sacred and fostering a sense of interconnectedness with nature, other people, and the cosmos, which underpins ecological consciousness (Allison, 2019; Bone, 2016).

The model is also founded on a strong theological understanding of human beings as stewards of God's creation. The interviews indicate that teachers do not rely solely on general Christian teachings but also contextualize ecological responsibility through the Confession of Faith of the Evangelical Christian Church (GKI) in Papua, particularly the commitment to cultivate and preserve the land of Papua as God's creation. Environmental responsibility is therefore perceived as a direct consequence of Christian faith. Students are not encouraged to care for the environment merely because of school regulations; rather, they are guided to recognize environmental preservation as a moral and spiritual responsibility. This theological foundation provides a distinctive feature of the learning design by integrating Christian faith, Papuan local religious identity, and ecological responsibility within a unified educational framework.

Teachers aim to empower students as environmentally responsible citizens, not just through knowledge but by fostering values, attitudes, and active participation (Birdsall, 2010; Dalli & Hamarat, 2026). Students' spiritual beliefs, alongside their educational background, significantly influence their environmental attitudes and knowledge. This suggests that when spiritual or moral frameworks are integrated into environmental education, students are more likely to perceive environmental preservation as a personal responsibility rooted in their values, not just institutional mandates (Syamsiah et al., 2024). Studies show that students' practice of environmental ethics includes dimensions such as knowledge, value, care, and responsibility. This indicates that environmental education often aims to cultivate a sense of ethical duty and personal responsibility, moving beyond simple rule-following to foster genuine moral engagement with environmental issues (Mahat et al., 2022).

Although CRE learning has traditionally relied on student textbooks, teacher guides, and other instructional materials as its primary references, the interview findings indicate a need for a more contextual and transformative learning design. Textbooks remain important sources of knowledge; however, spiritual transformation appears to occur more meaningfully when the learning content is connected to students' lived experiences. Consequently, the learning model developed in this study goes beyond reading, listening to teacher explanations, and memorizing Christian teachings. CRE content is directed toward meaningful interpretation, enabling students to relate biblical teachings to environmental conditions encountered in their daily lives. In this way, learning shifts from a predominantly informative orientation toward a process emphasizing value internalization and practical application. CRE addresses the emotional and moral complexities of environmental stewardship, helping students grapple with the magnitude of ecological threats and the ethical challenges posed by religious interpretations of humanity's role in creation (Gottlieb, 2025; Horrell, 2009).

Another essential component of the learning model is the integration of spiritual experience, faith reflection, and ecological practice. Students reported that prayer and reflection on the Word of God could generate an inner awareness of the responsibility to care for the environment. One student indicated that reflecting on biblical teachings created an awareness that damaging nature not only negatively affects human life but is also inconsistent with God's will. Other students connected prayer and spiritual reflection with practices such as avoiding indiscriminate tree cutting, replanting damaged vegetation, maintaining cleanliness, and protecting the natural environment. These findings demonstrate that spiritual experience can function as an entry point for developing students' ecological orientation. Biblical passages such as Genesis 1:26-31 and Genesis 2:15 appoint humans as stewards of the created world, framing environmental care as a sacred duty entrusted by God (Armstrong, 2016; Le Roux, 2020; Tewu & Kampilong, 2026; Village, 2021). This stewardship belief motivates pro-environmental attitudes and behaviors among religious individuals, reinforcing the idea that protecting nature aligns with God's will (Eom & Ng, 2023; Ng & Eom, 2024; Shin & Preston, 2021).

The learning design is also highly contextual because the environmental issues introduced in the learning process are closely related to students' everyday experiences. Waste, plastic consumption, school cleanliness, tree cutting, floods, landslides, and environmental degradation repeatedly emerged during the interviews. Students did not conceptualize environmental problems merely as abstract issues but connected them with direct consequences such as disruptions to the learning environment, health problems, flooding, and broader social losses. Some students also reported simple environmentally responsible practices, such as bringing reusable drinking bottles from home to reduce plastic waste. These findings suggest that an environmentally relevant CRE learning model should incorporate local ecological problems into students' faith-learning experiences. CRE should respect local traditions while remaining rooted in Christian teachings, fostering reconciliation between faith and local ecological practices (Pantan, 2025a, 2025b).

Students recognize that environmental problems such as climate change, flooding, and pollution have direct effects on their health and well-being, as well as on their communities. For example, increased flooding and climate change are seen as urgent issues requiring coordinated action, and students are aware of the social losses that can result from environmental degradation (Kiraz et al., 2020; Robredo & Ladrera, 2020). Students report engaging in simple, environmentally responsible behaviors, such as bringing reusable bottles to reduce plastic waste. These actions reflect an understanding of how individual choices can mitigate environmental problems (Robredo & Ladrera, 2020).

An important finding is that students' ecological awareness does not develop independently of their social awareness. Students understand environmental degradation as an issue that can adversely affect other people. Consequently, the Christian teaching of loving one's neighbor acquires an extended ecological meaning: loving others also involves protecting the environment in which people live together. Students emphasized that environmental degradation can create hardship for communities, whereas clean and healthy surroundings contribute to collective comfort and well-being. The learning model therefore establishes a conceptual relationship between love for God, love for others, and care for nature. In the context of this study, ecological awareness may therefore be more appropriately understood as socio-ecological awareness, because environmental actions are consistently interpreted in relation to their consequences for human and social life. Various explanations of the research findings are summarized in the following table.

**Table 1.** Spiritual–Ecological Learning Framework in Christian Religious Education

| Learning Component | Biblical/Spiritual Foundation | Local Ecological Issues | Practical Actions/Applications | Student Outcomes | Socio-Ecological Impact |
|---|---|---|---|---|---|
| Contextual Learning | Faith-learning experiences | Waste, plastic consumption, school cleanliness, tree cutting, floods, landslides, and environmental degradation | Bringing reusable drinking bottles from home to reduce plastic waste | Ability to relate biblical teachings to environmental conditions in daily lives; meaningful interpretation | Connecting abstract problems to health problems, flooding, and broader social losses |
| Spiritual Experience and Faith Reflection | Prayer and reflection on the Word of God; God's will | Indiscriminate tree cutting, damaged vegetation, and environmental cleanliness | Avoiding indiscriminate tree cutting, replanting damaged vegetation, maintaining cleanliness, and protecting the natural environment | Inner awareness of the responsibility to care for the environment; value internalization | Understanding that damaging nature negatively affects human life and is inconsistent with God's will |
| Socially-Integrated Ecological Learning | Command to love one's neighbor; love for God | Environmental degradation | Protecting the environment in which people live together | Socio-ecological awareness; understanding that ecological awareness is linked to social awareness | Preventing hardship for communities; promoting collective comfort and well-being |

The model identified in the data also positions students as agents of change rather than merely recipients of moral messages. This is reflected in students' reports of reducing plastic consumption, watering plants, disposing of waste properly, maintaining the school environment, and reminding peers not to litter. Such involvement is significant because spiritual transformation becomes observable through actual behavior. The change does not remain confined to the individual relationship between students and God but develops into a social willingness to influence peers and their surrounding environment. Therefore, a spiritual transformation-based CRE learning model can potentially cultivate not only personal ecological awareness but also students' capacity to become agents in creating an environmentally responsible school culture. Integrating ecotheology into Christian Religious Education helps shape ecological ethics and responsibility grounded in faith. This approach encourages students to see environmental stewardship as a faith-based moral imperative, fostering deeper ecological awareness and ethical action (Mary et al., 2026). Transformative sustainability education, when rooted in spiritual or religious frameworks, addresses the underlying value crisis contributing to environmental degradation. By connecting spiritual transformation with ecological responsibility, students are empowered to take initiative and lead pro-environmental actions within their school communities (Giusti et al., 2025).

Another notable finding concerns the affective and moral dimensions of students' ecological awareness. Several students reported experiencing an "inner awareness," a change of heart, and even feelings of guilt when encountering a dirty environment or neglecting environmental cleanliness. When students are exposed to environmental problems, they often display multidimensional emotional responses, including affective (emotional), behavioral, and cognitive reactions. These responses can include feelings of concern, guilt, and a desire to take action to improve the environment (Güler & Ürey, 2025; Samarawickrama et al., 2026). This indicates that the transformation extends beyond the cognitive dimension. Students do not simply recognize that littering is inappropriate; instead, they begin to develop moral sensitivity toward environmentally harmful behavior. Within the context of this study, ecological awareness therefore develops from environmental knowledge toward the formation of an ecological conscience. When environmental responsibility becomes part of students' personal moral judgment, environmentally responsible behavior has greater potential to persist than behavior that depends solely on external supervision or school regulations.

Based on the overall findings, the learning model can be characterized by six interrelated dimensions: theological, reflective, contextual, experiential, social, and practical. The theological dimension means that ecological responsibility derives from students' understanding of God and His creation. The reflective dimension provides opportunities for students to interpret biblical teachings and personal experiences. The contextual dimension connects learning with actual ecological problems in Sentani and the school environment. The experiential dimension enables students to participate directly in environmental activities. The social dimension connects environmental care with concern for others, while the practical dimension emphasizes the manifestation of faith through concrete actions. Together, these characteristics demonstrate that the proposed design extends beyond conventional CRE learning that primarily focuses on transferring religious knowledge.

The most compelling finding and the empirical-contextual novelty of the learning design lies in the integration of three interconnected dimensions: spiritual, social, and ecological transformation. Spiritual transformation is not regarded as the final objective; rather, it functions as a mechanism that stimulates social responsibility and ecological behavior. Another distinctive feature is the incorporation of local Papuan theological identity through the principle of preserving the land of Papua as God's creation, which is subsequently connected to concrete ecological issues such as waste management, flooding, plastic reduction, and vegetation preservation. Based on the findings, the learning design may be conceptualized as the following sequence: interpretation of the Word of God, spiritual reflection, ecological moral awareness, actions to care for creation, social responsibility, ecological habituation. This pattern represents one of the principal contributions emerging from the study.

The thematic synthesis converts participant perspectives into a defined model rather than treating them as isolated descriptions. The proposed framework consists of six linked components whose function is specified in Table 2 and Figure 1. The proposition is that Christian ecological learning becomes transformative when theological meaning is reflected upon, contextualized in lived environmental problems, discussed morally, translated into collaborative action, and reinforced through habituation and social responsibility. This is a conceptual proposition derived from the qualitative pattern; it is not a statistically validated causal pathway.

**Table 2.** Defined Components and Propositions of the Spiritual–Ecological Transformation Model

| Component | Operational meaning | Evidence indicator in this study | Structured proposition |
|---|---|---|---|
| Theological orientation | Word of God, stewardship, and creation as morally significant. | References to Genesis 2:15, creation, obedience to God, and care for Papua as God's creation. | Faith language supplies the normative reason for ecological responsibility. |
| Reflective internalization | Prayer, reflection, and personal meaning-making. | Accounts of inner awareness, guilt, gratitude, and changed interpretation. | Reflection mediates movement from received teaching to personally owned moral meaning. |
| Contextual interpretation | Linking biblical teaching with local ecological realities. | Waste, flooding, plastic use, tree cutting, school cleanliness, and local environmental degradation. | Context makes theological meaning actionable rather than abstract. |
| Dialogical moral awareness | Discussion of consequences for people, communities, and future generations. | Recognition of environmental harm as a moral and social issue. | Dialogue broadens stewardship into socio-ecological responsibility. |
| Collaborative ecological action | Concrete individual and group practice. | Proper waste disposal, reusable bottles, plant care, school cleaning, and reminding peers. | Action externalizes moral-spiritual commitments in observable practice. |

| Component | Operational meaning | Evidence indicator in this study | Structured proposition |
|---|---|---|---|
| Habituation and social extension | Repeated practice and peer/community orientation. | Reported routine behaviors and concern for peers, communities, and future generations. | Repetition and social reinforcement may stabilize responsibility beyond one lesson or activity. |

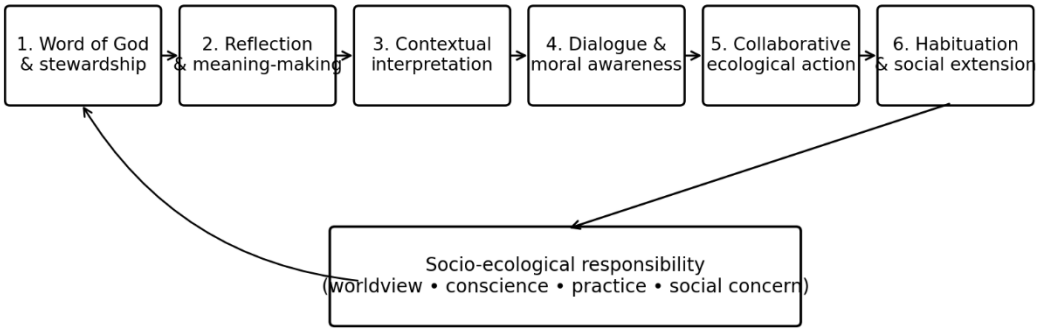



**Figure 1.** Structured Spiritual–Ecological Transformation Model Derived from the Thematic Findings

**Implementation Process of the Spiritual Transformation-Based CRE Learning Model in Classroom Practice**
The implementation of the spiritual transformation-based CRE learning model demonstrates that the learning process progresses from the communication of religious values toward students' lived experiences. Teachers encourage students to maintain cleanliness, demonstrate environmentally responsible behavior, and connect such actions with their personal faith. According to teachers, spiritual experience and faith reflection are important because environmental responsibility becomes more meaningful when it originates from students' internal beliefs. Students and individuals who perceive nature as sacred or imbued with intrinsic value often develop a stronger sense of environmental responsibility. This spiritual connection to nature fosters a deeper, more personal motivation to care for the environment, as environmental action becomes an expression of their internal beliefs and values (Hedlund-de Witt, 2013). Teachers also reported active student participation and observed changes in students' daily behavior at school. Thus, the implementation process is founded on the integration of classroom learning activities and practical experiences within the school environment.

A prominent stage in the implementation process involves the use of prayer, Bible reading, and reflection on the Word of God to develop students' spiritual orientation. Students explicitly referred to Genesis 2:15 as a biblical foundation for the human mandate to cultivate and care for God's creation. Christians are biblically appointed as stewards of the created world, with Genesis 2:15 specifically highlighting the responsibility to practice environmental stewardship (ES) by caring for and cultivating the earth (Le Roux, 2020). Prayer was understood as a means of developing gratitude, while biblical teachings encouraged students to perceive nature as a precious trust from God that must be protected. Consequently, spiritual activities do not merely function as opening or closing rituals in the learning process. Instead, they become an important means of shaping students' perspectives concerning the relationship between humanity, God, and the natural world. Within this model, spirituality therefore serves as an internal source of motivation for environmentally responsible behavior.

The next stage involves contextualizing biblical teachings through contemporary environmental issues. One student explained that the teacher connected biblical narratives such as creation and Noah's flood with current problems including flooding, waste accumulation, and deforestation. This finding is important because it illustrates how biblical narratives are employed to assist students in interpreting contemporary realities. Through such an approach, students do not perceive the Bible as a text disconnected from everyday life but rather as a source of reflection for understanding environmental problems around them. Contextualization therefore enables CRE learning to move from the question of "what does the Word of God say?" toward "how should the Word of God influence attitudes and responses to present environmental challenges?"

The implementation process also indicates a shift from predominantly teacher-centered instruction toward a more dialogical approach. One student reported that the teacher did not rely exclusively on one-way lectures but actively engaged students in discussions concerning the consequences of environmental degradation for human life. Linking classroom discussions to real-world challenges helps students see the relevance of environmental issues to human life (Ayong, 2024). Such discussions are significant because they allow students to express their own experiences, judgments, and understandings. Through dialogue, ecological values are not merely accepted as instructions from teachers but are interpreted and personally meaningful to students. This corresponds with the transformative character identified in the findings, in which behavioral changes begin with personal meaning-making and subsequently develop into attitudes and actions.

The learning process is subsequently translated into concrete environmental actions. The practices most frequently mentioned by students include disposing of waste properly, maintaining environmental cleanliness, caring for plants, reducing plastic waste, and refraining from damaging nature. Some students reported bringing reusable drinking bottles from home to reduce plastic waste, while others mentioned planting and maintaining vegetation around the school. Such practices constitute an important component of implementation because they provide students with direct experience of putting faith into action. Within this model, ecological action is not treated as an extracurricular activity separate from CRE but as an integral component of religious learning itself.

The social dimension of implementation emerges through collaborative environmental activities among students. Participants described feelings of enjoyment when working together to maintain the school environment. Such cooperation promotes a sense of community while simultaneously strengthening collective responsibility for the environment. Several students also reported becoming willing to remind or correct peers who littered. This indicates that the model does not merely cultivate individual environmental consciousness but can also produce positive forms of peer-based social regulation. The school learning environment can therefore gradually develop into a community in which students mutually reinforce their responsibility to care for God's creation.

Within this process, teachers function not only as transmitters of theological knowledge but also as facilitators of reflection and behavioral transformation. Teachers connect biblical passages with everyday environmental challenges, create opportunities for discussion, and guide students toward concrete environmental action. Such a role makes learning more closely connected with students' lived experiences. Teachers guide students to explore environmental justice through worship theologies and practices, encouraging them to address local environmental problems and possibilities. This approach helps students connect theological concepts to real-world contexts and motivates transformative action within their communities (Crainshaw, 2018). The effectiveness of implementation appears to depend less on the amount of religious content delivered and more on the teacher's ability to establish meaningful connections between faith teachings and ecological experiences. Consequently, teachers' competence in contextualizing religious teachings becomes an essential element in the development of the spiritual transformation-based CRE learning model.

Students' emotional responses constitute another important element of the implementation process. Students described environmental learning activities as enjoyable, exciting, satisfying, and helpful in increasing their understanding of how to care for nature. These positive responses indicate that experience-based ecological learning can enhance student engagement. Environmental activities are no longer interpreted simply as routine school obligations but can become meaningful and enjoyable learning experiences. Hands-on, field-based, and outdoor activities allow students to directly observe and interact with the environment, making learning more authentic and engaging. These experiences help students develop a deeper understanding and appreciation for nature, which can foster passion and commitment to environmental stewardship (Brown & Jones, 2021; Honig, 2019; Lo et al., 2021; O'Neil et al., 2020). This condition is particularly important because transformation of attitudes is more likely to develop when students are emotionally engaged and have positive experiences during the learning process.

Based on the interview patterns, the implementation process may be conceptualized as a learning cycle consisting of several stages. The first stage is the introduction of spiritual values through the Word of God; the second is reflection and meaning-making; the third is contextualization within local environmental problems; the fourth is dialogue and discussion; the fifth is collaborative ecological action; and the sixth is habituation followed by reflection on personal change. This cycle can be repeated continuously until environmentally responsible actions become part of students' habitual behavior. Spiritual transformation within the model should therefore not be understood as a single event but as a gradual process of understanding, internalizing, acting, and developing habits. The research findings are illustrated in this figure.

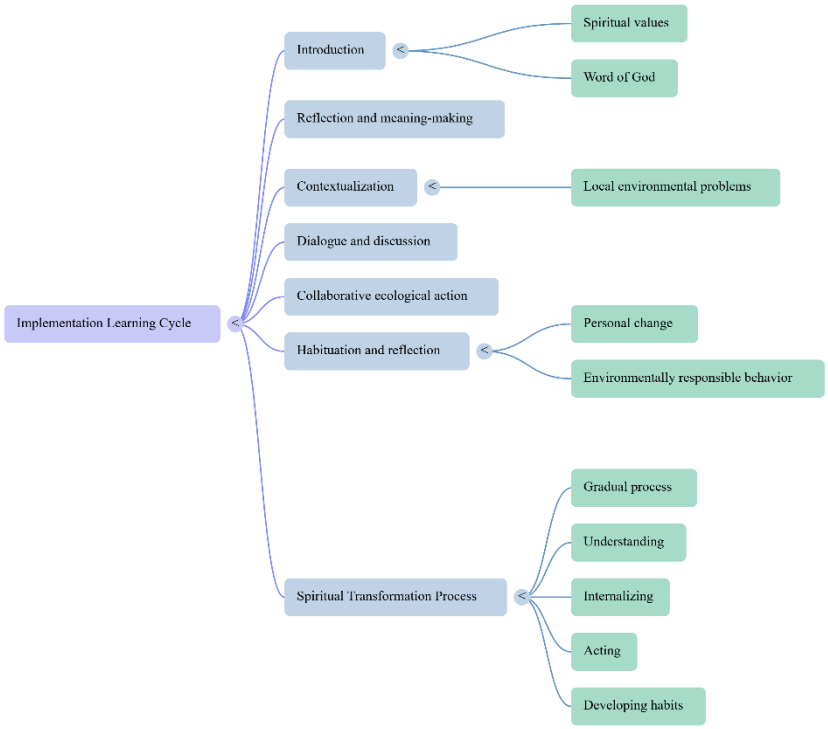



**Figure 2**. Implementation process may be conceptualized as a learning cycle consisting of several stages

The empirical novelty of the implementation process lies particularly in the emergence of a cycle from spirituality toward ecological praxis. Prayer, Bible reading, environmental care, and reflection are not understood as separate activities. One student even described these activities as an integrated process through which responsibility for God's creation develops. Based on these findings, the model can be formulated as a word, reflection, contextualization, action, habituation cycle, which may be conceptualized as a spiritual-ecological transformation cycle. Its distinctive feature lies in using spiritual activities as direct drivers of ecological learning, thereby transforming environmental care from a routine school cleanliness program into a form of faith praxis and an expression of love for God and others.

**Implementation of the Spiritual Transformation-Based CRE Learning Model in Enhancing Students' Socio-Ecological Awareness**

The interview findings provide strong indications that the implementation of spiritual transformation-based CRE contributes to the enhancement of students' socio-ecological awareness. Teachers observed changes through students' increasing concern for school cleanliness and their willingness to protect nature as God's creation. Changes were also evident in students' habits of maintaining the cleanliness and appearance of the school environment. Teachers evaluated these changes positively based on their observations of students' everyday behavior. Although such evaluations are qualitative in nature, the consistency between teachers' observations and students' reported experiences suggests that the learning process has generated identifiable changes among the participants.

The first area of improvement concerns the cognitive dimension, particularly changes in students' understanding of the relationship between humanity and nature. Students increasingly recognize that nature is not merely a resource available for human use but is God's creation entrusted to humanity for responsible management and preservation. Genesis 2:15 repeatedly emerged in students' responses as an important biblical reference. This understanding produces a reinterpretation of ecological responsibility: environmental protection is no longer regarded exclusively as the responsibility of governments, schools, or environmental organizations, but as a mandate inherent in human existence. Such a shift in perspective constitutes an important foundation for the development of deeper ecological awareness.

A further improvement is evident within students' affective and moral dimensions. Several participants described experiencing a change of heart after participating in CRE learning. One student explained that they had previously littered but developed an awareness of the need to discontinue such behavior after learning about the responsibility to care for God's creation. Another student reported feeling guilty when encountering dirty surroundings or neglecting cleanliness. These findings indicate that ecological awareness has begun to enter students' personal value systems. The environment is no longer perceived merely as an external object that must be protected because of regulations but as part of a personal moral responsibility experienced internally by

students. There is evidence that students are increasingly viewing environmental responsibility as a personal, internalized moral duty rather than merely an external obligation imposed by regulations. Studies show that educational programs focusing on ethics, sustainability, and social responsibility help instill a sense of personal responsibility for environmental issues, such as climate change, among students (Andevski et al., 2019; McKercher et al., 2014).

At the behavioral level, changes become more concrete and observable. Participants reported disposing of waste properly, reducing plastic consumption, bringing reusable drinking bottles, maintaining cleanliness, caring for plants, and refraining from environmentally destructive practices. Some students also became more proactive by reminding peers not to litter. These changes are significant because they demonstrate that ecological awareness does not remain at the level of stated attitudes. Environmental education and increased awareness foster not only personal pro-environmental actions but also encourage students to influence their peers. For example, students who become more ecologically aware are more likely to remind others not to litter, demonstrating a shift from passive attitudes to active engagement in environmental protection (Hasriyanti et al., 2025; Liang et al., 2022; Lin et al., 2022; Ruiz-Corro et al., 2024). There is evidence that the values learned during CRE have begun to be translated into everyday routines and actions. The effectiveness of the model can therefore be understood through the continuity between theological understanding, moral awareness, and environmentally responsible behavior.

The ecological awareness generated through the learning model simultaneously produces greater social awareness. Students recognize that littering and environmental destruction do not merely affect the relationship between individuals and nature but can also create negative consequences for other people. Floods and landslides were repeatedly mentioned as examples of environmental consequences capable of causing hardship within communities. Students also connected environmental cleanliness with comfortable learning conditions and the well-being of future generations. These findings demonstrate an expansion of students' moral orientation from individual interests toward broader social concerns. In other words, the ecological transformation emerging from CRE possesses an important dimension of social solidarity.

Interestingly, students frequently interpreted environmental awareness through a disaster-risk prevention perspective. Waste was associated with flooding, environmental degradation with landslides, and the preservation of trees and other natural elements with the protection of human life. This pattern indicates that ecological learning through CRE has helped students understand causal relationships between human behavior and environmental consequences. Consequently, responsibility for God's creation acquires not only theological meaning but also practical significance for protecting human life, community safety, and environmental sustainability.

A deeper finding concerns changes in the source of students' motivation for environmentally responsible behavior. Initially, students may maintain cleanliness because of school regulations or fear of sanctions. However, the interviews indicate an emerging orientation in which students care for the environment because they understand such behavior as an expression of obedience to God. Studies show a relationship between spiritual intelligence and environmental altruistic behavior, indicating that students who perceive environmental care as a spiritual or religious duty are more likely to engage in pro-environmental actions (Jadgal et al., 2024). One participant explicitly indicated that CRE can transform students' underlying motivations so that they protect nature not because they fear human or school regulations but because of sincere obedience to God. The transition from external motivation to internal-spiritual motivation represents an important indicator of transformation, as environmentally responsible behavior is more likely to become sustainable when it is grounded in deeply internalized beliefs and values.

The findings further suggest that the influence of the learning model extends beyond the school environment. Several students explicitly discussed the importance of protecting the environment both at school and at home. They understood that the mandate to care for creation applies to everyday life and is not restricted to the location in which formal learning occurs. This indicates a process of value transfer from the school context into students' personal lives. Their awareness also begins to develop an intergenerational dimension, as some participants mentioned the importance of environmental care as an example and inheritance for future generations. Environmental harm can cause irreversible damage and deplete resources, leaving future generations at a disadvantage (Baptiste, 2018; Dranseika, 2016; Hottó, 2025). The learning process therefore has the potential to develop a sustainability orientation that extends beyond students' immediate interests.

Enhancement of students' socio-ecological awareness can be interpreted through four layers of transformation: changes in worldview, changes in moral awareness, changes in behavior, and changes in social orientation. At the first level, students understand nature as God's creation. At the second level, they develop moral responsibility and sensitivity toward environmental degradation. At the third level, they engage in

environmentally responsible actions, including waste reduction and plant care. At the fourth level, students increasingly consider the consequences of environmental behavior for friends, communities, and future generations. Nevertheless, because these findings are based primarily on interview data, the term "enhancement" should be understood as an indication of change based on participants' experiences and perceptions rather than as evidence of experimentally established causal effects.

The principal empirical novelty of this study lies in the identification of a spiritual-ecological transformation chain. Based on the overall interview findings, the transformation can be conceptualized as follows: faith and interpretation of the Word of God, transformation of environmental worldview, emergence of ecological awareness and conscience, concrete ecological action, habituation, socio-ecological responsibility. One of the most significant findings is that transformation extends beyond changes in environmentally responsible behavior and reaches the motivational foundation of students' actions. Environmental protection gradually becomes part of students' identity as people of faith and an expression of their love for God and others. Therefore, the distinctive contribution of the proposed model lies in positioning spiritual transformation as an internalization mechanism through which environmental responsibility shifts from an externally imposed obligation to an internally grounded moral-spiritual awareness within the local context of students at SMA Negeri 2 Sentani. The various findings of this study can be summarized in the following table.

**Table 3.** Spiritual–Ecological Transformation Levels

| Transformation Level | Key Concept | Description of Change | Example Actions or Outcomes | Internalization Status (Inferred) |
|---|---|---|---|---|
| Level 1 | Spiritual-Ecological Worldview | A shift in fundamental perspective where nature is understood as God's creation and rooted in the interpretation of the Word of God. | Students identify nature as a divine creation; faith-based interpretation of environmental reality. | Internalized (Spiritual Foundation) |
| Level 2 | Moral Awareness and Conscience | Development of moral responsibility and sensitivity toward environmental degradation; emergence of an ecological conscience. | Feeling a sense of duty toward the environment; internal moral discomfort regarding pollution. | Internalized (Moral-Spiritual Awareness) |
| Level 3 | Concrete Ecological Action | Translating awareness into physical behaviors and visible environmental engagement. | Waste reduction; plant care; specific environmentally responsible actions. | Externalized (Behavioral) |
| Level 4 | Habituation and Social Orientation | Actions become consistent habits and expand to consider the impact on the broader community and future generations. | Consistency in green behavior; considering consequences for friends and society. | Internalized (Identity-based) |
| Level 5 | Socio-Ecological Responsibility | Environmental protection becomes an expression of love for God and others, fully integrated into the student's identity. | Shift from externally imposed obligation to internally grounded responsibility; long-term social commitment. | Fully Internalized (Identity and Love) |

Substantively, the strongest finding of this study is the emergence of the pattern word of God, reflection, awareness, action, habituation, socio-ecological responsibility. This pattern demonstrates that the spiritual transformation-based CRE learning model does not merely transfer religious and ecological knowledge. Instead, it creates a progressive process in which biblical teachings are reflected upon, contextualized within students' environmental realities, internalized as moral-spiritual awareness, translated into concrete ecological practices, and ultimately developed into environmentally responsible habits and socio-ecological responsibility.

Accordingly, this pattern has strong potential to serve as the conceptual syntax of the proposed learning model. The model positions the Word of God as the theological foundation, reflection as the internalization mechanism, ecological awareness as the psychological-moral transformation, environmental action as the behavioral manifestation of faith, habituation as the process that sustains behavioral change, and socio-ecological responsibility as the intended learning outcome. The central contribution of the model therefore lies in connecting Christian spirituality, ecological consciousness, social responsibility, and concrete environmental praxis within a single transformative learning process.

**Theoretical Distinctiveness and Comparative Positioning of the Spiritual–Ecological Transformation Model**
The findings converge with empirical work showing that environmental responsibility is strengthened when values, spirituality, and moral meaning are connected to ecological behavior. Csutora & Zsóka, (2014) linked spirituality with ecological-footprint-related orientations, Leal Filho et al., (2022) documented relationships between spirituality and sustainability, Syamsiah et al., (2024) found that spiritual beliefs were associated with environmental knowledge and attitudes, and Jadgal et al., (2024) reported relationships among spiritual health, environmental ethics, and protection behavior. The present study extends this line of work by locating spirituality inside an explicit CRE learning sequence rather than treating spirituality primarily as an individual background characteristic. Its distinctive claim is therefore not that spirituality matters for environmental concern, but that theological interpretation and reflection can be organized pedagogically as an internalization mechanism connecting faith with ecological practice.

The stewardship component also converges with religion-and-environment research while differing in pedagogical emphasis. Shin & Preston, (2021) showed that stewardship framing can improve climate-change attitudes, Ng & Eom, (2024) identified environmental guilt and anger as mediators between religious stewardship and pro-environmental action, and Eom and Ng (2023) theorized stewardship as a pathway through which religion can support sustainability. Le Roux, (2020) similarly connected Christian environmental stewardship with educational aims. In contrast to approaches centered on persuasive messages or general stewardship attitudes, the Sentani model embeds stewardship within reflection, local ecological interpretation, dialogue, collaborative action, and habituation. Thus, stewardship is treated as the theological starting point rather than the complete educational mechanism.

The action and habituation components are consistent with empirical environmental-education studies that emphasize practice. Birdsall, (2010) demonstrated the importance of empowering learners to act; Lin et al., (2022) found that action-oriented environmental education supported environmental awareness; Hasriyanti et al., (2025) reported pro-environmental attitude development through integrated environmental education in an Indonesian high-school context; and Liang et al., (2022) showed that social models can influence children's pro-environmental behavior. These studies provide an alternative explanation in which action, modeling, and school experience can shape ecological behavior without a religious mechanism. The present findings do not refute those explanations. Instead, they suggest that in CRE, action may acquire additional motivational meaning when students interpret it as an expression of faith and responsibility before God.

The affective findings also align with studies emphasizing emotion and moral concern. Güler & Ürey, (2025) documented multidimensional emotional responses to environmental problems, Samarawickrama et al., (2026) described children's environmental knowledge and emotional reactions in qualitative terms, and Mahat et al., (2022) identified knowledge, values, care, and responsibility as dimensions of environmental ethics among secondary students. Lewis, (2025) further argues that ecological empathy is important within religious education. The Sentani data similarly contain concern, guilt, gratitude, and moral discomfort, but the present model places these affects between theological reflection and ecological action. This ordering differentiates the model from environmental-awareness frameworks in which affect is an outcome or accompanying response rather than an explicit internalization stage.

A second alternative is transformative sustainability education, which can produce changes in relationships with nature without relying on religious doctrine. Giusti et al., (2025) emphasize the social and spatial conditions through which schools can support transformative sustainability learning, while Ruiz-Corro et al., (2024) frame environmental awareness as a pedagogical commitment and Kiraz et al., (2020) show that instructional strategies can affect water-pollution learning among secondary students. These approaches highlight context, participation, and action, all of which are also present in the current model. The difference lies in the motivational architecture: the Sentani framework explicitly connects ecological action to Word-of-God interpretation, spiritual reflection, and Christian moral identity. This distinction should be understood as a contextual specialization rather than evidence that a faith-based model is universally superior.

Model contributes to the emerging literature on faith-based environmental education in Indonesia and comparable religious settings. Panggarra et al. (2025) illustrate the relevance of ecotheology in an Indonesian Christian community, Rosales (2024) develops climate-sensitive religious-education curriculum, Tri Pudji Rahayu and Rode Sri Rahayu (2024) emphasize spiritual transformation in Christian character formation, and Imelda Butarbutar et al. (2025) integrate environmental ethics with CRE through project-oriented learning. The present study differs by combining theological grounding, reflective internalization, local ecological contextualization, collaborative action, habituation, and social responsibility within one sequential framework. Its novelty therefore lies in the proposed spiritual–ecological transformation chain Word of God, reflection, contextual awareness, action, habituation, and socio-ecological responsibility while its evidentiary status remains qualitative and context-bound rather than experimentally validated.

**Table 4**. Comparative Positioning of the Proposed Model Against Alternative Environmental-Education Approaches

| Approach | Representative studies | Shared element | How the proposed model differs |
|---|---|---|---|
| Spirituality and sustainability | Csutora & Zsóka (2014); Leal Filho et al. (2022); Syamsiah et al. (2024); Jadgal et al. (2024) | Values and spiritual orientation can relate to environmental responsibility. | Operationalizes spirituality as a classroom sequence of reflection, action, and habituation. |
| Religious stewardship | Shin & Preston (2021); Eom & Ng (2023); Ng & Eom (2024); Le Roux (2020) | Creation care is framed as moral/religious responsibility. | Uses stewardship as the starting point, then adds contextualization, dialogue, collaborative action, and social extension. |
| Action-oriented environmental education | Birdsall (2010); Lin et al. (2022); Hasriyanti et al. (2025); Liang et al. (2022) | Learning is strengthened through action, modeling, and participation. | Interprets action as faith praxis and connects repeated action with spiritual internalization. |
| Affective/ethical environmental education | Mahat et al. (2022); Güler & Ürey (2025); Samarawickrama et al. (2026); Lewis (2025) | Care, emotion, guilt, empathy, and responsibility matter. | Places affective-moral awareness as an explicit bridge between theological reflection and behavior. |
| Transformative/contextual sustainability education | Giusti et al. (2025); Ruiz-Corro et al. (2024); Kiraz et al. (2020) | Context, participation, and real-world issues support change. | Adds Christian theological meaning and Papuan ecological identity to the transformation process. |
| Faith-based ecological education | Panggarra et al. (2025); Rosales (2024); Tri Pudji Rahayu & Rode Sri Rahayu (2024); Imelda Butarbutar et al. (2025) | Faith formation and environmental concern are integrated. | Defines a sequential spiritual–ecological mechanism linking Word, reflection, awareness, action, habituation, and social responsibility. |

## Conclusions

The study identified a six-stage spiritual–ecological transformation sequence Word of God, reflection, contextual awareness, action, habituation, and socio-ecological responsibility through inductive thematic analysis of teacher interviews, student interviews, classroom observations, and qualitative pre- and post-implementation evidence. The sequence emerged through repeated familiarization, initial coding, categorization, comparison across participant groups and data sources, and development of higher-order themes. Its prominence reflects the recurrence and convergence of these elements across different forms of qualitative evidence rather than statistical validation or a formally tested causal pathway. Internalization was interpreted cautiously from indicators that went beyond visible compliance, including students' explanations of environmental care as obedience to God, expressions of guilt or moral concern about environmental harm, reported application of ecological practices beyond immediate classroom requirements, and consideration of consequences for peers, communities, and future generations. However, these indicators remain interpretive and cannot definitively distinguish deeply internalized commitment from socially desirable responses or temporary compliance because the study did not include formal member checking, independent coding, inter-rater reliability, or longitudinal follow-up. The contribution of the model lies in framing spiritual transformation as a context-specific pedagogical mechanism in which theological interpretation and reflection give ecological responsibility explicitly religious meaning before it is expressed through action and habituation. This differentiates the model conceptually from secular value-internalization approaches that may also use reflection, participation, emotion, and repeated ecological practice, but it does not establish that spiritual transformation is a uniquely superior mechanism. Alternative explanations for the observed changes including teacher influence, school rules, peer modeling, prior environmental attitudes, and participation in practical environmental activities cannot be excluded within the present qualitative design. The findings therefore support the model as a theoretically grounded and empirically informed framework rather than as a validated causal intervention. Future research should test the model through multi-site and longitudinal designs, clearly specified qualitative coding procedures, independent coding or audit-trail verification, validated measures of socio-ecological awareness and value internalization, and comparative or mixed-method designs capable of distinguishing faith-based internalization from ordinary pedagogical reflection, social compliance, and broader environmental-education effects.

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