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Ethnoscience of the Blue-eyed Cuscus as a Learning Resource for Island Science in Elementary Schools

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ABSTRACT

This study aims to explore the local knowledge of communities surrounding Lake Tolire regarding the blue-eyed cuscus (*Phalanger matabiru*) and to analyze its potential as a contextual learning resource for island-based science education in elementary schools. The research employed a qualitative exploratory design using an ethnoscience approach. Data were collected through field observations, semi-structured interviews with local community members and elementary school teachers, and documentation. The data were analyzed through stages of data reduction, data display, and conclusion drawing to identify scientific concepts embedded in community knowledge. The findings reveal that local communities possess ecological knowledge related to the behavior, habitat, and feeding patterns of the blue-eyed cuscus, including its nocturnal activity, arboreal lifestyle, and consumption of fruits and leaves within forest ecosystems. This knowledge reflects traditional ecological understanding developed through long-term interactions between humans and their natural environment. Furthermore, the identified local knowledge can be transformed into scientific concepts relevant to the elementary Integrated Science and Social Studies (IPAS) curriculum, such as living organism adaptation, habitat relationships, food chains, and forest ecosystems.

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INTRODUCTION

Science learning at the elementary school level plays an important role in building students' scientific literacy from an early age. At this stage, students begin to develop the ability to observe natural phenomena, ask questions, and understand the relationships between living organisms and their environment. However, in practice, science learning in elementary schools is often presented in an abstract manner and is rarely connected to students' real-life experiences in their surrounding environment. This condition makes scientific concepts difficult to understand contextually because students do not have direct experiences that can link the concepts learned with everyday life (Wardani et al., 2024). This situation indicates that science learning requires approaches that connect scientific concepts with the environmental and cultural contexts of students so that learning becomes more meaningful.

One approach that has developed in contextual science learning is the ethnoscience approach. Ethnoscience integrates local community knowledge with modern scientific concepts, making learning more relevant to students' social and cultural environments. Through this approach, community experiences in interacting with the natural environment can be analyzed to identify scientific concepts that can then be used as learning resources in science education (Sari & Tias, 2025). This approach also enables students to understand scientific concepts through phenomena that are familiar in their daily lives, making learning more contextual and easier to understand (Sari et al., 2023).

Various studies indicate that the integration of ethnoscience in Integrated Science and Social Studies (IPAS) learning has a positive impact on the quality of education. Research conducted by Sari et al. (2021) shows that ethnoscience-based learning can improve students' understanding of scientific concepts because the learning materials are connected with cultural experiences and environmental contexts familiar to students. In addition, the implementation of ethnoscience has been shown to increase student engagement in the learning process because students learn through phenomena they encounter in their daily lives. This indicates that local community knowledge can serve as an effective learning resource in science education.

Besides improving conceptual understanding, ethnoscience-based learning also plays an important role in developing students' scientific attitudes and environmental awareness. Research conducted by Sinthya et al. (2023) shows that integrating local knowledge into science learning can foster respect for culture and the environment because students realize that traditional community knowledge is closely related to scientific principles. Therefore, ethnoscience functions not only as a learning approach but also as a means to strengthen cultural identity and ecological awareness among students.

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In line with this, several studies also emphasize the importance of utilizing local environmental potential as a learning resource in science education. Solihin et al. (2024) explain that various phenomena found in the surrounding environment can be analyzed within an ethnoscience framework to identify scientific concepts relevant to elementary school learning materials. The use of local phenomena in learning enables students to understand scientific concepts more concretely because the concepts are connected to experiences they directly encounter.

The utilization of local potential in science learning can also be implemented through the development of ethnoscience-based learning media and teaching materials. Research conducted by Putri et al. (2023) shows that ethnoscience-based learning media can help students understand scientific concepts more contextually because learning is linked to phenomena present in local community life. Similar findings are reported in other studies emphasizing that the integration of local values in science learning can increase students' learning motivation and strengthen the connection between scientific knowledge and everyday life (Verawati & Wahyudi, 2024).

Furthermore, several studies indicate that the ethnoscience approach can be developed in various contexts of science learning, both through cultural exploration and environmental phenomena. Research conducted by Saputro et al. (2023) shows that integrating local wisdom into IPAS learning can improve students' understanding of scientific concepts and develop critical thinking skills. Meanwhile, other studies demonstrate that science learning based on local contexts can enhance students' scientific literacy because they learn through phenomena encountered in daily life(Jufrida et al., 2024).

Although many studies have demonstrated the potential of ethnoscience in science learning, most of them focus on cultural aspects such as traditional foods, local games, or community activities as sources of science learning (Nurcahyani et al., 2021). Studies linking ethnoscience with local biodiversity, particularly endemic fauna in island regions, remain relatively limited. In fact, Indonesia as an archipelagic country possesses extremely high biodiversity that has great potential to be utilized as a contextual science learning resource.

Island regions such as North Maluku have unique biodiversity and various endemic species that are not found in other regions. This biodiversity not only has ecological value but also has potential as a learning resource in school science education (Hastuti et al., 2020; Leimena et al., 2024). One of the endemic fauna found in North Maluku is the blue-eyed cuscus (*Phalanger matabiru*). This species inhabits forest areas on Ternate Island and is often associated by local communities with the area around Lake Tolire. Local communities possess various forms of knowledge regarding the behavior, habitat, and feeding patterns of the blue-eyed cuscus, which have been obtained through direct experience as well as oral traditions passed down from generation to generation.

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Community knowledge about the blue-eyed cuscus is part of a local knowledge system that has developed through interactions between communities and their natural environment. From an ethnoscience perspective, this knowledge contains scientific concepts that can be analyzed and linked to science learning materials in elementary schools (Nandia & Sayekti, 2023). The integration of local knowledge about endemic fauna into IPAS learning can serve as a strategy for developing more contextual science learning while simultaneously fostering conservation awareness among students from an early age.

However, to date, local knowledge about endemic fauna in island regions has not been widely utilized as a learning resource in elementary science education. Therefore, studies are needed to explore the ethnoscience potential embedded in community knowledge about local biodiversity and to analyze its relevance to scientific concepts in science learning.

Based on this background, this study aims to explore the ethnoscience of the blue-eyed cuscus (*Phalanger matabiru*) within the knowledge of local communities around Lake Tolire on Ternate Island and to analyze its potential as a learning resource for island-based science education at the elementary school level. This study is expected to contribute to the development of science learning based on local potential and to enrich the utilization of biodiversity in island regions as a learning resource in IPAS learning in elementary schools.

RESEARCH METHODS

This study employed a qualitative approach with an exploratory ethnoscience design. This approach was used to identify local community knowledge regarding the blue-eyed cuscus and analyze its relationship to scientific concepts that can be utilized in science learning in elementary schools. An ethnoscience approach allows researchers to interpret community knowledge about natural phenomena and convert it into scientific concepts relevant to science learning (Sari et al., 2021; Saputro et al., 2023). Through this approach, the research not only describes community knowledge but also analyzes the relationship between local knowledge and scientific concepts in science learning.

Research Location

The study was conducted in the area surrounding Lake Tolire on Ternate Island. This location was selected because it is recognized as one of the habitats of the blue-eyed cuscus (*Phalanger matabiru*) and is inhabited by local communities who still retain traditional knowledge about the species. In addition, the forest environment around Lake Tolire represents a distinctive island ecosystem characterized by rich biodiversity and strong interactions between organisms and their habitats. These ecological characteristics make the area particularly relevant for exploration within the context of island-based science education, as it provides authentic environmental phenomena that can be linked to scientific concepts in elementary science learning.

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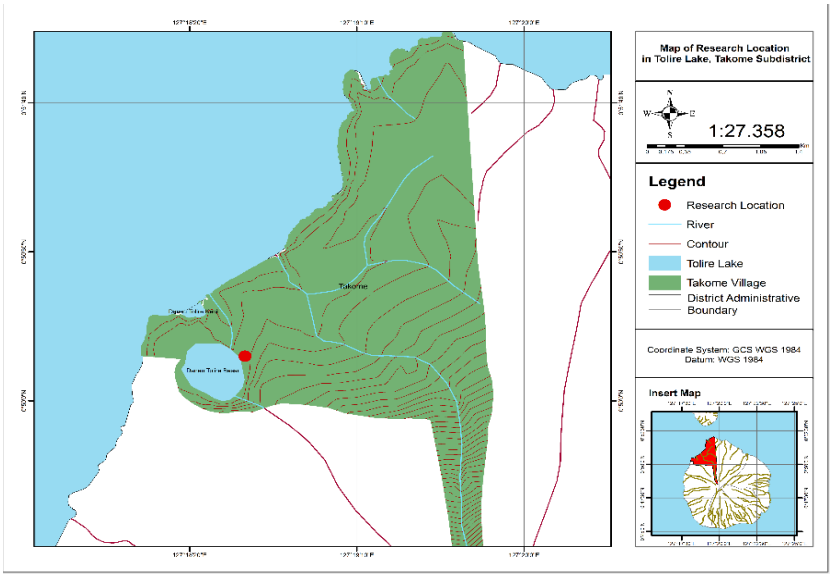

Figure 1. Research Location Map

Research Subjects

The research participants consisted of several groups of informants selected using a purposive sampling technique based on their knowledge and experience related to the blue-eyed cuscus (*Phalanger matabiru*). The informants included local community members who had seen or directly interacted with the species, community leaders who possessed knowledge of local traditions and environmental understanding related to wildlife, and elementary school teachers who teach the Integrated Science and Social Studies (IPAS) subject.

The purposive selection of informants was intended to obtain in-depth information regarding the local community's knowledge about the blue-eyed cuscus and to identify the potential use of this knowledge as a learning resource or contextual basis for science education in elementary schools.

Data Collection Techniques

Data in this study were collected through several techniques, namely field observation, in-depth interviews, documentation, and curriculum analysis. Field observations were conducted to directly examine the environmental conditions and the habitat of the blue-eyed cuscus (*Phalanger matabiru*) around Lake Tolire. Through these observations, the researchers obtained information regarding habitat characteristics, types of vegetation, and ecosystem conditions related to the presence of the species.

In-depth interviews were conducted using a semi-structured format with research informants to explore community knowledge about the blue-eyed cuscus. The aspects explored in the interviews included the animal's activity patterns, habitat and locations where it is commonly found, types of food consumed, and its interactions with the surrounding environment. The semi-structured interview technique was used to allow the researchers to

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obtain more comprehensive information while also giving informants the opportunity to describe their experiences and knowledge more freely.

Documentation was carried out by collecting photographs, videos, and field notes related to the activities of the blue-eyed cuscus and the environmental conditions at the research site. This documentation served to support and complement the data obtained from observations and interviews. In addition, curriculum analysis was conducted to identify elementary school Integrated Science and Social Studies (IPAS) materials that are related to scientific concepts embedded in the community's local knowledge. This analysis aimed to determine the potential integration of ethnoscience related to the blue-eyed cuscus into science learning at the elementary school level.

Data Analysis Techniques

Data analysis in this study employed a qualitative analysis model consisting of three main stages: data reduction, data display, and conclusion drawing, as proposed by Matthew B. Miles and A. Michael Huberman (Salmia, 2023). The analysis process was conducted systematically to organize, interpret, and understand the data obtained from observations, interviews, and documentation in order to generate meaningful findings.

More specifically, the data analysis was carried out through three stages within the ethnoscience framework. The first stage was the identification of local knowledge, which involved identifying various forms of community knowledge regarding the blue-eyed cuscus (*Phalanger matabiru*) obtained through interviews and field observations. The second stage was the ethnoscience analysis of community knowledge, in which the identified local knowledge was analyzed to reveal the scientific concepts embedded within it by comparing it with concepts in biology and ecology. The third stage was the transformation into learning concepts, where the identified scientific concepts were linked to the Integrated Science and Social Studies (IPAS) curriculum in elementary schools. This stage aimed to develop the potential use of ethnoscience-based knowledge as a contextual science learning resource within an island-based educational context.

Data Validity

To ensure the validity of the data, this study employed triangulation techniques. Triangulation was used to enhance the credibility of the research findings and to ensure that the collected data accurately reflected the actual conditions in the field. The application of triangulation also enabled the researchers to examine the consistency of information obtained from various sources and data collection methods.

Triangulation in this study consisted of three forms. First, source triangulation was conducted by comparing information obtained from different research informants who possessed knowledge related to the blue-eyed cuscus (*Phalanger matabiru*). Second, method triangulation was carried out by comparing data obtained through observation, interviews,

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and documentation. Third, theory triangulation involved comparing the research findings with scientific concepts and perspectives found in the literature on science and education. Through these three forms of triangulation, the validity of the data was strengthened, thereby increasing the credibility and reliability of the research results.

RESULTS AND DISCUSSION

Results

Local Community Knowledge about the Blue-eyed Cuscus

The results of this study indicate that communities around Lake Tolire on Ternate Island possess relatively rich local knowledge regarding the blue-eyed cuscus (*Phalanger matabiru*). This knowledge has been acquired through the community's direct interactions with the surrounding forest environment and has been transmitted across generations through oral traditions.

Based on the findings from interviews and field observations, the local knowledge of the community about the blue-eyed cuscus includes several main aspects, namely animal behavior, habitat, and feeding patterns. Community members recognize that the blue-eyed cuscus is a nocturnal animal that is active at night, lives in trees, and feeds on fruits and leaves. This knowledge indicates that the community possesses ecological understanding related to the behavior of wildlife living in their surrounding environment.

In addition, the community understands that the blue-eyed cuscus inhabits relatively natural forest areas around Ternate Island, particularly in regions characterized by dense vegetation. This knowledge demonstrates that local communities have an awareness of the relationship between the presence of wildlife and the conditions of its habitat.

These findings suggest that the community's local knowledge reflects characteristics of traditional ecological knowledge that has developed through long-term interactions between humans and the natural environment.

Table 1. Mapping of Local Community Knowledge about the Blue-eyed Cuscus

Category of Local Knowledge	Description of Community Knowledge	Ecological Meaning	Potential Science Concept
Animal behavior	Community members know that the blue-eyed cuscus (*Phalanger matabiru*) is generally active at night	Nocturnal behavior	Adaptation of living organisms
Habitat	The cuscus is often found in forest areas with dense tree vegetation	Dependence of wildlife on forest habitat	Ecosystems and habitat
Lifestyle	The cuscus lives in trees and rarely descends to the ground	Arboreal adaptation	Body structure and adaptation

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Feeding pattern	The cuscus feeds on fruits and leaves from several forest tree species	Interaction between organisms and food sources	Food chain

Ethnoscience Analysis in Community Knowledge

Based on the analysis of field data and literature review, this study developed a conceptual model regarding the utilization of ethnoscience related to the blue-eyed cuscus (*Phalanger matabiru*) as a learning resource for island-based science education in elementary schools. This model illustrates the process of transforming local community knowledge into scientific concepts that can be applied in science learning. The process consists of several main stages.

1. Identification of local community knowledge

   Community knowledge about the behavior, habitat, and feeding patterns of the blue-eyed cuscus was obtained through direct experiences of interacting with the forest environment surrounding Lake Tolire.
2. Ethnoscience analysis

   The identified local knowledge was then analyzed to reveal the scientific concepts embedded within it, particularly those related to the fields of biology and ecology.
3. Transformation into scientific concepts

   The scientific concepts identified from the ethnoscience analysis were subsequently linked to science learning materials at the elementary school level.
4. Integration into island-based science learning

   Finally, these concepts were used as contextual learning resources for science education that are relevant to the island environments where students live.

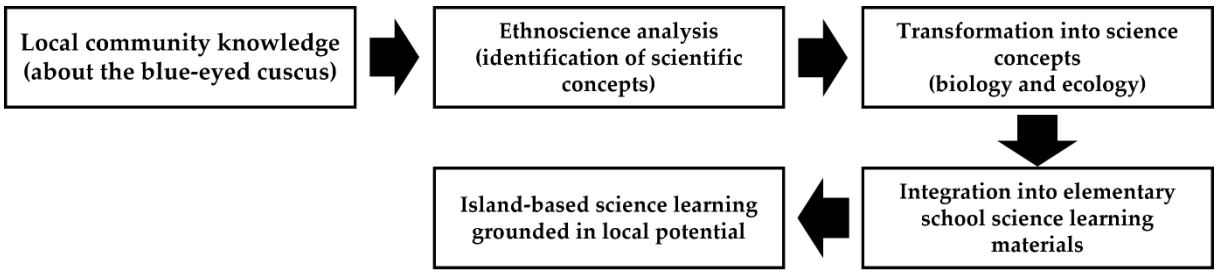

Figure 2 Conceptual model of Ethnoscience integration in Learning

Based on the analysis of local community knowledge regarding the blue-eyed cuscus (*Phalanger matabiru*), a relationship was identified between aspects of animal behavior, habitat, and feeding patterns and scientific concepts in the fields of biology and ecology. The relationship between community local knowledge and these scientific concepts was subsequently mapped into an ethnoscience conceptual framework of the blue-eyed cuscus. This conceptual map illustrates how community local knowledge can be interpreted and transformed into scientific concepts that are relevant for Integrated Science and Social Studies (IPAS) learning at the elementary school level.

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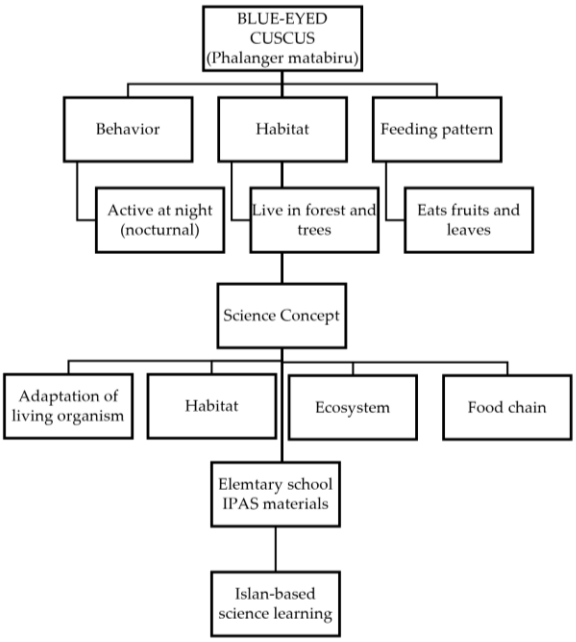

Figure 3. Conceptual Map of Ethnoscience of the Blue-Eyed Cuscus

Transformation of Ethnoscience into IPAS Learning Concepts

The results of the ethnoscience analysis indicate that community knowledge about the blue-eyed cuscus (*Phalanger matabiru*) can be converted into various learning concepts within the Integrated Science and Social Studies (IPAS) curriculum at the elementary school level. This transformation process is carried out by linking the community's local knowledge with scientific concepts contained in the IPAS curriculum. Several concepts that can be identified include the following:

Table 2. Conversion of Blue-Eyed Cuscus Ethnoscience into IPAS Learning Concepts

Local Knowledge	Science Concept	Elementary School IPAS Material
The blue-eyed cuscus (*Phalanger matabiru*) is active at night	Adaptation of living organisms	Animal adaptation
The cuscus lives in trees	Arboreal habitat	Relationships between living organisms and their environment
The cuscus eats fruits and leaves	Herbivore	Food chain
The cuscus lives in forests	Forest ecosystem	Ecosystem

Through this transformation process, community knowledge is not only understood as a form of local tradition but also as a learning resource that can enrich science education. The integration of local knowledge into Integrated Science and Social Studies (IPAS) learning enables students to understand scientific concepts through examples that are closely related to their daily lives.

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Previous studies have shown that science learning which integrates local potential can help students understand concepts more deeply because the learning process is connected to real-life experiences that they encounter in everyday life (Putri et al., 2023). In addition, ethnoscience-based learning can also increase students' learning motivation because the learning materials become more engaging and relevant to their surrounding environment (Jufrida et al., 2024).

Potential for the Development of Island-Based Science Learning

The integration of ethnoscience related to the blue-eyed cuscus (*Phalanger matabiru*) in IPAS learning also has significant potential to support the development of island-based science education. The island region of North Maluku possesses distinctive ecological characteristics, including high biodiversity and the presence of various endemic species that are not found in other regions.

Utilizing endemic fauna as a source of science learning allows students to understand ecological concepts more contextually while also fostering conservation awareness toward their surrounding environment. This is important because science education does not only aim to improve students' understanding of scientific concepts but also to cultivate attitudes of environmental responsibility.

Research shows that learning which utilizes local environmental contexts can improve students' scientific literacy as well as their awareness of the importance of conserving biodiversity (Saputro et al., 2023). Therefore, the integration of ethnoscience related to the blue-eyed cuscus in IPAS learning can serve as a strategy to develop contextual science learning while also supporting efforts to conserve local fauna.

Discussion

Local Community Knowledge about the Blue-eyed Cuscus

The results of this study indicate that communities around Lake Tolire possess relatively comprehensive local knowledge regarding the behavior, habitat, and feeding patterns of the blue-eyed cuscus (*Phalanger matabiru*). This knowledge has developed through the community's direct interactions with the forest environment on Ternate Island and has been transmitted across generations through oral traditions. These findings suggest that local communities have an ecological understanding of wildlife in their environment, particularly regarding the nocturnal behavior, arboreal habitat, and feeding patterns of the blue-eyed cuscus.

In scientific studies, such local knowledge is often categorized as traditional ecological knowledge (TEK). Traditional ecological knowledge refers to a knowledge system that develops through long-term interactions between communities and their surrounding natural environment. This form of knowledge is typically accumulated through direct observation,

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experience, and cultural transmission over generations (Albuquerque et al., 2021; Nepal, 2024). Within island communities, traditional ecological knowledge often reflects relatively accurate understandings of organism behavior and the dynamics of local ecosystems.

The findings of this study are consistent with previous research indicating that local communities frequently possess ecological knowledge related to wildlife activity patterns, habitat preferences, and food sources of organisms within their environment (Braga‐Pereira et al., 2024; Buchholtz et al., 2020; Madsen et al., 2020). The community's knowledge regarding the nocturnal behavior of the blue-eyed cuscus revealed in this study suggests that local people have strong observational abilities in recognizing the activity patterns of wildlife within forest ecosystems.

Furthermore, the community's understanding of the habitat of the blue-eyed cuscus, particularly its association with forest areas characterized by dense vegetation, indicates that local communities are also aware of the relationship between the presence of wildlife and the conditions of its ecosystem. This demonstrates that local community knowledge is not merely descriptive but also contains ecological insights concerning the interactions between organisms and their environment.

Other studies have also shown that the ecological knowledge of local communities often possesses a relatively high level of accuracy because it is based on long-term empirical experiences (Albuquerque et al., 2021). Therefore, the local knowledge of communities regarding the blue-eyed cuscus identified in this study can be viewed as a form of traditional ecological knowledge that holds scientific value and potential for development within the context of science education.

However, unlike many ethnzoological studies that emphasize the utilization of animals by local communities, this study reveals that community knowledge about the blue-eyed cuscus is more closely related to ecological observations concerning the behavior and habitat of the species. This represents one of the distinctive aspects of the present study, as its focus extends beyond cultural perspectives to highlight the potential of local knowledge as a resource for science learning.

Ethnoscience Analysis of Community Knowledge

The ethnoscience analysis conducted in this study indicates that local community knowledge regarding the blue-eyed cuscus (*Phalanger matabiru*) can be systematically analyzed and transformed into scientific concepts within the fields of biology and ecology. This process involves several stages, including the identification of local knowledge, ethnoscientific analysis, transformation into scientific concepts, and integration into island-based science learning.

The ethnoscience approach in science education aims to connect traditional community knowledge with modern scientific concepts so that science learning becomes more contextual and meaningful for students (Zidny et al., 2021; Sari et al., 2023; Munira et al., 2024). In the

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context of this study, community knowledge regarding the nocturnal behavior of the blue-eyed cuscus can be associated with the scientific concept of organismal adaptation to environmental conditions. Meanwhile, community knowledge concerning its arboreal habitat can be linked to the ecological concept describing relationships between organisms and their habitats.

These findings align with previous studies indicating that ethnoscience-based approaches can help students understand scientific concepts through cultural experiences and environmental contexts that are familiar to them (Zidny et al., 2021; Sari et al., 2023; Braga - Pereira et al., 2024; Munira et al., 2024). Integrating local knowledge into science learning enables students to relate scientific concepts to real phenomena present in their surrounding environment.

In the context of primary education, this approach is also consistent with the principles of contextual learning, which emphasize the importance of connecting instructional materials with students' real-life experiences (Thi Thu et al., 2024). Through ethnoscience-based learning, students not only study scientific concepts in abstract terms but also develop an understanding of how these concepts relate to natural phenomena encountered in their daily lives.

Furthermore, ethnoscientific analysis allows local community knowledge to be reinterpreted within a scientific framework without eliminating the cultural values embedded within it. This is particularly important because integrating local knowledge into education not only aims to improve students' understanding of scientific concepts but also contributes to the preservation and sustainability of community cultural knowledge.

Transformation of Ethnoscience into IPAS Learning Concepts

The results of this study indicate that local community knowledge regarding the blue-eyed cuscus (*Phalanger matabiru*) can be transformed into various learning concepts within the subject of Natural and Social Sciences (IPAS) at the elementary school level. This transformation process is carried out by linking community knowledge with scientific concepts contained in the learning curriculum.

Several scientific concepts identified from community knowledge include the adaptation of living organisms, relationships between organisms and their habitats, food chains, and forest ecosystems. These concepts constitute essential components of IPAS learning materials in elementary schools, which aim to help students understand the relationships between living organisms and their environments.

These findings are consistent with previous studies showing that integrating local potential into science learning can improve students' conceptual understanding because learning materials are connected to phenomena that students encounter in their daily lives (Putri et al., 2023). Contextual learning enables students to construct conceptual understanding in a more meaningful way compared with learning that is purely theoretical.

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In addition, other studies indicate that ethnoscience-based learning can enhance students' learning motivation because instructional materials become more engaging and relevant to the environment in which they live (Wirama et al., 2023). When students learn scientific concepts through examples derived from their local environment, they tend to understand those concepts more easily and develop greater interest in exploring natural phenomena around them.

In the context of island regions such as Ternate Island, the use of local fauna such as the blue-eyed cuscus as a learning resource also has strategic value because it can help students understand the characteristics of island ecosystems and the biodiversity present in their region. This aligns with studies indicating that the utilization of local biodiversity in science learning can enhance students' scientific literacy as well as their environmental awareness (Hastuti et al., 2020).

Contribution of the Study to the Development of Island Science Learning

This study provides an important contribution to the development of science learning in island regions, particularly in utilizing local biodiversity as a learning resource. Through the ethnoscientific analysis of the blue-eyed cuscus, the study demonstrates that endemic fauna can serve as an effective learning context for explaining various ecological concepts to elementary school students. Most previous ethnoscience studies in Indonesia have primarily used cultural objects such as traditional foods or community economic activities as sources for science learning. This study shows that endemic fauna also possesses significant potential to be utilized as a contextual source for science learning.

Furthermore, this research emphasizes the importance of developing science learning approaches that consider the geographical characteristics of island regions. Island environments possess ecological dynamics that differ from continental land areas; therefore, science learning in such regions should be developed by utilizing local environmental potential. Thus, integrating ethnoscience related to the blue-eyed cuscus into IPAS learning not only contributes to improving students' understanding of scientific concepts but also helps foster ecological awareness and appreciation for local biodiversity from an early age.

CONCLUSION

Communities living around Lake Tolire possess rich local knowledge regarding the blue-eyed cuscus (*Phalanger matabiru*), particularly related to the animal's behavior, habitat, and feeding patterns. This knowledge, which has developed through long-term interactions with the surrounding forest environment, can be categorized as traditional ecological knowledge that contains an understanding of the relationships between organisms and their environments. Through an ethnoscience approach, this knowledge can be identified and transformed into scientific concepts in biology and ecology, such as nocturnal behavior, organism adaptation, relationships between organisms and their habitats, food chains, and

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forest ecosystems, all of which are relevant to the Natural and Social Sciences (IPAS) curriculum at the elementary school level.

The utilization of local endemic fauna such as the blue-eyed cuscus as a learning resource has the potential to create science learning experiences that are more contextual and meaningful for students. The integration of ethnoscience into IPAS learning not only helps students understand scientific concepts through phenomena closely related to their daily lives but also encourages the development of awareness regarding the importance of environmental conservation and biodiversity protection. Therefore, the development of science learning in island regions should consider the potential of local knowledge and regional biodiversity as relevant and contextual learning resources.

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