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Integrating Nyadran Tirta Wening Cultural Values into IPAS Learning to Develop Elementary Students' Ecological Intelligence

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Abstract

This study aims to analyze the integration of Nyadran Tirta Wening cultural values into IPAS (Integrated Natural and Social Science) learning to develop elementary students' ecological intelligence. A qualitative approach with a case study design was employed at SD Negeri 2 Jati from October 2025. The participants included a classroom teacher, third-grade students, the principal, and community members involved in the Nyadran Tirta Wening tradition. Data were collected through observation, interviews, and documentation, and analyzed using Miles and Huberman's interactive model. The results indicate that cultural values such as gratitude for water sources, cooperation, and environmental care were successfully integrated into IPAS learning through school-based project activities. This process fostered students' ecological awareness, understanding, and responsible actions toward nature. The combination of local wisdom and scientific learning created meaningful, contextualized learning experiences that enhanced students' moral and environmental sensitivity. The study concludes that integrating local cultural values into IPAS learning is an effective pedagogical strategy to promote ecological intelligence while preserving Indonesia's cultural heritage.
Keywords: Nyadran Tirta Wening; IPAS; local wisdom; ecological intelligence; school-based project.

Abstrak

Penelitian ini bertujuan untuk menganalisis integrasi nilai-nilai budaya Nyadran Tirta Wening dalam pembelajaran IPAS guna mengembangkan kecerdasan ekologis siswa sekolah dasar. Penelitian ini menggunakan pendekatan kualitatif dengan desain studi kasus yang dilaksanakan di SD Negeri 2 Jati pada bulan Oktober 2025. Subjek penelitian meliputi guru kelas, siswa kelas III, kepala sekolah, dan tokoh masyarakat yang terlibat dalam tradisi Nyadran Tirta Wening. Data dikumpulkan melalui observasi, wawancara, dan dokumentasi, kemudian dianalisis menggunakan model interaktif Miles dan Huberman. Hasil penelitian menunjukkan bahwa nilai-nilai budaya Nyadran Tirta Wening seperti rasa syukur terhadap sumber air, gotong royong, dan kepedulian lingkungan berhasil diintegrasikan dalam pembelajaran IPAS melalui kegiatan proyek berbasis sekolah. Proses ini mampu menumbuhkan kesadaran, pemahaman, dan tindakan ekologis pada siswa. Pembelajaran yang menggabungkan kearifan lokal dengan sains menciptakan pengalaman belajar yang

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bermakna dan relevan dengan kehidupan siswa. Penelitian ini menyimpulkan bahwa pengintegrasian nilai budaya lokal ke dalam pembelajaran IPAS merupakan strategi efektif untuk mengembangkan kecerdasan ekologis sekaligus melestarikan kearifan budaya bangsa.
Kata kunci: *Nyadran Tirta Wening; IPAS; kearifan loka;, kecerdasan ekologis; proyek sekolah.*

INTRODUCTION

The increasingly critical state of the global environment has demanded a strong educational response, particularly in cultivating ecological awareness and intelligence from an early age. Education is no longer limited to transferring knowledge but is directed toward forming attitudes and behaviors that are environmentally responsible (Syahrial et al., 2022). This orientation aligns with the mandate of the Merdeka Curriculum in Indonesia, which emphasizes the development of the *Profil Pelajar Pancasila*, one of which is the character of "*beriman, bertakwa kepada Tuhan Yang Maha Esa, dan berakhlak mulia*" as well as "*berkebinekaan global dan bergotong royong*."(Sugih et al., 2023) These values must be translated into daily learning experiences that nurture students' sensitivity to environmental issues and their ability to take concrete actions to protect nature. Within this context, the subject *Ilmu Pengetahuan Alam dan Sosial (IPAS)* in elementary schools has a vital role, as it integrates natural and social sciences to build holistic understanding of human nature interactions (Khairullina & Prastowo, 2024). However, the implementation of IPAS learning in schools still tends to be theoretical and less connected with students' lived experiences, especially with the local wisdom that surrounds them.

A field observation at SD Negeri 2 Jati on October 21, 2025, with the third-grade homeroom teacher, revealed that the ecological intelligence of students remains relatively low. Most students demonstrated a limited understanding of how their daily habits, such as littering, wasting water, or neglecting school gardens, contribute to environmental degradation. Learning activities still rely on textbooks and teacher explanations, while contextual and experiential learning that connects students to their surrounding environment is minimal. Although the school has environmental programs such as tree planting and waste sorting, students' participation tends to be passive because they perceive such activities as mere obligations rather than as part of their moral and cultural responsibility. This condition illustrates that the ecological intelligence targeted in the curriculum has not yet been internalized as an integral part of students' character and mindset.

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In contrast, Indonesia is rich in local traditions that embody ecological wisdom passed down through generations. One of these is the *Nyadran Tirta Wening* tradition in certain Javanese communities, which symbolizes purification of the soul and environment through the ritual of cleaning water sources (Melayu, 2025). This tradition reflects an indigenous ecological philosophy: maintaining harmony between humans, nature, and the Creator. Within Nyadran Tirta Wening, the act of cleaning springs and rivers, offering prayers for the environment, and fostering communal cooperation are not only religious rituals but also ecological education in practice (Julianto et al., 2021). If these cultural values are integrated into formal education, particularly IPAS learning, they could become a powerful medium for developing students' ecological intelligence based on contextual experiences and local identity. Such integration will make learning more meaningful, as students can directly relate scientific concepts of ecosystems, water cycles, and environmental conservation to the living culture of their community.

The real condition observed at SD Negeri 2 Jati shows a gap between the expected goals of IPAS learning, producing students who are ecologically literate and act responsibly toward nature and the actual situation where ecological understanding remains shallow. The third-grade students' limited ability to connect the concept of "clean water" or "ecosystem balance" with their real environment reflects a disconnection between curriculum content and cultural context. Learning that should be holistic and transformative still operates within a cognitive domain, rarely touching the affective and behavioral aspects that form the foundation of ecological intelligence. This discrepancy suggests that while environmental education is formally included in the curriculum, its implementation lacks cultural grounding and contextual depth.

Educational research and theoretical developments in recent years have increasingly emphasized the importance of culturally responsive pedagogy and contextual learning. Studies such as those by (Asrial et al., 2019) and (Ajeng Rahadini et al., 2022) argue that ecological education should be rooted in cultural and spiritual dimensions that connect learners emotionally to their environment. Similarly, research in Indonesia, such as by (Yusuf, 2023), reveals that integrating local wisdom into science education fosters students' sense of belonging and ecological awareness. However, despite the growing discourse, empirical studies focusing on how specific cultural traditions like *Nyadran Tirta Wening* can be used as a learning context in IPAS remain scarce. Most previous research has examined general environmental programs or extracurricular eco-school initiatives, without delving

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into how cultural rituals can be transformed into pedagogical strategies within the formal classroom setting.

This gap indicates a need for innovative learning designs that not only convey ecological concepts but also embed local values that shape environmental ethics. *Nyadran Tirta Wening* provides a rich pedagogical resource: it combines cognitive, affective, and behavioral components of ecological intelligence through real actions of environmental care, social solidarity, and spiritual reflection (Novia, 2023). Integrating this tradition into IPAS learning can enable students to understand environmental science not as abstract knowledge but as part of their cultural and moral identity. By observing, participating in, and reflecting upon *Nyadran Tirta Wening* activities, students can experience how traditional practices embody principles of sustainability such as maintaining clean water sources, preserving biodiversity, and fostering community cooperation. This approach aligns with the constructivist theory of learning, which posits that knowledge is constructed through interaction with one's environment and culture.

From a broader perspective, this integration also supports the paradigm of education for sustainable development (ESD), which UNESCO promotes as a global educational agenda. ESD emphasizes the development of critical thinking, values, and behaviors that enable individuals to contribute to sustainable societies (Anggraini & Kusniarti, 2022). In the Indonesian context, embedding cultural values in science education is a strategic effort to ensure that sustainability is not imported as a foreign concept but emerges organically from the nation's cultural heritage. Thus, integrating *Nyadran Tirta Wening* into IPAS learning represents both a pedagogical innovation and a cultural revitalization movement, ensuring that environmental education is rooted in local traditions while addressing global challenges.

The urgency of developing ecological intelligence among elementary students lies in the fact that early childhood is a crucial period for shaping values and habits. According to Gardner's theory of multiple intelligences, ecological intelligence or naturalist intelligence is the capacity to recognize, categorize, and interact with elements of the natural world (AKKUZU GÜVEN & UYULGAN, 2021). When cultivated from a young age, this intelligence fosters empathy for living things and awareness of ecological balance. However, ecological intelligence is not merely about environmental knowledge; it involves emotional connection, ethical reflection, and sustainable behavior (Güven & Uyulgan, 2021). Therefore, IPAS learning must transcend conventional methods by engaging students in real, culturally embedded experiences that make them feel part of the natural system. The

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integration of Nyadran Tirta Wening values such as cleanliness, gratitude, harmony, and cooperation provides an effective avenue for nurturing these dimensions.

The research underlying this study seeks to bridge the disconnection between the cultural and scientific dimensions of environmental education. It investigates how *Nyadran Tirta Wening* cultural values can be pedagogically integrated into IPAS learning to enhance students' ecological intelligence. Specifically, it aims to explore how the tradition's symbolic and practical elements such as water purification rituals, collective cleaning activities, and expressions of gratitude toward nature can be translated into learning materials, classroom discussions, and project-based activities that align with the curriculum objectives. By doing so, the research expects to produce a model of culturally integrated IPAS learning that is relevant, contextual, and transformative.

Ultimately, the goal of this research is to contribute to the advancement of educational practices that harmonize scientific learning with cultural wisdom. Through the integration of *Nyadran Tirta Wening* values into IPAS, students are expected not only to understand environmental concepts but also to internalize ecological ethics as part of their identity and everyday behavior. The expected outcome is a generation of learners who view environmental stewardship as both a scientific responsibility and a moral-cultural obligation. This study thus positions *Nyadran Tirta Wening* not merely as a cultural artifact but as a living pedagogy that can inspire sustainable learning models grounded in local heritage while nurturing ecological intelligence in the global era.

RESEARCH METHOD

This study employed a qualitative descriptive approach with a case study design to explore and analyze the integration of Nyadran Tirta Wening cultural values into IPAS (Integrated Natural and Social Science) learning in order to develop elementary students' ecological intelligence. The qualitative approach was chosen because it allows the researcher to understand deeply the meaning, values, and pedagogical implications behind cultural practices and their implementation in the classroom context. The case study design focused on SD Negeri 2 Jati as the research locus, where the Nyadran Tirta Wening tradition still actively takes place in the surrounding community. This design enabled the researcher to examine the real-life context of cultural value internalization, teacher strategies, and student responses in a natural setting, aiming for a holistic understanding of the phenomenon rather than generalization.

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The research was conducted at SD Negeri 2 Jati, a public elementary school located in a semi-rural area with a strong cultural identity and community participation in traditional rituals, including Nyadran Tirta Wening. The selection of this site was based on the school's potential for integrating local wisdom into the curriculum, as well as the accessibility of the researcher to conduct in-depth observation and interaction. The study took place from October 2025, covering the period of preparation, implementation, and reflection of IPAS learning activities integrated with cultural content. The main participants of this research were the third-grade teacher, students, and community members involved in the Nyadran Tirta Wening tradition. This grade level was chosen because students at this developmental stage (ages 8–9) are in the concrete operational phase, where learning is most effective when related to real and tangible experiences such as community traditions.

The sources of data in this research included primary and secondary data. Primary data were obtained directly from participants through interviews, observations, and documentation. The participants consisted of one classroom teacher, fifteen third-grade students, the principal, and two cultural figures from the community who actively participate in Nyadran Tirta Wening. Secondary data were collected from supporting documents such as lesson plans (Modul Ajar), teaching materials, photos, videos of learning activities, and local literature related to the Nyadran Tirta Wening tradition. These multiple data sources were used to triangulate findings and ensure data credibility.

Data were collected using three main techniques: observation, interviews, and documentation. Observation was carried out to capture the real implementation of IPAS learning that integrated Nyadran Tirta Wening values, including classroom interactions, student participation, and environmental learning projects. The researcher acted as a non-participant observer, meaning that the researcher did not interfere in the teaching process but only observed naturally occurring activities. Field notes were made to record both verbal and non-verbal behaviors that reflected students' ecological awareness, such as their attitudes toward cleanliness, cooperation, and environmental care.

The interview technique was used to obtain detailed information about the teachers' planning and pedagogical strategies, students' perceptions, and the community's views on integrating cultural traditions into school learning. Semi-structured interviews were conducted to allow participants to express their thoughts freely while ensuring that the discussion stayed within the scope of the research focus. The researcher prepared guiding questions such as: "How do you incorporate Nyadran Tirta Wening values into IPAS

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learning?" or "What changes have you observed in students' environmental attitudes after the activity?" Interviews with students were carried out using simple and interactive language to make them comfortable and encourage genuine responses. The interviews were recorded, transcribed, and coded for thematic analysis.

Documentation served as an important complementary data source. It included learning plans, students' project reports, photos of classroom and field activities, and materials about the Nyadran Tirta Wening ritual such as posters, community announcements, and local history notes. Documentation helped verify the data obtained from observations and interviews while enriching the description of the research context. All documents were organized systematically and categorized according to their relevance to the aspects of cultural integration, learning activities, and ecological intelligence indicators.

The process of data analysis was carried out simultaneously with data collection following the interactive analysis model of Miles and Huberman, which includes three stages(Miles & Huberman, 1994): data reduction, data display, and conclusion drawing/verification. In the data reduction stage, the researcher selected, focused, and simplified the raw data obtained from the field based on the research focus, namely the process and results of integrating Nyadran Tirta Wening values in IPAS learning. During the data display stage, the researcher organized the reduced data into descriptive narratives, tables, and matrices to facilitate understanding of emerging patterns. The final stage involved drawing conclusions by interpreting the meaning of the data and verifying them through triangulation, member checking, and continuous reflection. This process ensured that the conclusions were grounded in the empirical reality of the research site.

To ensure the trustworthiness and credibility of the findings, the researcher applied several validation techniques. Triangulation was used in terms of data sources, techniques, and time. Data source triangulation involved comparing information from teachers, students, and community members. Technique triangulation involved comparing data from observation, interview, and documentation results. Time triangulation was done by collecting data at different times during the Nyadran Tirta Wening activity and classroom learning sessions to observe consistency. Member checking was also conducted by discussing preliminary findings with participants to confirm the accuracy of interpretations. Additionally, peer debriefing with academic advisors and qualitative research experts was performed to review analytical logic and ensure objectivity.

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The research instrument was the researcher himself (human instrument), functioning as the planner, data collector, analyzer, and reporter. Before entering the field, the researcher conducted an initial study, prepared observation guidelines, interview protocols, and documentation checklists. The observation guideline included indicators of ecological intelligence such as students' awareness of cleanliness, care for living things, and participation in environmental activities. The interview guideline included questions related to teaching strategies, student experiences, and community perceptions. All instruments were validated through expert consultation and pilot-tested to ensure clarity and relevance.

The procedure of the study consisted of three stages: preliminary, fieldwork, and data analysis/reporting. In the preliminary stage, the researcher conducted a situational analysis of the school environment, obtained research permission, and prepared data collection instruments. In the fieldwork stage, the researcher engaged in direct observation of IPAS learning and participated in discussions with teachers and cultural figures about the meaning and educational relevance of Nyadran Tirta Wening. The researcher then conducted interviews and collected documentation data. In the data analysis and reporting stage, all collected data were organized, analyzed using the Miles and Huberman framework, and synthesized into comprehensive findings that reflected the integration process and its impact on students' ecological intelligence.

Ethical considerations were also carefully addressed throughout the research process. The researcher obtained formal permission from the school principal and informed consent from the teacher and students' parents. Participants were assured that their personal data and responses would remain confidential and would be used solely for academic purposes. The researcher also respected the cultural and spiritual dimensions of the Nyadran Tirta Wening ritual by participating as an observer in accordance with community norms and values, ensuring that research activities did not disrupt the sanctity of the tradition.

this study's qualitative case study design enabled an in-depth exploration of how Nyadran Tirta Wening cultural values can be pedagogically embedded into IPAS learning to foster ecological intelligence among elementary students. Through a systematic process of observation, interviews, and documentation supported by rigorous data analysis and triangulation the research aimed to produce authentic, contextual, and empirically grounded insights. The methodological framework provided the foundation for developing a culturally responsive model of environmental education that connects scientific understanding with local wisdom and community-based ecological ethics.

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RESULT AND DISCUSSION

Result

The findings are based on data collected through observation, interviews, and documentation conducted at SD Negeri 2 Jati on October 2025. The analysis focuses on how *Nyadran Tirta Wening* cultural values were integrated into IPAS learning conducted through school-based project learning and how this integration fostered the development of ecological intelligence among third-grade students. The findings are presented in three sections: (1) the process of integrating *Nyadran Tirta Wening* values into school-based project learning, (2) the development of students' ecological intelligence, and (3) the supporting and inhibiting factors in the implementation of the cultural-based IPAS learning model.

Integration of Nyadran Tirta Wening Cultural Values into IPAS Learning

Based on field observations and interviews with teachers, the integration of *Nyadran Tirta Wening* cultural values into IPAS learning was carried out through school-based project learning, which emphasized real experiences within the school environment. The teacher designed the learning activities under the IPAS theme "Air, Sumber Kehidupan" (Water, the Source of Life) by embedding the meanings and values derived from the *Nyadran Tirta Wening* tradition such as gratitude, cleanliness, harmony, and cooperation. The learning process was carried out in three stages: planning, implementation, and reflection.

In the planning stage, the teacher developed a lesson plan (Modul Ajar) that connected the *Nyadran Tirta Wening* values to IPAS concepts such as the water cycle, the importance of clean water, and environmental preservation. The cultural values were explicitly stated in the section of "penguatan profil pelajar Pancasila," focusing on religious character, cooperation, and environmental responsibility. The learning objectives emphasized both knowledge acquisition and behavioral formation related to ecological awareness.

The implementation stage took place entirely in the school environment through project-based learning activities. Instead of visiting the *Tirta Wening* spring directly, students conducted a "Clean Water and Green School Project" (*Proyek Air Bersih dan Sekolah Hijau*) inspired by the *Nyadran Tirta Wening* tradition. In groups, students observed water usage around the school, identified sources of waste or pollution, and created mini projects to improve the school environment such as making posters on water conservation, cleaning the schoolyard, and planting vegetation around the school well. The teacher facilitated

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Edisi : Vol. 9, No. 3, Desember/2025, hlm. 566-586

discussions linking these activities with the meaning of *Nyadran Tirta Wening*, highlighting the value of purifying both the environment and human behavior as a form of gratitude to God.

The reflection stage involved collective discussions in the classroom. Students shared their experiences, what they learned about clean water, and how they could maintain school cleanliness. The teacher encouraged them to connect their school project with broader cultural and environmental values, fostering moral and ecological reflection.

The integration process is summarized in the following table:

Table 1
Integration of Nyadran Tirta Wening Cultural Values into School-Based Project Learning

Stage	Learning Activity	Integrated Cultural Value	Related IPAS Concept	Observed Impact
Planning	Designing RPP themed "Water as the Source of Life"	Gratitude, harmony with nature	Water cycle, conservation	Students recognize the link between faith, culture, and science
Implementation	School-based project: observing water use and waste	Cooperation, care for the environment	Water usage, pollution control	Students actively record and discuss findings
Implementation	Cleaning the schoolyard and planting vegetation	*Gotong royong*, responsibility, cleanliness	Waste management, green school concept	Students eagerly participate and take initiative
Reflection	Discussion and report presentation	Gratitude, awareness, ecological empathy	Environmental balance, sustainability	Students articulate lessons learned and propose follow-up actions

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Edisi : Vol. 9, No. 3, Desember/2025, hlm. 566-586

As shown in Table 1, *Nyadran Tirta Wening* cultural values were seamlessly embedded in every learning stage. The teacher used the project as a pedagogical bridge connecting local wisdom with environmental science. The use of the school as a learning environment made activities accessible, safe, and manageable while still reflecting the spirit of *Nyadran Tirta Wening* the purification and protection of water sources.

Documentation analysis revealed that the teacher designed the activities to address cognitive, affective, and behavioral domains simultaneously. Students not only learned about the water cycle and pollution but also reflected on how their actions affected the environment. Observations showed students' high engagement during group work, enthusiasm during cleaning activities, and awareness of conserving water. These activities embodied the essential values of the *Nyadran Tirta Wening* tradition respect for water, communal cooperation, and moral purity translated into modern school practices.

Development of Students' Ecological Intelligence

The second finding focuses on how students' ecological intelligence developed through the school-based project inspired by *Nyadran Tirta Wening*. Ecological intelligence was analyzed in three main dimensions: cognitive (understanding of ecological concepts), affective (environmental empathy and moral awareness), and behavioral (responsible environmental actions). The evaluation was conducted through observations, interviews, and analysis of students' project outcomes.

Table 2
Students' Ecological Intelligence Indicators after School-Based Project Learning

Dimension	Indicator	Before Project Implementation	After Project Implementation	Observed Improvement
Cognitive	Understanding of water conservation and pollution	Students knew that water is important but could not explain how to save it	Students could explain the water cycle and how human activity affects it	Students used scientific terms and could make cause–effect reasoning
Affective	Emotional connection and	Indifferent to dirty areas in school	Expressed pride and responsibility	Students showed ecological empathy and

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UIKA Universitas Ibn Khaldun Bogor
Edisi : Vol. 9, No. 3, Desember/2025, hlm. 566-586

	care toward the environment		for keeping school clean	collective concern
Behavioral	Actions that reflect environmental awareness	Often littered and wasted water	Participated actively in cleaning, watering plants, and saving water	Formation of consistent environmentally responsible habits
Social-Ecological	Collaboration and leadership in environmental actions	Passive during cleaning routines	Actively led peers in waste sorting and recycling projects	Emergence of leadership and initiative among students

The data in Table 2 demonstrate significant positive changes across all dimensions of ecological intelligence. Initially, students perceived environmental cleanliness as merely a school rule; after participating in the *Clean Water and Green School Project*, they began to view it as a shared moral and cultural duty. The teacher reported that students showed a deeper understanding of how water connects life systems, including humans, plants, and animals.

Interview excerpts also supported this finding. One student said, *"Kami belajar bahwa menjaga air itu penting karena seperti Nyadran, kalau air bersih kita juga sehat dan Tuhan senang."* (We learned that protecting water is important because, like in *Nyadran*, clean water keeps us healthy and makes God happy.) This statement indicates a synthesis between cultural meaning and ecological understanding, which is central to ecological intelligence.

During classroom observations, the researcher noted several behavioral transformations: 1) Students regularly checked that water taps were turned off after use, 2) They initiated a "Green Patrol" rotation to ensure the school remained clean. 3) They recycled paper and plastic waste into creative crafts. 4) They reminded peers not to litter, using phrases like *"ingat Tirta Wening, jaga air kita"* (remember *Tirta Wening*, protect our water).

These behaviors reflected the internalization of *Nyadran Tirta Wening* values translated into daily school actions. The learning process successfully bridged the moral and scientific dimensions of ecological intelligence, leading to sustainable behavioral change among students.

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Moreover, cognitive tests conducted through oral questioning revealed that students could now explain the water cycle stages, causes of water pollution, and ways to maintain water quality. They also demonstrated reflective thinking—recognizing that human actions such as littering or wasting water disrupt the natural balance. This indicates that project-based learning within the school environment can effectively nurture ecological literacy when contextualized with meaningful cultural values.

Supporting and Inhibiting Factors

The successful integration of *Nyadran Tirta Wening* cultural values into IPAS learning was influenced by various supporting and inhibiting factors. Through interviews with the teacher, principal, and community members, several key factors were identified.

Table 3
Supporting and Inhibiting Factors of the Implementation

Category	Specific Factor	Description	Impact on Learning Process
Supporting	Collaboration between school and community	The community and local elders provided cultural insight about *Nyadran Tirta Wening*	Enriched the contextual and moral dimension of learning
Supporting	Student enthusiasm and engagement	Students enjoyed hands-on and group activities within school projects	Increased motivation, participation, and retention
Supporting	Contextual environment	The school had wells, gardens, and waste areas suitable for observation	Facilitated direct practice and environmental reflection
Inhibiting	Limited time allocation	Schedule constraints limited project duration	Activities compressed, reducing reflection time
Inhibiting	Teacher capacity	Lack of training in integrating culture into science learning	Teachers needed to rely on self-exploration and community support
Inhibiting	Curriculum rigidity	Focus on cognitive assessment limited	Teachers had to balance between target scores and value-based goals

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Edisi : Vol. 9, No. 3, Desember/2025, hlm. 566-586

	flexibility for affective outcomes

From Table 3, it is evident that community participation and students' enthusiasm were the strongest supporting factors. The school's environmental facilities such as a garden, well, and open yard were utilized optimally for observation and project activities. Teachers collaborated with local elders to explain the symbolic meaning of water in *Nyadran Tirta Wening*, enabling students to connect their classroom projects with real cultural narratives. However, several obstacles were encountered. Teachers needed more structured guidance on designing cultural-based science lessons, and the tight schedule sometimes shortened reflection sessions that were crucial for deep value internalization. Despite these limitations, the implementation ran effectively because of strong teamwork between teachers, students, and the school community.

The research findings show that integrating *Nyadran Tirta Wening* cultural values into IPAS learning through school-based project activities effectively developed students' ecological intelligence. The integration process allowed students to experience learning that combined scientific reasoning with moral and cultural reflection. Through the *Clean Water and Green School Project*, students learned not only about the importance of water and environmental preservation but also about spiritual gratitude, cooperation, and responsibility as part of their cultural identity.

Key findings include: 1) The integration process aligned *Nyadran Tirta Wening* values with IPAS content through contextual and school-based activities such as observation, cleaning, and planting. 2) Students demonstrated notable improvement in ecological intelligence, evident in cognitive understanding, emotional engagement, and consistent environmentally responsible behaviors. 3) The success of the program was supported by collaboration between teachers and the community, contextual learning environments, and strong student motivation, though limited time and teacher training posed challenges.

In essence, this study confirms that embedding cultural values into school-based project learning can transform IPAS lessons into more meaningful, character-building, and ecologically oriented experiences. The *Nyadran Tirta Wening* tradition, even when not practiced directly at the spring site, remains a powerful cultural framework to instill ecological intelligence, moral awareness, and environmental stewardship among elementary students.

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Edisi : Vol. 9, No. 3, Desember/2025, hlm. 566-586

Discussion

Integration of Nyadran Tirta Wening Cultural Values into IPAS Learning

The findings revealed that teachers at SD Negeri 2 Jati integrated *Nyadran Tirta Wening* values into IPAS learning through a contextual and experiential approach. Rather than using the ritual itself as a direct learning project, the teachers designed school-based project activities inspired by the spirit of *Nyadran Tirta Wening*, such as water conservation campaigns, school cleaning movements, and plant cultivation projects. These activities emphasized gratitude toward nature, cooperation, and environmental stewardship core values embodied in *Nyadran Tirta Wening*. This integration created meaningful connections between local culture and scientific learning, making students more engaged and reflective in understanding environmental issues.

These findings align with the study by (Rosala & Budiman, 2020), who emphasized that integrating local cultural traditions into science education helps students bridge the gap between scientific knowledge and local wisdom. Similarly, (Achyani et al., 2025) found that cultural-based education not only enhances cognitive understanding but also nurtures moral and ecological awareness. The teachers' strategy at SD Negeri 2 Jati reflected this principle by embedding the moral values of *Nyadran Tirta Wening* such as purity, respect for water sources, and communal harmony into IPAS learning objectives and classroom activities.

Moreover, the use of cultural narratives in science lessons aligns with the constructivist theory proposed by Vygotsky in (Yu et al., 2013), which suggests that learning is most effective when new concepts are built upon familiar social and cultural experiences. By connecting environmental learning with local traditions, students were able to construct deeper meaning and show greater empathy toward their natural surroundings. This approach also resonates with (Cresswell, 2016) perspective that qualitative cultural integration promotes authenticity and relevance in the educational process**.**

Development of Ecological Intelligence through School-Based Projects

The school-based project model implemented in this research proved to be effective in enhancing students' ecological intelligence. The project activities such as water purification experiments, recycling crafts, and tree planting helped students develop awareness, responsibility, and action-based understanding toward the environment. Through these projects, students not only learned scientific concepts (e.g., the water cycle, pollution, and sustainability) but also internalized values such as care, empathy, and cooperation.

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Edisi : Vol. 9, No. 3, Desember/2025, hlm. 566-586

This finding is consistent with (Bouley, 2012) framework of ecological intelligence, which emphasizes the ability to understand the interconnection between human behavior and environmental systems, followed by ethical decision-making. The students at SD Negeri 2 Jati demonstrated an increased sense of ecological responsibility after participating in hands-on environmental activities. Teachers observed behavioral changes, such as students' habit of conserving water, separating waste, and maintaining school cleanliness.

The use of project-based learning (PBL) as a pedagogical framework aligns with studies by (Riyan Rizaldi & Fatimah, 2022), who reported that PBL encourages critical thinking, collaboration, and problem-solving, which are essential components of ecological intelligence. In this study, teachers designed projects not merely as assignments but as meaningful learning journeys rooted in local environmental issues. For example, when students created posters about water conservation, they reflected on the community's practice of maintaining the purity of *Tirta Wening* springs. This contextualization transformed ordinary science lessons into value-oriented experiences.

The results also support (Azizatul 'uula et al., 2022) , who found that integrating local wisdom into project-based science learning improved students' eco-literacy and participation in environmental protection. The students' projects at SD Negeri 2 Jati were not competitive in nature but collaborative, reflecting the communal spirit of *Nyadran Tirta Wening*. This shows that combining cultural identity with modern educational approaches creates synergy between traditional ethics and scientific inquiry.

Furthermore, the findings indicate that ecological intelligence develops through three key stages: (1) awareness, where students recognize environmental problems; (2) understanding, where they analyze causes and effects; and (3) action, where they apply solutions in daily life. These stages mirror the ecological learning model proposed by Orr (2004), who argued that real environmental education must move beyond theory into action. The integration of *Nyadran Tirta Wening* values in project activities successfully nurtured these three aspects, making ecological intelligence both cognitive and behavioral**.**

Pedagogical Implications of Cultural-Based Environmental Education

The integration of *Nyadran Tirta Wening* values in IPAS learning demonstrates significant pedagogical implications. First, it provides a contextualized learning framework that makes science learning more relatable to students' lived experiences. The teacher's approach shifted from conventional instruction to an inquiry-based model where students

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Edisi : Vol. 9, No. 3, Desember/2025, hlm. 566-586

explored real environmental issues within their cultural context. This method supports (Huett et al., 2008) notion that transformative education arises when learning connects cultural consciousness with critical reflection.

Second, the findings show that cultural-based environmental education enhances students' affective and moral domains, not only their cognitive understanding. By participating in projects inspired by *Nyadran Tirta Wening*, students internalized respect for nature as a moral obligation. This supports (Antonelli-Ponti & Crosswaite, 2019) who emphasized that sustainability education must address values, attitudes, and behaviors, not just factual knowledge. The teacher's role as a cultural mediator was crucial in translating local wisdom into pedagogical content.

Third, the findings highlight the importance of collaboration between schools and the community. Teachers involved community members in sharing knowledge about traditional water rituals, while students documented and presented their reflections in class. This interaction aligns with UNESCO's concept of *Education for Sustainable Development (ESD)*, which promotes community-based and culturally relevant learning. The collaboration between the school and the *Nyadran Tirta Wening* community thus embodied ESD principles in practice.

A comparison with related studies further strengthens this interpretation. (Amirin, 2013) found that integrating local culture into science learning increased student engagement and environmental responsibility. Similarly, (Fahrozy et al., 2022) observed that local wisdom integration in elementary education created positive behavioral change in ecological habits. However, unlike previous studies that mainly focused on cognitive outcomes, this research revealed the deeper emotional and ethical transformation that occurred when cultural values were interwoven with project-based activities.

Additionally, this study fills a research gap in the domain of ecological intelligence development through cultural integration in elementary science education. Most prior studies, such as (Noor & Sugito, 2019), explored environmental education through modern sustainability programs or STEM-based approaches. Few studies examined the intersection between *indigenous cultural values* and ecological intelligence development. Therefore, this research provides new insights into how local wisdom like *Nyadran Tirta Wening* can serve as a pedagogical resource for nurturing environmental ethics in young learners.

This study contributes to the discourse of character education and sustainable pedagogy in Indonesia's elementary education context. By integrating *Nyadran Tirta Wening*

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Edisi : Vol. 9, No. 3, Desember/2025, hlm. 566-586

into IPAS learning, teachers not only preserved cultural heritage but also aligned with the national curriculum's emphasis on *Profil Pelajar Pancasila* especially in the aspects of "beriman dan bertakwa kepada Tuhan Yang Maha Esa" and "*berkebinekaan global."* This integration of faith, culture, and environmental stewardship reflects a holistic model of education that strengthens students' ecological identity as both scientific learners and moral citizens.

CONCLUSION

Based on the findings and discussion, this study concludes that the integration of Nyadran Tirta Wening cultural values into IPAS learning through school-based project activities significantly contributes to the development of ecological intelligence among elementary students. The implementation at SD Negeri 2 Jati demonstrates that when local wisdom is meaningfully embedded in the learning process, students not only acquire scientific knowledge but also develop awareness, sensitivity, and responsibility toward their natural environment.

First, the internalization of Nyadran Tirta Wening values such as gratitude for water sources, communal cooperation, and respect for nature provided a strong moral and cultural foundation for environmental education. These values, when integrated into classroom learning and projects, enhanced the relevance and emotional connection of students to ecological concepts. Teachers acted as facilitators who translated cultural meanings into learning experiences that were both scientific and ethical.

Second, the use of school-based projects allowed students to transform ecological understanding into practical actions. Activities like water conservation, waste management, and school greening empowered students to think critically, work collaboratively, and make environmentally responsible decisions. These projects bridged the gap between theoretical knowledge and real-life application, reflecting the stages of ecological intelligence—awareness, understanding, and action.

Third, the integration of cultural and scientific learning fostered holistic development. Students demonstrated improved ecological behavior, empathy for nature, and a sense of belonging to their cultural identity. The findings affirm that education rooted in local traditions can serve as an effective medium for promoting sustainability and character formation. Furthermore, the collaboration between schools and the community strengthened the social and spiritual dimensions of ecological learning.

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