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Analysis of Needs in the Development of Animal Ecology Textbooks Oriented to Wildlife Conservation

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ANALYSIS OF NEEDS IN THE DEVELOPMENT OF ANIMAL ECOLOGY TEXTBOOKS ORIENTED TO WILDLIFE CONSERVATION

Abstract: Animal ecology courses at universities in Indonesia play a crucial role in environmental conservation efforts. However, access to adequate educational resources is limited, creating disparities in awareness and participation in conservation activities. This research aims to analyze the needs of users (students) and stakeholders (lecturers) in developing animal ecology textbooks oriented towards wildlife conservation. The research method uses the Plomp development model. This research focuses only on the initial investigation phase, namely needs analysis. Data were collected through interviews and questionnaires with students and lecturers. The results show that 82.5% of lecturers and 85% of students need animal ecology textbooks oriented towards wildlife conservation. Specifically, 100% of lecturers understand the importance of wildlife conservation-oriented learning approaches, but only 65% actively apply these approaches in their teaching. Additionally, 70% of lecturers use textbooks in their teaching, and the same percentage develop their learning resources. Among students, 100% expressed the need for wildlife conservation material, with 75% currently using available textbooks. Furthermore, 100% of students prefer printed textbooks for ease of use in field practicals. In conclusion, the development of animal ecology textbooks oriented towards wildlife conservation is essential to increase student's awareness and involvement in wildlife conservation.
Keywords: Need analysis, animal ecology, textbooks, conservation, wildlife

Introduction

Wildlife in Indonesia is estimated at 300,000 species or 17% of all animals in the world, even though Indonesia is only 1.3% of the land area on Earth (Slamet Khoiri, 2019). Wildlife has an important role in balancing ecology and biodiversity, as well as storing energy for ecosystems, as it is the first consumer in the food pyramid (Arief, H., Mujiarto, 2015; Nidh, 2021). A decrease in wildlife populations will negatively impact the sustainability of food webs and hinder the smooth flow and energy cycle (*Desi et al*., 2021). The survival of animal life depends on each other, so real efforts or actions are needed to maintain and protect wildlife populations. The action in question is the conservation of wildlife. This action is carried out to prevent damage to the natural habitat of animals. Understanding the interactions between different species and their environments is crucial in wildlife ecology, especially with increasing awareness of wildlife conservation and ecosystem preservation (Castillo-Huitrón *et al*., 2020; Jacobson, 2018; Sandbrook, 2015). However, if conservation efforts are not carried out, it can cause damage to the natural habitat of animals which has an impact on conflicts between humans and animals which can cause losses to both parties. Conflict can lead to loss of wildlife life and will be subject to human poaching (Hockings, 2010). Another phenomenon that occurs in society is that certain types of wildlife are made into a lifestyle that can describe social stratification. So there is a wildlife trade. This is because public knowledge related to wildlife is very low (Zamzami *et al*., 2019).

Thus, one of the efforts that can be made to prevent conflicts from occurring is to prepare learning activities oriented to maintaining ecosystem functions starting with saving wildlife. The subject that discusses this is Animal Ecology. The Animal Ecology course is a compulsory subject taken in the Biology Study Program and Biology Education in all universities in Indonesia. Learning Animal Ecology is an important learning in efforts to increase understanding and preservation of biodiversity. The concept of ecological education not only helps in understanding the diversity of species and ecosystems but also encourages direct involvement in environmental conservation (Sarbaini & Fahlevi, 2022; Ahaaha & Saroyo, 2019). In many developing countries, access to adequate education and resources to learn about conservation is very limited. This situation creates huge disparities in the level of awareness and participation in conservation activities between regions and between social groups (Maduriana & Gata, 2021).

Based on the development of the world of education and the demands of the curriculum in universities in Indonesia, it is necessary to develop contextual teaching materials closely related to the understanding of natural environmental aspects (DIKTI, 2008). Thus, the development of these learning resources needs to be carried out in the Animal Ecology course. The development of a wildlife-oriented Animal Ecology textbook with a thorough and interactive approach is perhaps one of the most effective solutions for addressing wildlife-related problems. Animal Ecology learning that focuses on wildlife and biodiversity plays an important role in environmental conservation efforts. Through appropriate learning materials, understanding wildlife behaviour, habitat mapping, landscape management, and species-specific studies, we can strengthen awareness of the importance of safeguarding biodiversity for a sustainable future. A textbook that specifically discusses wildlife ecology can be an effective tool for conveying relevant scientific concepts as well as applying teaching methods appropriate to current educational needs (Lowry *et al*., 2012). Recent research highlights the limited availability of textbooks designed specifically for this topic and stresses the need for more in-depth development (Nathan *et al*., 2008; Spiegel *et al*., 2016).

Several previous studies have developed animal ecology textbooks including Indriaty & Setyoko (2018) have developed animal ecology teaching materials based on problem-based learning to build students' science competencies and skills through problem-solving based activities in the surrounding environment. Furthermore, (Husain *et al*., 2017) developed an ecology textbook by utilizing the potential of mangrove ecosystems as carbon absorption areas with the results of student responses showing that the percentage of ideality is 94% (very good). Another study (Lubis & Indrawati, 2019) states that the Animal Ecology textbook based on the local potential of Lake Toba is valid and practical for students to use in the learning process. While the students' response to textbooks was positive.

Based on the above study, the main purpose of developing this wildlife conservation-oriented animal ecology textbook is to provide comprehensive educational resources that support learning about wildlife conservation and ecology. This book is designed to enhance students' conceptual understanding as well as their practical skills in dealing with the challenges of true wildlife conservation. The hypothesis underlying the development of this textbook is that well-designed educational materials can significantly increase students' awareness and involvement in wildlife conservation.

Thus, before the development of wildlife-oriented animal ecology textbooks, it is very necessary to analyze the needs related to this. Analyzing needs is an important step to take. This is done to be able to ensure that the final product meets the needs of its users and stakeholders (Bukhsh *et al*., 2020; Svensson & Torkar, 2021). The purpose of the needs analysis in this study is to determine the response of students and lecturers of related Animal Ecology courses that will be carried out to develop wildlife-oriented animal ecology textbooks.

Method

This research was carried out at Mandalika University of Education and Mataram University with research subjects consisting of students and lecturers with details: 35 students from Mataram University, 20 students from Mandalika University of Education, 4 lecturers from Mataram University and 2 lecturers from Mandalika University of Education. This research uses the Plomp development model (Akker *et al*., 2013). This model consists of the preliminary investigation phase, the design phase, the realization/construction phase, and the test, evaluation revision, and implementation phases. Of all these phases, this study only uses the initial phase. The initial investigation phase aims to collect data and analyze information. The investigation phase consists of 2 stages, namely needs analysis and learning obstacle analysis. This research is also limited to the needs analysis stage. A needs analysis was conducted to find out what is needed to support the learning of animal ecology courses. Needs analysis is carried out through interviews with educators, in this case, lecturers who teach courses and questionnaires of student responses who have studied or taken animal ecology courses.

Data was collected through interviews and questionnaires with students and lecturers. In the lecturer of animal ecology course, the questionnaire consists of 10 questions and an interview with 5 questions. Meanwhile, students are only given a questionnaire consisting of 30 questions using a dichotomous scale. The interview was conducted using a semi-structured interview where the researcher had prepared the direction of the interview but the researcher did not prepare alternative answers. Data obtained from observations and interviews are then converted into descriptive form. The needs analysis questionnaire uses the Guttman scale which includes an excellent scalogram scale to confirm the results of the study. The answer from the students "yes" is worth "1" and "no" is worth "0", for alternative answers in the questionnaire. This research is in the form of checklists using the Guttman scale. Furthermore, the results are analyzed quantitatively in the form of percentages.

The category to interpret the results of the percentage of needs analysis was obtained from the modification of the results of the research of Munggaran (2012). These categories are described in Table 1.

Table 1: Percentage category

Percentage	Category
0 – 1,9%	Not required
2% - 25,9%	A small percentage requires
26% - 49,9%	Less than half need
50%	Half need
50,1% - 75,9%	More than half need
76% - 99,9%	Most need
100%	All in need

Result and Discussion

Result

The research was conducted to analyse the development of wildlife-oriented animal ecology textbooks. This is done by collecting data through questionnaires and interviews with students and lecturers of the Animal Ecology course. Here are the details of the research results as follows:

1. *Analysis of Questionnaires for Subject Lecturers*

Questionnaires were given to 6 lecturers who teach animal ecology courses at Mataram University and Mandalika Education University. The results of the questionnaire analysis of animal ecology lecturers about the need for developing wildlife-oriented animal ecology textbooks in Table 2 are below.

Table 2: Analysis of lecturers' understanding of wildlife and animal ecology textbooks

No	Aspect	Percentage (%)
1	Lecturers' understanding of wildlife-oriented learning approaches	100
2	Lecturers apply the wildlife material approach in teaching	65
3	Lecturers use textbooks in learning Animal Ecology	70
4	Lecturers develop their leag resources in learning for animal Ecology	70
5	The books available are wildlife-oriented	70
6	The available books contain Biodiversity Literacy	70
7	The available books contain attitudes to care for the environment	70
8	Lecturers expect learning objectives to empower students' Biodiversity Literacy	100
9	Lecturers expect learning objectives to empower environmental care attitudes	100
10	Lecturers want to use animal ecology books oriented towards wildlife conservation	100
	Average	82,5
	Category	Most Require

Based on Table 2 above, the lecturers' understanding and use of the wildlife approach in animal ecology learning states that, all lecturers (100%) understand the importance of a learning approach oriented to wildlife conservation. However, only 65% of lecturers actively apply this approach in daily learning. This means that only more than half of lecturers apply a learning approach with wildlife material. Meanwhile, regarding the need for textbooks, as many as 70% of lecturers have used textbooks in animal ecology learning, and most of them (70%) indicated that the available books already contain biodiversity literacy and environmental care attitudes. As many as 70% of lecturers develop their learning resources. For lecturers' expectations for the textbooks to be developed, it is stated that All lecturers (100%) expect textbooks that can empower students' biodiversity literacy and instil an attitude of caring for the environment.

Thus, based on the results of the analysis the average percentage obtained is 82.5% with the category of most in need. This means that lecturers feel that they need animal ecology textbooks oriented towards wildlife conservation, this shows the high need for innovative and relevant teaching materials.

2. Analysis of lecturer interviews

Interviews were conducted with 6 lecturers who teach animal ecology courses at Mataram University and Mandalika Education University. The purpose of conducting interviews is to obtain response data, suggestions and input related to animal ecology learning. The results of the interview synthesis can be seen in Table 3 below.

Table 3: Results of an interview with a lecturer in animal ecology

No	Question	Answer
1	What methods or strategies are often used by lecturers in the learning process?	The methods used are project-based learning (PjBL), discussion, Problem Based Learning (PBL), and case studies.
2	What are the shortcomings of the method that has been used? And what do you want to study Animal Ecology for?	Disadvantages: students are not active in discussions, field guides are incomplete, and students' initial understanding is lacking. What you want: Student activity in animal ecology learning and a complete field guide.
3	What resources do you commonly use in Animal Ecology lessons?	Textbooks, textbooks, modules, and journals.
4	If researchers want to develop a textbook of animal ecology oriented towards wildlife conservation, What do you think?	Strongly agree, because it can support ecological learning based on actual problems that occur in the field, and can instil an attitude of caring for wildlife conservation.
5	What kind of textbooks do you hope to support Animal Ecology learning that can improve biodiversity literacy and environmental care attitudes?	Textbooks developed from research results, are concise, accompanied by interesting pictures, contain actual problems in the environment and are related to the concept of basic ecological concepts.

Based on the results described in Table 3 state that, in animal ecology learning methods, methods that are often used include project-based learning (PjBL), discussion, Problem Based Learning (PBL), and case studies. In addition, lecturers identified shortcomings in this method, such as a lack of student activity in discussions and a lack of complete field guidance. Therefore, lecturers strongly support the development of animal ecology textbooks oriented towards wildlife conservation. The lecturer also suggested that the textbook be arranged concisely, equipped with interesting pictures, and contain actual problems in the environment related to the basic concepts of ecology. Thus, all lecturers strongly agree that animal ecology textbooks oriented towards wildlife conservation are developed, because they can support ecological learning based on actual problems that occur in the field, and can instill an attitude of caring for wildlife conservation.

3. Student Questionnaire Analysis

Questionnaires were given to 50 students who had taken animal ecology courses. Students (respondents) came from two universities, namely Mandalika Education University and Mataram University. The results of the questionnaire analysis can be seen in Table 4 below.

Based on Table 4 above, states that, in the availability and use of textbooks, as many as 75% of students stated that the textbooks used were already available and they felt interested in using existing teaching materials. Meanwhile, the need for wildlife conservation materials states that most students (100%) show a need for wildlife conservation materials, and prefer printed versions of textbooks because of their ease of use in field practicum activities. In addition, the strategy and evaluation stated that students feel that the current textbooks are quite effective, but 100% of them are interested in using textbooks that specifically discuss wildlife conservation.

Thus, based on the results of the average analysis, the average percentage of student questionnaires related to the need for the development of animal ecology textbooks oriented towards wildlife conservation obtained an average percentage of 85% with the category of most in need. This means that

most students who have taken animal ecology courses also want an animal ecology textbook that is oriented towards wildlife conservation.

Table 4: Questionnaire results from students

Dimension	Indicator	Sum Grain	Question Number	Percentage (%)
Text book	Availability of textbooks used by students	7	1-7	75
Teaching Materials	**1.** Students are interested in using the teaching materials that are already available	2	8-9	70
	2. Student needs related to wildlife conservation materials	8	10-17	100
	3. Students need printed textbooks or e-books	3	18-20	100
Strategy	**1.** Ease of students in using existing teaching materials	2	21-22	65
	2. Student interest in developing textbooks specifically for wildlife conservation	3	23-25	100
Evaluation	**1.** The effectiveness of lecturers in using textbooks	3	26-28	70
	2. Benefits of textbooks that discuss specific studies as a source of student learning	2	29-30	100
Rata-rata			85%	
Category			Most Require	

Discussion

Textbooks are a very important key element in learning activities for many significant reasons. Textbooks serve as fundamental resources written by experts in their field, meet certain educational standards, and are widely distributed for educational purposes (Aprilia *et al*., 2021). Quality textbooks are very important in education because they are considered a vital aspect of the learning process (Andaru Bahy &; Taufiq, 2022). The preference of teachers or lecturers towards textbooks plays an important role in the selection and use of textbooks (Vojíř & Rusek, 2021). The way the content is structured in the textbook also influences the learning approach applied by the teacher (Li *et al*., 2009). Such is the case in the development of animal ecology textbooks that add wildlife conservation content in animal ecology textbooks. The purpose of adding this content is to grow and raise awareness of wildlife conservation. Therefore, textbooks not only serve as a source of information but also contain important character education values (Wardani *et al*., 2019), as well as determine what learners learn and how instructors structure their pedagogical practice (Lee *et al*., 2013).

The results of this study show a significant need for the development of animal ecology textbooks oriented towards wildlife conservation from both lecturer and student perspectives. This need is based on several factors that can be described in the research discussion including:

1. The Desire for More Active and Relevant Learning

Faculty and students alike want teaching materials that not only cover basic concepts of ecology but also integrate actual and relevant conservation issues. To achieve this, the development of this textbook will integrate issues related to wildlife and wildlife conservation issues. This is also in line with the approach that has been applied before by (Bolt & Schreier, 2022; Cannizzo *et al*., 2021) applying an approach by combining basic ecological concepts with actual conservation issues, this activity is carried out to enrich teaching materials with relevant conservation issues. It goes (Akçakaya *et al*., 2019; and Ward *et al*., 2023) mention that it is important for us to understand the ecological function in species recovery, as it can be the basis for expanding teaching materials towards species conservation. This provides a deeper understanding of how ecosystem functions play a role in the success of conservation efforts and can help students apply these concepts in real contexts. Another study was also conducted by (Kamaludin *et al*., 2018) who mentioned that the development of issue-based teaching materials can improve student learning outcomes in the Aquatic Biology course. Furthermore, Nuangchalerm &; Kwuanthong (2010) state that issue-based learning can improve analytical thinking and learning satisfaction.

Integrating environmental education into the learning process can equip students with the knowledge and skills necessary to contribute effectively to conservation efforts. In addition, the theoretical foundation of textbooks should cover a wide range of subjects such as landscape ecology, nuisance ecology, conservation biology, restoration ecology, ecological economics, ecological ethics, and ecological systems theory (Yang *et al*., 2015). This interdisciplinary approach ensures a holistic understanding of ecological systems and conservation practices, providing students with a comprehensive view of the complexities involved in wildlife conservation

To increase the effectiveness of teaching related to ecological concepts, it is important to consider innovative pedagogical approaches. Utilizing the main literature and adopting pedagogy such as the CREATE pedagogy can help teach the science process effectively in ecology courses (Smith & Paradise, 2022). In addition, integrating higher order thinking skills (HOTS) into textbooks through reading comprehension questions can improve learners' cognitive development and analytical abilities. By structuring questions based on Bloom's Taxonomy, educators can encourage students to think critically and apply their knowledge to solve complex ecological problems, thus fostering a deeper understanding of ecological concepts (Atiullah *et al*., 2019).

Thus, the conclusion that can be obtained is that the development of textbooks on animal ecology oriented towards wildlife conservation requires a multidisciplinary approach that integrates basic ecological principles with current conservation issues. By adopting innovative pedagogy, emphasizing higher-order thinking skills, and addressing environmental challenges through education, such textbooks can serve as valuable resources in promoting conservation literacy and sustainable practices among college students.

2. Student Involvement in Wildlife Conservation

The results showed that all students (100%) expressed a need for wildlife conservation materials and preferred printed textbooks for their practical field activities, indicating their level of awareness of the importance of engaging in wildlife conservation efforts. The integration of current environmental issues related to basic ecological concepts in textbooks with attractive illustrations can effectively increase students' awareness and involvement in wildlife conservation efforts. The development of textbooks that support problem-based learning in real-world contexts is expected to increase biodiversity literacy and environmental concern among students (Freund *et al*., 2019). Furthermore, education that integrates conservation education with course programs has been proven to equip learners with the knowledge, skills, and opportunities to actively support conservation efforts (Freund *et al*., 2019).

Wildlife conservation requires a comprehensive approach involving protected areas, ongoing monitoring, law enforcement, and community engagement to raise awareness and implementation of conservation initiatives (Lukas *et al*., 2017). In addition, engaging communities through education, training, and visitor activities or ecotourism activities can contribute significantly to wildlife conservation efforts (Hvenegaard & Kur, 2010; L. Fraser *et al*., 2016). Education and extension programs play an important role in maintaining ecological processes, restoring habitats, and improving wildlife habitats (Tanner, 2010). Actively engaging stakeholders in community-based conservation initiatives can encourage positive public participation in conservation efforts and the restoration of endangered species (Bernacchi *et al*., 2015; Miao *et al*., 2020).

Thus, in conclusion, integrating effective conservation education strategies, such as developing engaging textbooks and incorporating real-world problem-based learning, is expected to play an important role in increasing biodiversity literacy, environmental awareness, and active participation in wildlife conservation efforts among students.

Conclusion

Based on the results and discussion, the conclusions that can be drawn from this study are:

Lecturers stated that the learning approaches they use today, such as project-based learning, discussions, and case studies, still have shortcomings, especially in increasing student activity and completeness of field guides. As many as 100% of lecturers understand the importance of a learning approach oriented to wildlife conservation, and 70% of them have used textbooks in animal ecology learning. However, they feel that the textbooks currently available are not fully adequate, so they strongly support the development of new textbooks that are more innovative and relevant.

From the student side, the results of the questionnaire showed that 75% of students had used the available textbooks and felt interested in the existing teaching materials. However, 100% of students expressed a need for wildlife conservation materials and preferred printed textbooks for ease of use in field practicum activities. They also showed a high interest in textbooks that specifically discussed wildlife conservation.

Overall, the study concludes that the development of animal ecology textbooks oriented towards wildlife conservation is urgently needed. The textbook is expected to improve students' conceptual understanding and practical skills in facing wildlife conservation challenges. A multidisciplinary approach, integration of actual conservation issues, and use of innovative learning methods are expected to support more effective and relevant learning for a sustainable future.

Suggestion

The suggestion after the implementation of this research is the next stage of developing animal ecology textbooks oriented towards wildlife conservation based on the results of the needs analysis that has been carried out. After development, the textbook was piloted at several universities to measure its effectiveness in increasing students' understanding and engagement in wildlife conservation. Evaluation can be done through surveys, interviews, and tests to get comprehensive feedback from lecturers and students.

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