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Learning the Concept of Local Wisdom in Bima "Ngaha Aina Ngoho" to Increase Environmental Awareness Among Students at SMAN 1 Lambitu, Bima Regency

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Abstract
Based on the identification of problems and urgency that have been described, this study aims to analyze the effect of learning the "Ngaha Aina Ngoho" local wisdom concept on increasing environmental awareness among students at SMAN 1 Lambitu. Through this approach, it is hoped that there will be synchronization between biological knowledge about ecosystems and traditional moral values relevant to the geographical context of students in Bima Regency. The main focus of the research is not merely on academic achievement, but on changes in student behavior and attitudes in responding to the issue of land degradation in the Lambitu mountainous region after internalizing the philosophy of "eat but do not consume". Thus, the results of this study are projected to provide empirical contributions to the development of a more humanistic biology learning model based on local environmental conservation. Translated with DeepL.com (free version). This study is a quantitative study with a quasi-experimental design that aims to test the effectiveness of local wisdom-based learning interventions. The research location was purposively determined at SMAN 1 Lambitu. The results of quantitative data analysis show that the implementation of a biology learning model that integrates "Ngaha Aina Ngoho" local wisdom has succeeded in creating a positive transformation in the ecological profile of students at SMAN 1 Lambitu. The results show very high success in the indicators of environmental knowledge (90%), caring attitude (85%), and responsibility (85%). Based on the results of the research and discussion, it can be concluded that teaching the Ngaha Aina Ngoho local wisdom concept is significantly effective in increasing environmental awareness among students at SMAN 1 Lambitu, Bima Regency. This is evidenced by the scores obtained on the three indicators of environmental awareness, which are in the very high category, namely: environmental knowledge reached an average of 90%, environmental awareness reached 85%, and environmental responsibility reached 85%. These findings confirm that integrating the ethoscience values of "eat but do not destroy" into biology material can transform students' theoretical understanding into a strong ethical awareness to preserve the ecosystem in the Lambitu mountainous region.

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1. Introduction

The current global environmental crisis has reached an alarming level, where ecosystem damage is not only an environmental problem, but also a serious threat to the survival of humanity as a whole. At the regional level, Bima Regency faces the same problem, which is very different from the character of its people who used to live in harmony with nature.

This coincides with observations that environmental damage caused by human activities continues to increase rapidly, despite long-standing conservation efforts. In particular, the environmental conditions in Lambitu District show a significant decline in ecological quality, as evidenced by the increasing conversion of forests into uncontrolled monoculture agricultural areas. Land clearing in the highlands of Lambitu has led to the loss of native vegetation that functions as an air catchment area, making the area more vulnerable to hydrometeorological disasters and the threat of severe soil erosion. This is further exacerbated by changes in the community's economic orientation, which tends to prioritize short-term gains, indicating a decline in the value of local wisdom in preserving the mountain ecosystem (Umar & Rizki, 2024) [7]

Addressing the increasingly serious environmental pollution in the Lambitu area, education has an important role in changing the way young people think and act towards nature. Science education, especially biology, should not only focus on theories that are difficult to understand and isolated from the students' environmental conditions. As stated by biology education experts, teaching must be able to transform knowledge into real action for the environment (Husamah *et al*., 2022) [9]. The low level of environmental awareness among students at SMAN 1 Lambitu often stems from a learning process that tends to be textual and lacks exploration of local issues, so that students do not feel an emotional connection or moral responsibility towards preserving the natural environment around them. Therefore, a learning approach is needed that can bridge the formal curriculum with the ecological reality in the field in order to foster meaningful environmental literacy (Bima & Bima, 2024) [1,2]

The key to restoring the fractured relationship between the Lambitu community and its natural environment lies in revitalizing the long-established local wisdom known as the "Ngaha Aina Ngoho" philosophy. Etymologically and semantically, this philosophy contains a profound message about the wise use of natural resources: "eat (Ngaha) but do not (Aina) consume or destroy (Ngoho)". This value is a manifestation of the environmental ethics of the Bima community, which emphasizes the importance of sustainability for future generations. However, it is unfortunate that amid the tide of modernization and economic demands, this noble principle has begun to be regarded as a relic of the past that is no longer relevant (Ulfaturrohmatiririn *et al*., 2023). The fading internalization of Ngaha Aina Ngoho in everyday life is directly proportional to the increasing exploitation of forests in the Lambitu mountains. Reintegrating this philosophy into students' cognitive structures through biology education is an urgent step toward fostering a sense of responsibility toward the local ecosystem. The following is a diagram illustrating the relationship between the philosophy of "Ngaha Aina Ngoho" and the principles of sustainable development (SDGs):

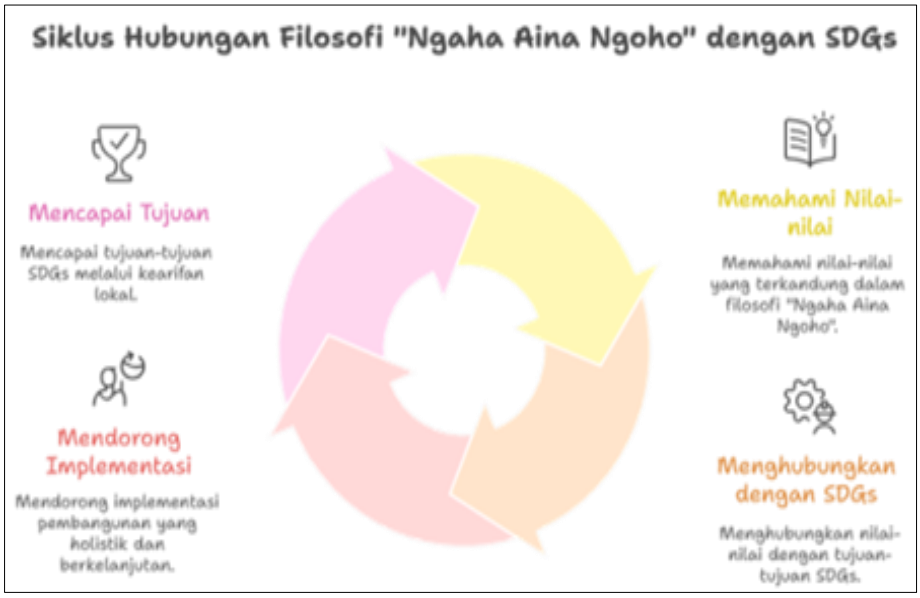

Fig 1: Relationship between the "Ngaha Aina Ngoho" Philosophy and Sustainable Development Goals (SDGs)

The gap between the availability of "Ngaha Aina Ngoho" noble values and the low level of environmental awareness among students at SMAN 1 Lambitu indicates a failure in the transmission of knowledge in the classroom. Until now, learning has often been one-sided and dependent on general textbooks, failing to touch on the affective side of students regarding local ecological issues that are happening right before their eyes. In the context of modern biology education, there is a need for innovative learning tools such as digital modules or project-based learning units that are able to package local wisdom into an interactive format that is suitable for the characteristics of the digital generation (Alanoglu *et al*., 2025; Staneviciene & Žekienė, 2025). The use of technology in teaching local wisdom concepts is expected to provide flexibility for students to explore the relationship between biological theory and traditional nature conservation practices independently and meaningfully (Iman *et al*., 2023) [4]

Incorporating local wisdom into the biology curriculum, especially in the topics of ecology and environmental change, is more than just adding local content. It is an effort to strengthen science literacy based on cultural identity. Ethnoscience methods that study the relationship between indigenous knowledge and scientific concepts have been proven effective in significantly increasing students' cognitive and affective engagement (Dhea Eprillia Anzelina, 2023) [3] In the context of SMAN 1 Lambitu, the "Ngaha Aina Ngoho" philosophy can be understood from a biological

perspective as a way to preserve natural resources and manage ecosystems in a sustainable manner. When students realize that the concept of environmental conservation they learn at school has already been practiced by their ancestors through local wisdom, psychological barriers to material that is considered difficult will decrease, and a sense of concern for the environment will develop naturally. Therefore, biology education that incorporates local values becomes an important bridge for transforming theoretical knowledge into concrete action in conservation in the Lambitu area. (Ramadhani *et al*., 2024) [6]

Environmental awareness is a multifaceted concept that involves understanding, attitudes, and behavioral tendencies in preserving nature. At SMAN 1 Lambitu, when studying biology, it is important that this awareness goes beyond simply memorizing what an ecosystem is, but also touches the students' feelings so that they are motivated to protect their environment. Often, low environmental awareness triggers destructive exploitation, as seen in the mountainous areas of Lambitu. Recent research shows that learning experiences that connect global issues with local values can increase strong environmental awareness (Widiyatmoko *et al*., 2022). By adopting the "Ngaha Aina Ngoho" concept, students are encouraged to understand that every act of consumption must be accompanied by a responsibility for restoration. This transformation in awareness is crucial, given that students are the future decision-makers who will determine the sustainability of natural resources in Bima Regency.

The urgency to conduct research on the recognition of "Ngaha Aina Ngoho" values at SMAN 1 Lambitu arose because the Lambitu area is ecologically very important for Bima Regency, but is now facing a serious threat of destruction. Conservation efforts, which are generally carried out by the government using a top-down approach, are often hampered by a lack of involvement and understanding of local communities about their philosophy. As a strategic institution, schools have a moral responsibility to stop this cycle before local wisdom is completely lost with the passage of time. This research is crucial in demonstrating that educational methods based on cultural and ecological values can be a driving force for creating more meaningful and sustainable environmental awareness than conventional teaching methods. Thus, incorporating "Ngaha Aina Ngoho" into biology lessons is not only an experiment in teaching, but also an effort to save the identity and environment of Lambitu simultaneously (Munawaroh *et al*., 2017) [5]

Studies on local synergy in biology teaching have attracted the interest of scientists due to their positive results in shaping students' character in accordance with environmental principles. Several studies highlight that the best biology teaching should be able to foster the idea of ethnoscience with an understanding of conservation so that teaching becomes more relevant and meaningful (Hudha *et al*., 2023) [10]. This is in line with the view that environmental literacy is not merely the mastery of scientific data, but rather the internalization of ethical values that can be found in the local culture of the community (Husamah *et al*., 2022) [9]. Although research on local wisdom in science education has been conducted in various regions, specific exploration of the value of "Ngaha Aina Ngoho" in the context of raising environmental awareness in the Lambitu mountainous region is still very limited. Therefore, this study fills this gap by offering a learning model that revitalizes the original philosophy of Bima as a preventive solution to local ecosystem damage.

Based on the identification of problems and urgency that have been described, this study aims to analyze the effect of learning the "Ngaha Aina Ngoho" local wisdom concept on increasing environmental awareness among students at SMAN 1 Lambitu. Through this approach, it is hoped that there will be synchronization between biological knowledge about ecosystems and traditional moral values relevant to the geographical context of students in Bima Regency. The main focus of the research is not merely on academic achievement, but on changes in students' behavior and attitudes in responding to the issue of land degradation in the Lambitu mountainous region after internalizing the philosophy of "eat but do not consume". Thus, the results of this study are projected to provide empirical contributions to the development of a more humanistic biology learning model based on local environmental conservation.

This research is expected to be more than just an academic document, but also a practical guideline for reforming biology teaching that focuses on conservation in Bima Regency. By internalizing the ideas of "Ngaha Aina Ngoho", education at SMAN 1 Lambitu has changed from simply conveying information to becoming an ethical movement to protect mountain ecosystems. It is hoped that the successful integration of local wisdom will have a sustainable positive effect, whereby students become agents of change who can inform the community about the importance of maintaining the balance of nature. Based on the philosophical and empirical foundations described above, this research will continue with the evaluation of the effectiveness of learning tools through a planned experimental design to obtain accurate data on changes in students' environmental awareness. This effort is a concrete commitment to connect students' intellectual intelligence with cultural wisdom for the sake of future survival.

2. Method

This study is a quantitative study with a quasi-experimental design that aims to test the effectiveness of local wisdom-based learning interventions. The research location was purposively selected at SMAN 1 Lambitu, Bima Regency, considering its geographical location, which is directly adjacent to a degraded mountain forest area. The research subjects involved 20 tenth-grade students who were actively enrolled in the 2024/2025 academic year. The selection of these subjects was based on the characteristics of students who were in a transitional period towards independent thinking, so they were considered appropriate for strengthening their environmental awareness through ethnoscience values.

Research data was collected using a systematically developed environmental awareness questionnaire. This instrument consists of 12 statements covering three main indicators: 1) Environmental knowledge, 2) Environmental awareness, and 3) Environmental responsibility. Each statement item was designed to reflect the internalization of the Ngaha Aina Ngoho philosophy in the context of students' daily lives. The validity of the instrument was ensured through expert assessment, while its reliability was measured to ensure the consistency of the data obtained.

Data analysis techniques use descriptive statistics to calculate the percentage achievement of each environmental awareness indicator. The percentages obtained are then interpreted into

specific categories, ranging from low to very high, to describe the ecological profile of students after participating in the learning process.

3. Results and Discussion

The results of quantitative data analysis show that the implementation of a biology learning model that integrates "Ngaha Aina Ngoho" local wisdom has succeeded in creating a positive transformation in the ecological profile of students at SMAN 1 Lambitu. The achievement of environmental knowledge indicators reaching 90% in the very high category is empirical evidence that ecological material is no longer viewed as a collection of rigid theories, but rather as a reality of life that is close to their daily lives. The use of local Bima values as the basis for learning materials enables more effective assimilation of knowledge between modern scientific concepts and the cognitive structures of students who already have cultural preconceptions about nature conservation. This success indicates that the more relevant the learning material is to the environmental context in which students live, the more their absorption and intellectual interest will increase significantly.

The increase in students' environmental awareness is also strongly reflected in the indicator of environmental awareness, which reached an average percentage of 85%. This achievement, which falls into the very high category, shows that learning the concept of "Ngaha Aina Ngoho" local wisdom does not only stop at the transfer of knowledge, but has succeeded in touching the affective realm of students. Psychologically, the internalization of the value of "Aina Ngoho" (do not destroy) acts as an internal control that protects students from exploitative behavior towards nature. This is in line with the principle of character education that learning based on local wisdom can foster a sense of love and ownership of regional identity, which in turn gives rise to a protective attitude towards the surrounding environment (Husamah *et al*., 2022) [9]. Thus, the caring attitude shown by the students of SMAN 1 Lambitu is a manifestation of the noble understanding that protecting nature is part of protecting their own cultural honor.

The third indicator that complements the structure of students' environmental awareness is environmental responsibility, which recorded an average percentage of 85% in the very high category. This achievement is crucial because it shows the psychomotor readiness of SMAN 1 Lambitu students to take concrete action in preserving the mountain ecosystem. This responsibility emerged as a crystallization of the "Ngaha Aina Ngoho" concept, which emphasizes that every use of nature must be accompanied by restoration efforts. In the context of biology education, this high sense of responsibility indicates that students have achieved a functional level of environmental literacy, where they are able to identify ecosystem problems around them and feel obliged to be part of the solution (Hudha *et al*., 2023) [10].

The following bar chart compares the achievements of the three indicators (knowledge, attitude, and responsibility) to clarify the consistency of the research data.

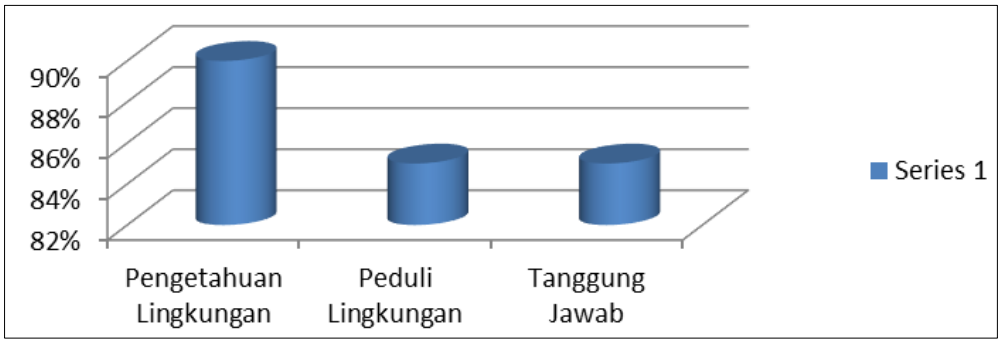

Fig 2: Capaian Indikator

Bar chart comparing the achievements of the three indicators (Knowledge, Attitude, and Responsibility)

The high level of synchronization across all three indicators shows that the process of internalizing Ngaha Aina Ngoho values in biology learning has reached the stage of "meaningful learning." This success is due to a learning design that doesn't just rely on texts, but also connects environmental damage in Lambitu District with local philosophies that students have known since childhood. This integration of ethnoscience reduces the level of abstraction in ecological material, making it easier for students to assimilate new information into their cognitive structures. When students gain a deep cognitive understanding that nature is a source of life that must be preserved, they automatically develop corresponding affective attitudes and conative responsibilities. This phenomenon proves that the strengthening of environmental literacy at SMAN 1 Lambitu has succeeded in going beyond mere mastery of exam material, but has formed an ecological awareness that is integrated into the students' personalities.

The success of raising environmental awareness among students at SMAN 1 Lambitu has strategic implications for conservation efforts in the Lambitu mountain region. The high scores in knowledge (90%) and attitude and responsibility (85%) prove that the philosophy of "Ngaha Aina Ngoho" is not just a cultural jargon, but an effective educational tool to respond to the real threat of land degradation that students see before their eyes. When biology education is able to extract these local values, schools shift their function from centers of knowledge transfer to bastions of ecological defense. This is particularly important given that the Lambitu community has historically held traditions in high regard; thus, reinforcing the value of "do no harm" through formal channels will create young conservation agents capable of engaging with older generations on the importance of maintaining ecosystem balance for long-term sustainability in Bima Regency.

The findings in this study reinforce the theory that the integration of ethnoscience in biology education is a major catalyst in the formation of pro-environmental character. The

results, which reached the "Very High" category on all indicators, are in line with the research by Husamah *et al*. (2022) [9], which states that environmental literacy will develop rapidly if students are able to relate scientific concepts to the local wisdom they have inherited from their ancestors. The successful internalization of the "Ngaha Aina Ngoho" philosophy also proves that humanistic and cultural learning approaches can overcome students' cognitive fatigue. This is in line with the views of Hudha *et al*. (2023) [10], who emphasize that 21st-century biology education must be able to transform knowledge into real action through the utilization of local potential as an authentic learning laboratory. Thus, the synchronization of knowledge data (90%) and attitudes and responsibilities (85%) is not merely a statistical figure, but a reflection of the successful integration of moral values into the science curriculum.

As a final synthesis, this research at SMAN 1 Lambitu confirms that the novelty of this learning model lies in its ability to revitalize cultural identity as a solution to the global ecological crisis on a local scale. Although the data shows very high success rates in terms of environmental knowledge (90%), caring attitudes (85%), and responsibility (85%), the sustainability of these results is highly dependent on the consistent integration of an ethnoscience-based curriculum in the future. These findings make an important contribution to the development of biology modules in Bima Regency, proving that approaches that value local wisdom such as "Ngaha Aina Ngoho" can create coherence between traditional values and modern scientific standards. Thus, this model is not only relevant for increasing students' environmental awareness, but also has the potential to be adopted more widely as a sustainable development education strategy rooted in the cultural strengths of local communities.

4. Conclusion

Based on the results of the research and discussion, it can be concluded that teaching the "Ngaha Aina Ngoho" local wisdom concept is significantly effective in increasing environmental awareness among students at SMAN 1 Lambitu, Bima Regency. This is evidenced by the scores obtained on the three indicators of environmental awareness, which are in the very high category, namely: environmental knowledge reached an average of 90%, environmental awareness reached 85%, and environmental responsibility reached 85%. These findings confirm that the integration of the ethoscience values of "eat but do not destroy" into biology material is capable of transforming students' theoretical understanding into a strong ethical awareness to preserve the ecosystem in the Lambitu mountainous region.

The implications of this study indicate that education based on local wisdom is a strategic instrument for mitigating environmental crises at the local level. Therefore, it is recommended that biology teachers in Bima Regency consistently integrate ethnoscience values into their teaching materials so that science learning remains relevant to the socio-cultural context of students. In addition, schools and education policymakers are expected to provide support in the form of developing more comprehensive learning modules based on local potential. Further research can expand the scope of the research subject or use a development research design to produce standardized teaching materials, so that the vision of environmental preservation through the "Ngaha Aina Ngoho" philosophy can be internalized more widely among all generations of Bima's youth.

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