Journal of the Community Development in Asia (JCDA) Vol. 8 No. 2, pp. 302-322, May, 2025
E-ISSN: 2654-7279 P-ISSN: 2685-8819
https://www.ejournal.aibpmjournals.com/index.php/JCDA

Priorities of Flickingeria bicostata (J.J.Sm) Orchid Management Strategy in KHDTK Mungku Baru Using SWOT and AHP Approaches

Kamaliah[1,2*], Yudi Firmanul Arifin[2], Zainal Abidin[2], Mufidah Asyari[2]
[1]University of Muhammadiyah Palangka Raya, Palangka Raya City, Central Kalimantan 73111, Indonesia
[2]Lambung Mangkurat University, Banjarbaru City, South Kalimantan 70714, Indonesia
*Corresponding Email: kamaliahchua@gmail.com

ARTICLE INFORMATION

Publication information

Research article

HOW TO CITE
Kamaliah, K., Arifin, Y. F., Abidin, Z., & Asyari, M. (2025). Priorities of Flickingeria bicostata (J.J.Sm) Orchid management strategy in KHDTK Mungku Baru using SWOT and AHP approaches. *Journal of the Community Development in Asia*, *8*(2), 302-322.

DOI:
https://doi.org/10.32535/jcda.v8i2.3825

Received: 17 March 2025
Accepted: 19 April 2025
Published: 20 May 2025

ABSTRACT

Flickingeria bicostata (J.J.Sm) is a wild orchid species found abundantly in the Special Purpose Forest Area (KHDTK) of Mungku Baru, Central Kalimantan. Despite its significant economic potential, it has not received enough attention in research and sustainable management planning. Currently traded in ornamental plant markets without clear management strategies, the species is at risk of overexploitation. This study aims to formulate management priorities using SWOT and AHP approaches, balancing conservation with economic potential. It uses a qualitative approach, with data collected through questionnaires and in-depth interviews. Respondents were selected purposively based on their involvement in managing KHDTK Mungku Baru. The research identified four main strategic priorities: forest patrols for monitoring KHDTK Mungku Baru (Strategy 1, 17%), engaging local communities in collaborative efforts (Strategy 2, 21.3%), formulating climate change-related management policies (Strategy 3, 23.9%), and promoting orchid conservation strategies (Strategy 4, 37.8%). In conclusion, *Flickingeria bicostata* requires sustainable management strategies, focusing on forest patrols, community involvement, climate change policies, and conservation efforts. The practical implications suggest the need for community-based management policies and enhanced monitoring.

Keywords: AHP; KHDTK Mungku Baru; Orchid; Palangka Raya; Strategy; SWOT

INTRODUCTION

Special Purpose Forest Areas (KHDTK) are forest zones designated by the government to support public interests, including research, education, training, and religious or cultural activities (Susantoa et al., 2020). One such area is the Mungku Baru KHDTK in Central Kalimantan, managed by Universitas Muhammadiyah Palangkaraya as an Educational Forest. According to the Decree of the Minister of Forestry No. 611/Menhut-II/2014, this forest is part of a Permanent Production Forest covering approximately 4,910 hectares. It encompasses two primary ecosystem types, peat swamp forest and heath forest (kerangas), each with distinct ecological characteristics and rich biodiversity (Purnama & Afitah, 2021).

Among the significant plant groups in the Mungku Baru KHDTK is the orchid family (*Orchidaceae*), one of the most diverse plant families globally, with around 28,000 known species (Christenhusz & Byng, 2016). Indonesia is home to roughly 5,000 to 6,000 orchid species, many of which are found in Kalimantan and Papua (Sugiyarto et al., 2016). Preliminary field observations have identified several orchid species in the area, including *Coleogyne peltastes*, *Flickingeria bicostata (J.J.Sm)*, and *Grammatophyllum*, which are ecologically and economically valuable. *Flickingeria bicostata*, an epiphytic orchid endemic to Kalimantan, features unique floral traits and blooms year-round. Despite its abundance and commercial interest, there has been limited scientific study on its conservation and management potential.

The orchid management potential in KHDTK Mungku Baru presents significant opportunities for both conservation and commercial development. However, several challenges persist, such as habitat degradation due to human activities and unpredictable rainfall that may affect orchid growth. Therefore, strategic approaches are necessary to evaluate both internal and external factors influencing orchid management and to establish appropriate priority strategies. This research aims to formulate a conservation management strategy for *Flickingeria bicostata* within the Mungku Baru KHDTK. A lack of comprehensive data on species presence and distribution remains a major constraint, even though such information is essential for effective biodiversity conservation and sustainable resource utilization. This study is expected to support the development of forest management policies that balance conservation efforts, economic use, and the ecological integrity of Kalimantan's tropical forests.

The strategy of orchid management potential in KHDTK Mungku Baru has great potential for orchid management, both conservation and commercial. KHTDK Mungku Baru has huge potential, so orchid management in this region still faces various challenges. One of them is habitat destruction due to human activities, and changes in rainfall that can interfere with orchid growth. Therefore, a strategic approach is needed that can analyze internal and external factors that affect orchid management and determine the right strategic priorities.

This research is highly significant in developing a management strategy for the sustainability of *Flickingeria bicostata* orchid habitats, which are an essential component of the ecosystem in the KHDTK Mungku Baru area. By formulating a management strategy that ensures the long-term sustainability of orchid habitats, this study addresses the challenges of environmental management by integrating ecosystem conservation with active participation from local communities. This is especially important in the face of growing threats such as climate change, land degradation, and increasing pressure on natural resource use. The novelty of this study lies in its integrated approach, which combines orchid conservation with socio-economic strategies. It introduces a balanced model between ecosystem preservation and sustainable use, a perspective that has

rarely been explored for orchid species in tropical forest areas. Furthermore, the inclusion of community involvement and climate change mitigation within the management plan offers a new direction for adaptive conservation practices. This study makes a significant contribution to conservation management by offering a comprehensive strategy for the sustainability of *Flickingeria bicostata* habitats in KHDTK Mungku Baru. Its practical recommendations include forest monitoring and surveillance activities, community-based conservation efforts, and adaptive management practices that consider both ecological and climate-related factors. The proposed strategy serves as a replicable model for similar conservation efforts in other regions facing comparable biodiversity and ecosystem management challenges.

LITERATURE REVIEW

Law No. 41 of 1999 on Forestry, particularly Article 8, has provided a space for activities such as research, development, education, training, as well as religious and cultural activities through the establishment of KHDTK. KHDTK can be designated in conservation, protection, or production forest areas without altering their primary functions. Its establishment is done through a Ministerial Decree. KHDTK reflects a variety of ecosystems, habitats, climates, and soil types, making it possible to study various technical and socio-economic aspects of forest management, such as silviculture, soil and water conservation, nature preservation, and forest protection, including growth rates. The natural vegetation and tree collections within KHDTK have great potential to support breeding, cultivation, and both in situ and ex-situ conservation programs. Additionally, KHDTK can also be used for various research activities, trials, and the development of demonstration models aimed at formulating sustainable forest management systems involving local communities (Petrus et al., 2021).

Central Kalimantan is one of the provinces in Indonesia on the island of Kalimantan with a population of around 2.5 million people. The area is approximately 15.4 million hectares, 13.0 million hectares are forests, and 2.7 million hectares are peatlands (Sundari et al., 2025). Regulations regarding the area of Central Kalimantan's forests are regulated in a Ministerial Decree of the Environment and Forestry No. SK.9246/MENLHK-PHPL/KPHP/HPL.0/12/2018 dated 31 December 2018 concerning an indicative map of the direction of production forest utilization permits are not burdened for forest utilization (Syahza et al., 2021).

The Palangkaraya Muhammadiyah University Educational Forest is located in Mungku Baru Village, Rakumpit District, Palangka Raya City. It is located from Palangka Raya City ± 70 KM, reached by land and water transportation. Educational Forest Status has the Minister of Forestry Decree Number 611/MenhutII/2014 dated July 8, 2014, concerning the designation of KHDTK as Educational Forests in permanent Production Forest areas in Palangka Raya City, with an area of ± 4,910 Ha. KHDTK Mungku Baru has several types of areas, such as peat swamp forests and heathlands, with quite high levels of biodiversity, both vegetation and animals (Purnama & Afitah, 2021).

KHDTK Mungku Baru has several types of forest, namely peat swamp forest and heathland forest, each of which has different characteristics. The peat swamp forest in KHDTK Mungku Baru is a forest with wetlands that are almost always flooded, usually located on river embankments. This forest is dominated by soil that develops from piles of organic material, better known as peat soil. The landforms that form domes are usually located between two large rivers. Peat swamps cover a very large area in the lowlands of Kalimantan, with estimates varying between 8% and 11% (Petrus et al., 2021). Habitats towards peat domes are often mentioned as deep peat forests with lower vegetation diversity. Other habitats are located in peat domes and are usually called

forest fields with very little vegetation diversity, namely, consisting only of small trees with a low level of density. The Kerangas Forest in KHDTK Mungku Baru is a forest with dry land where the condition of the forest floor is sandy and poor in nutrients, rainwater is absorbed quickly, so that the capacity of plants to bind water in the roots is relatively small. The types of trees that grow in the Kerangas Forest, KHDTK Mungku Baru, are dominated by the sapling growth rate, and most of the family members are *Dipterocarpaceae*. Kerangas Forest has special vegetation composition characteristics; the trees appear short and thin, different from lowland mixed forests in general. The plants in the Kerangas forest are physiologically adapted, namely by adapting to the morphology of the Kerangas forest vegetation, which is small and uniform, and the leaves are shiny and small. The plant vegetation in KHDTK Mungku Baru includes a variety of trees and non-timber forest products such as medicinal plants, resin, orchids, and others.

Based on the vegetation in KHDTK Mungku Baru, researchers want to increase non-timber forest products, especially orchids. According to Christenhusz and Byng (2016), taxonomically, orchids are grouped into tribes *Orchidaceae* or the tribe Orchidaceae, which is one of the types of plant groups with the highest level of diversity in the world. At least, there are 28,000 known types of orchids belonging to 763 genera. Indonesia as a country with megabiodiversity has a wealth of orchid species predicted to reach 5,000-6,000 species and Kalimantan and Papua are estimated to have the highest number of orchids, namely 2,500-3,000 species, while in Sumatra ± 900 species and Java ± 700 species, so with relatively high economic potential (Sugiyarto et al., 2016). As for the results of field observations, the types of orchids at KHDTK Mungku Baru are orchids *Acriopsis densiflora* Lindl*, Bulbophyllum brienianum, Broomhedia reinwardtiana, Bulbophyllum dentiferum* Ridtl*, Bulbophyllum sheathum, Coleogyne miniata (BI)* Lind*, Cymbidium atropurpureum* Lind*, Cymbidium dayanum, Cymbidium finlaysonianus, Dendrobium incinnum* friends*, Dendrobium pinifalium* Ridtl*, Dendrobium uniflorum, Eria monostachya, Eria multiflora, Eria javanicum, dan Trixspermum centipeda.*

Orchid plants have two benefits, namely ecological and economic benefits. Ecologically beneficial, native orchid species growing in forest ecosystems are also categorized as germplasm sources of biodiversity (Nugroho et al., 2018). In nature, orchids have a symbiotic, mutualistic relationship with insects. Orchids cannot pollinate themselves, so orchids need insects for the pollination process, and insects get pollen from orchid flowers (Mamonto et al., 2013). Meanwhile, for economic benefits, orchids are non-timber forest products (NTFPs) which people use as ornamental plants because of their beautiful flower shape and attractive colors. So, orchids have a high selling value in the world of trade. Apart from that, orchids can also be used as traditional medicine and cosmetics (Mardiyana et al., 2019). In Europe, orchid flowers are used as a mixture in making perfume because the flowers have a distinctive aroma.

SWOT analysis is a systematic approach to evaluating internal factors, including strengths and weaknesses, as well as external factors such as opportunities and threats faced by an organization. This process aims to identify various factors in a structured manner to formulate the most appropriate and effective management strategies. The analysis involves a deep understanding of both internal and external factors to determine the necessary strategic steps (Darmanto, 2017). The goal of SWOT analysis is to evaluate the internal and external conditions of a company, to understand its position in the market, and to assess the company's ability to carry out planned activities that will enable it to compete with other companies (Kurttila, Kangas, et al., 2000).

The Analytical Hierarchy Process (AHP) is a decision support model that breaks down complex multi-factor or multi-criteria problems into a hierarchical structure (Enyinda et

al., 2023). The hierarchy is defined as a representation of a complex problem in a multi-level structure, where the first level represents the objective, followed by levels for factors, criteria, sub-criteria, and eventually the alternatives at the bottom. In other words, AHP is a decision-making technique that uses multiple criteria and alternatives in the decision-making process (Darmanto, 2017).

AHP is often preferred as a problem-solving method compared to other techniques for several reasons, as noted by Setyaningsih et al. (2022). It has a hierarchical structure that extends from the selected criteria down to the deepest sub-criteria. b. It takes into account the validation of inconsistencies within the chosen criteria and alternatives, ensuring decisions meet a tolerance threshold. c. It evaluates the robustness of the decision-making process through a sensitivity analysis of the results. The primary objective of AHP is to solve complex or unstructured problems where statistical information is limited. It helps bridge the gap between rationality and intuition, allowing decision-makers to choose the best alternative from a set of evaluated options based on several criteria. The hierarchical process builds concepts and defines the problem by making assumptions and obtaining solutions from them (Sahani, 2021).

The Mungku Baru KHDTK management strategy needs to be implemented to maintain the integrity of the habitat and biodiversity, and can provide positive benefits to the quality of life of the surrounding community. Sustainable management of an area must pay attention to the ecological, economic, and social balance of society. Efforts to manage sustainably often experience difficulties because data and information are not sufficient as a basis for management. One of them is data regarding the existence of orchid plant species. The types of orchids in KHDTK Mungku Baru are biological natural riches that really need to be expressed as the supporting capacity of the area, as well as supporting research activities, area development, and conservation of natural resources.

RESEARCH METHOD

This study was conducted from June to September 2024 in the Rakumpit District, specifically in Mungku Baru and Bukit Sua Villages, involving both government and private sector stakeholders. The instruments used were questionnaires and interviews. Data collection for strategy analysis was carried out through field observations and interviews. Observations were conducted through direct visits to examine the physical conditions of the area, community activities, and the locations involved (Utomo et al., 2017). Respondents were selected from Mungku Baru and Bukit Sua Villages, which are directly adjacent to the Special Purpose Forest Area (KHDTK). The number of respondents was determined using Slovin's formula.

Interviews were conducted using a prepared questionnaire and complemented by in-depth interviews. A purposive sampling technique was applied to select respondents based on specific criteria. This method ensured that samples were proportionally taken from different areas, taking population size into account to provide adequate representation of the community.

$$\mathrm{n} = \frac{\mathrm{N}}{1 + N.e^2}$$

Description:
N: Sample size
N: Total population
e: Margin error (5%)

The interviews involved stakeholders related to the KHDTK Mungku Baru, including the Sustainable Forest Management Unit Region X (KPHL X), the Environmental Agency of Palangka Raya City, Muhammadiyah University of Palangka Raya, and the Borneo Nature Foundation (BNF).

The data analysis method used was the formulation of management strategies for the sustainability of the orchid habitat in KHDTK Mungku Baru through a SWOT analysis. Data sources included the local community and government agencies in Palangka Raya. The SWOT analysis aimed to determine the strategic position, whether it falls under S-O, S-T, W-O, or W-T categories. This analysis was carried out descriptively using a qualitative SWOT approach (Strengths–Weaknesses–Opportunities–Threats).

The analysis steps were divided into two main categories: internal and external factors. These factors were identified through interview-based surveys. The Internal Factor Evaluation (IFE) assessed the strengths and weaknesses affecting the potential of the orchid habitat in KHDTK Mungku Baru. Meanwhile, the External Factor Evaluation (EFE) evaluated the opportunities and threats from outside the area. The weighting process was conducted based on the identification of internal and external strategic factors as outlined by Wardoyo (2011) (see Tables 1 and 2).

Table 1. Identify Internal and External Factors

No	IFE and EFE
A	Internal Factors (IFE)
1	Power Factor - …… - ……
2	Weal Factors - …… - ……
B	External Factors (EFE)
1	Opportunity Factors
	- …….. - ……...
2	Threat Factors - …… - ……

Table 2. Matrix IFAS – EFAS

No	IFE and EFE	Weight	Rating	Score
A	Internal Factors (IFE)			
1	Power Factors - …… - ……			
2	Weak Factors - …… - ……			
Total				
B	External Factor (EFE)			
1	Opportunity Factors			
	- …….. - ……...	-	-	-
2	Threat Factors - …… - ……			

Journal of the Community Development in Asia (JCDA) Vol. 8 No. 2, pp. 302-322, May, 2025
E-ISSN: 2654-7279 P-ISSN: 2685-8819
https://www.ejournal.aibpmjournals.com/index.php/JCDA

Total	

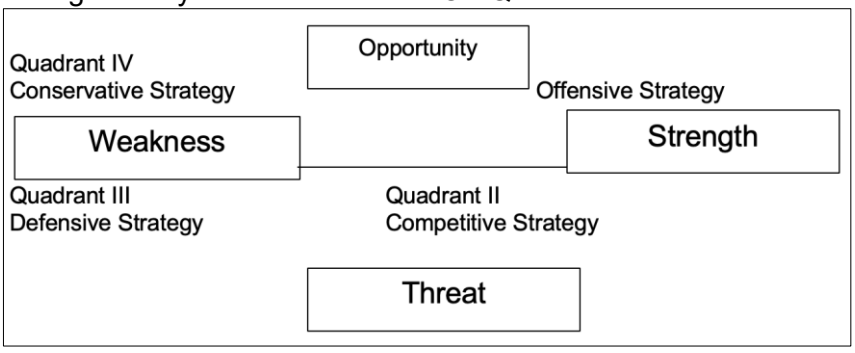
The grand strategy matrix analysis is to sharpen the strategy to be applied (Yusuf et al., 2020). The grand strategy matrix is used to find out the position of the next direction of development. The data used is the difference between the number of internal factor scores (strengths-weaknesses) and the number of external factor scores (opportunities-threats). Strategic policy positions can be grouped into four alternative formulations (Wardoyo, 2011), detailed in Table 3.

Table 3. Formulation of Alternative Strategies

Internal Factors	Strength	Weakness
External Factors	Identify the factors of strength	Identify the factors of weakness
Opportunity Identify opportunity factors	SO strategy (alternative) Strategies that use power to capitalize on opportunities	WO Strategy (Alternative) Strategies that minimize weaknesses to take advantage of opportunities
Threat Identify threat factors	ST Strategy (Alternative) Strategies that use force to overcome threats	WT strategy (alternative) Strategies that minimize weaknesses and address threats

The grand strategy matrix is a matching stage in the strategy formulation process that will produce alternative development strategies. The grand strategy matrix has four quadrants that represent the state of a company. Graphically, the SWOT analysis is shown in Figure 1.

Figure 1. Strategic Policy Position in the SWOT Quadrant

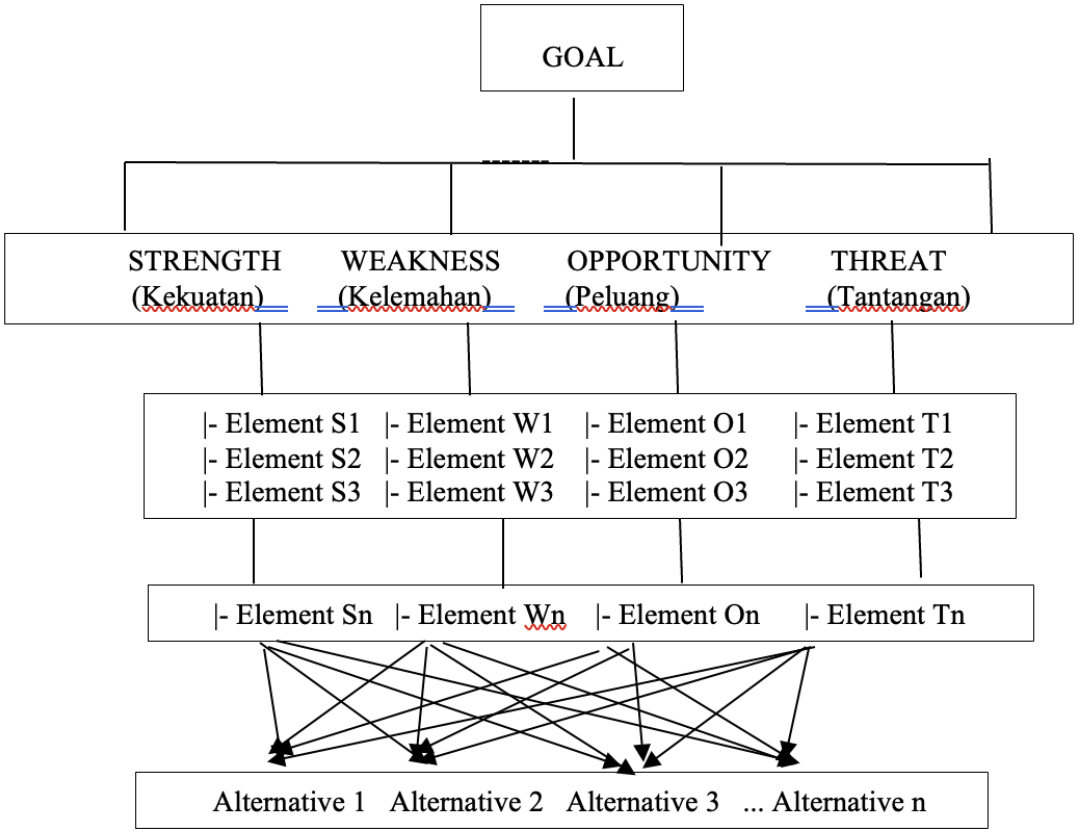


The analysis of the management strategy of KHDTK Mungku Baru orchids was carried out by SWOT-AHP analysis. The SWOT-AHP model is a model that combines SWOT analysis into AHP (Kurtilla, Pesonen, et al., 2000). SWOT analysis consists of analyzing strengths, weaknesses, opportunities, and threats, and is one of the tools to analyze internal and external conditions with a systematic approach to making decisions. The AHP is a theory of measurement through paired comparisons and depends on the judgment of experts to determine the priority scale (Saaty, 2008). To make comparisons, a numerical scale is needed that shows the importance of one element to another.

The stages in this study are (1) identify stakeholders involved in decision-making, (2) classification of critical factors that affect decisions, and (3) evaluate the factors in each group using the SWOT-AHP method (see Figure 2).

Figure 2. SWOT-AHP Hierarchy Diagram

Journal of the Community Development in Asia (JCDA) Vol. 8 No. 2, pp. 302-322, May, 2025
E-ISSN: 2654-7279 P-ISSN: 2685-8819
https://www.ejournal.aibpmjournals.com/index.php/JCDA



RESULTS

The results of the strategy formulation in this study are divided into two stages, namely: (1) Stages of policy strategy formulation with a SWOT approach; and (2) Stage of determining strategy priority with the AHP approach.

The stage of determining the priority of the strategy, which is used as an alternative to strategy research in AHP, is the result of the strategy obtained from the analysis of the spatial matrix. The strategy in the resulting space matrix is used as an alternative strategy in AHP, with the consideration that these conditions describe the situation faced.

Internal and External Factors

Internal factors in research activities on orchid habitat conservation management strategies in KHDTK Mungku Baru are as follows:

Strength

The Number of Species Found is Quite High

The number of orchids found in this study was around 630 individuals, which can reflect high biodiversity, which is an important indicator of environmental health. The discovery of a fairly high number of species often indicates that the ecosystem has conditions that support the growth and survival of various organisms. According to one study, high species diversity not only contributes to ecosystem stability but also increases resilience to environmental changes (Petrus et al., 2021). Areas such as Central Kalimantan, which is rich in biodiversity, have enormous potential for species research and conservation. According to Petrus et al. (2021), tropical forests in Borneo have more than 15,000 species of plants and diverse fauna, making it one of the biodiversity hotspots in the

world. The existence of this high number of species also shows the importance of habitat conservation to maintain the sustainability of the ecosystem.

Orchids Have Economic Value in the Local Market as Ornamental Plants
Orchids have significant economic value in the local market as an ornamental plant, thanks to their beauty and diversity of species that appeal to plant enthusiasts. Hanafi et al. (2017) stated that the demand for orchids in the local market is increasing, especially among hobbyists and landscapers, who see orchids as a symbol of status and beauty.

In addition, orchid marketing also supports the local economy, creating business opportunities for farmers and traders. According to a study by Juriyah et al. (2024), Forest and land management in the communities surrounding KHDTK Mungku Baru should be carried out using a local wisdom-based approach that respects the traditional knowledge and practices of local people. In this context, the utilization of orchid cultivation presents itself as a relevant and promising strategy. Orchid cultivation not only supports the conservation of biodiversity but also has the potential to increase farmers' income, as it offers higher profit margins compared to other ornamental plants. Therefore, developing orchid-based enterprises rooted in local wisdom contributes not only to ecosystem conservation but also provides significant economic benefits for the surrounding communities.

Playing a Role in Environmental Conservation Activities
Orchids play an important role in environmental conservation activities, as many orchid species are endangered due to habitat loss and overexploitation. Yuliastuti et al. (2024) showed that conservation programs involving orchid cultivation can help conserve rare species while increasing public awareness of the importance of biodiversity conservation. In addition, orchids also contribute to maintaining the balance of the ecosystem through their role as pollinators for various insect species. According to Petrus et al. (2021), the presence of orchids in ecosystems can support complex ecological interactions and contribute to the overall health of ecosystems. Therefore, orchid conservation efforts are not only important to protect the species itself, but also to maintain the integrity of the environment.

Legality of KHDTK Mungku Baru
The legality of the Mungku Baru KHDTK is important in the context of forest resource management and environmental sustainability. The determination of the Mungku Baru KHDTK in Palangka Raya City by the central government, by issuing the SK Menhut RI No. SK. 611/Menhut-II/2014 and in 2021-2022, the Mungku Baru KHDTK boundary planning activity was carried out by the Palangka Raya City Government, and UMPR Management facilitated by BNF. Based on Syahza et al. (2021), KHDTK is recognized as an area designated for research, education, and responsible development of forest resources. The legality of the Mungku Baru KHDTK not only provides legal protection for the forest area but also creates a clear framework for collaboration between the government, communities, and research institutions in efforts to conserve and manage the forest sustainably. With clear regulations, the management of the Mungku Baru KHDTK is expected to encourage more in-depth research and effective conservation practices.

Weakness
Orchids are Difficult to Cultivate
Orchid cultivation is often considered difficult due to the specific needs of these plants, including environmental conditions, growing media, and careful care. Orchids require proper temperature, humidity, and light settings for optimal growth, which is often difficult to achieve, especially in areas with unfavorable climates. In addition, orchids are also

susceptible to various diseases and pests, which makes the cultivation process more complex. Agus and Subiksa (2008) stated that challenges in orchid cultivation include pest and disease control that requires special knowledge and skills, as well as the application of appropriate cultivation techniques. This difficulty can result in a low success rate in orchid cultivation, especially for the novice community.

Lack of Human Resources
The lack of trained human resources (HR) in orchid cultivation is one of the main obstacles in the development of this ornamental plant industry. The lack of knowledge and skills among the orchid community and orchid entrepreneurs leads to low productivity and quality of the crops produced. Additionally, inadequate training and education for the orchid community contribute to difficulties in managing plants effectively, including pest and disease control and proper care techniques. According to an analysis by Maria et al. (2023), increasing human resource capacity through structured training and education programs is essential to increase the success of orchid cultivation and encourage local economic growth.

The Cost of Orchid Cultivation is Quite High
The cost of orchid cultivation is quite high, which is one of the challenges for orchid entrepreneurs in developing this business sustainably, including the cost of purchasing seeds, planting media, and other equipment, which can be a barrier for new orchid entrepreneurs who want to enter orchid cultivation. In addition, the operational costs associated with maintenance, including temperature and humidity regulation, as well as pest and disease control, also add to the financial burden.

A Thorough Inventory Has Not Been Carried Out
A thorough inventory of orchid resources has not been carried out, which hampers efforts to effectively manage and conserve this species. Without accurate data for orchid diversity and distribution, it becomes difficult to formulate the right conservation strategy. In addition, there is also a lack of inventory, which results in a lack of understanding of the economic potential of orchids in an area. A comprehensive inventory is urgently needed to support the development of sustainability-oriented policies and the optimal use of orchid resources. Without this step, many orchid species may be threatened because there are no adequate protection efforts.

The implementation of policies or regulations on orchid management strategies in KHDTK Mungku Baru involves several government agencies. The results of observations and interviews on the implementation of orchid management strategy activities external factors produce opportunities, namely tissue culture technology to multiply orchid plants, orchid derivative products such as ornamental plants, cosmetics, and medicines can provide economic added value, the potential for the development of arboretums in KHDTK Mungku Baru, and the potential of the orchid market. Meanwhile, the threat from the results of this study is that changes in temperature and rainfall patterns can interfere with the growth of orchids, and the community and miners around the Mungku Baru KHDTK can damage the habitat of orchids.

Strategy Analysis from the Value of Internal and External Factors
The study's results show that the influence of internal and external factors on orchid management strategy activities in KHDTK Mungku Baru can be known through the analysis of each factor. The results of the analysis of internal and external factors are presented in Tables 4 and 5.

Table 4. Factor Internal Analysis of Orchids Management Strategy in KHDTK Mungku Baru

F I Strenght	Weight	Rating	Score
The number of species found is quite high	0.27	4	4
Orchids have economic value in local market as ornamental plants	0.27	3	4
Playing a role in environmental conservation activities	0.20	4	3
Legality of KHDTK Mungku Baru	0.27	4	4
Total	1	15	15
F I Weakness	Weight	Rating	Score
Orchids are difficult to cultivation	0.17	2	2
Lack in human resources	0.25	3	3
The cots of orchids cultivation is quite high	0.25	3	3
A thorough inventory has not been carried out	0.33	3	4
Total	1	11	12

Source: Processed Primary Data (2024)

Table 5. Factors External Analysis of Orchids Management Strategy in KHDTK Mungku Baru

F E Opportunity	Weight	Rating	Score
Tissue culture technology to propagate orchid plants.	0.24	3	4
Derivative products from orchids such as ornamental plants, cosmetics, and medicines can provide added economic value.	0.24	3	4
Potential for arboretum development in KHDTK Mungku Baru	0.29	4	5
Orchid Market Potential	0.24	3	4
Total	1	13	17
F E Threats	Weight	Rating	Score
Changes in temperature and rainfall patterns can interfere with the growth of orchids.	0.50	3	4
The community and miners around the Mungku Baru KHDTK can damage the orchid habitat.	0.50	4	4
Total	1	7	8

Source: Processed Primary Data (2024)

Space Matrix Analysis

The analysis of the rawang matrix in this study used data on the difference between the number of internal factor scores (strengths-weaknesses) and the difference between the number of external factors (opportunities–threats). The data from the calculation of this study can be seen in Table 6.

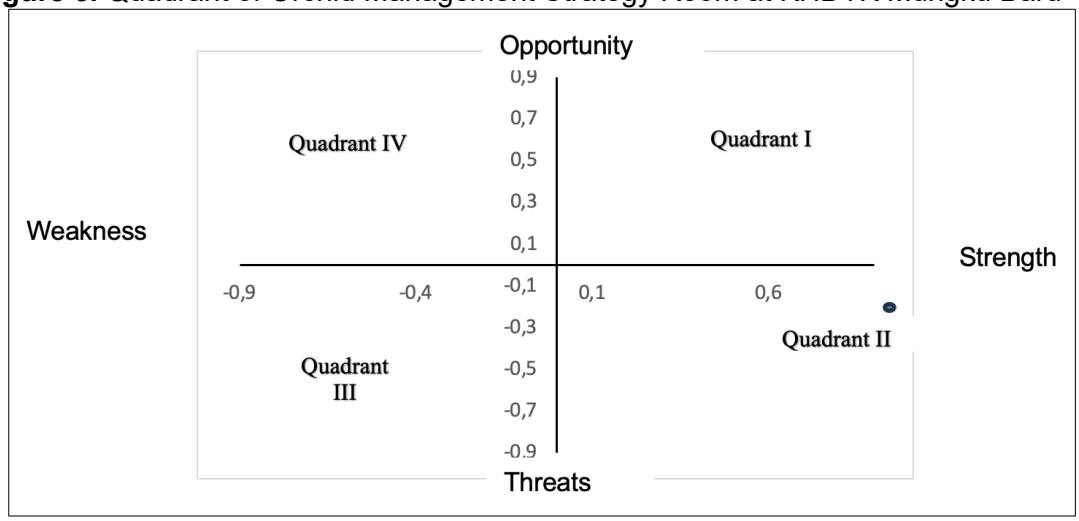
Table 6. The Different Values of the Internal and External Factors

Factors	Value	Difference
Strength-Weakness	3.73-2.83	0.90
Opportunity –Threats	3.29-3.50	-0.21

The difference value in the space quadrant (space diagram), with the difference value of the internal factor input as the X axis, and the difference value of the external factor input as the Y axis, so that the space quadrant as shown in Figure 3 is obtained.

Journal of the Community Development in Asia (JCDA) Vol. 8 No. 2, pp. 302-322, May, 2025
E-ISSN: 2654-7279 P-ISSN: 2685-8819
https://www.ejournal.aibpmjournals.com/index.php/JCDA

Figure 3. Quadrant of Orchid Management Strategy Room at KHDTK Mungku Baru



The results of the estimation of internal factors (strengths-weaknesses) and external factors (opportunities-threats) show that the position of the orchid management strategy in the Mungku Baru KHDTK is in quadrant II. This condition is a situation that presents a position facing various threats, yet still possesses several strengths. Policy strategies that can be applied include utilizing and maximizing their strengths to mitigate existing threats. An alternative strategy prioritized in the use of AHP is the one located in quadrant II. The results of this study's SWOT analysis are presented in Table 7.

Table 7. Matrix SWOT Analysis

	Strength	Weakness
	1. The number of species found is quite high 2. Orchids have economic value in the local market as an ornamental plant 3. Playing a role in environmental conservation activities 4. Legality of KHDTK Mungku Baru	1. Orchids are difficult to cultivate 2. Lack in human resources 3. The cost of orchid cultivation is quite high 4. A thorough inventory has not been carried out
Opportunity	Strategy S-O	Strategy W-O
1. Tissue culture technology to propagate orchid plants. 2. Orchid derivative products such as ornamental plants, cosmetics, and medicines can provide economic added value. 3. Potential for aboretum development at KHDTK Mungku Baru 4. Orchid market potential	1. Development of tissue culture technology for orchid sustainability (O1, S1) 2. Development of orchid derivative products for economic diversification (O2, O3, S2) 3. Development of the arboretum as an educational and ecotourism destination (O3, S3, S4)	1. Increasing economic value through exports and local markets (O1, W1) 2. Collaboration with external parties to develop derivative products (O2, W2, W3) 3. Developing an arboretum to increase human resource capacity (O3, W2, W3) 4. Comprehensive inventory of KHDTK Mungku Baru (W4)

	4. Increasing economic value through exports and local markets (O1, O4, S1, S4)	
Threat	Strategy S-T	Strategy W-T
1. Changes in temperature and rainfall patterns can interfere with the growth of orchids. 2. The community and miners around the Mungku Baru KHDTK can damage the habitat of orchids	1. Forest patrol activities for monitoring and supervision of KHDTK Mungku Baru (S4, T2) 2. Collaboration with the community (S2, S4, T2) 3. Development of Mungku Baru KHDTK management policy for climate change mitigation (S3, S4, T1) 4. Development of adaptive conservation for orchids (S1, S3, T1)	1. Collaboration with partners for training activities, human resource improvement and orchid cultivation (T1, T2, W2, W3) 2. Environmental education and conservation activities (T2, W2) 3. Research on orchid adaptation due to climate change (T1, W1, W4)

Source: Processed Primary Data (2024)

The management strategy implemented based on the SWOT analysis falls within the ST strategy quadrant, which utilizes power to overcome threats. The priority of the orchid plant management strategy in the Mungku Baru KHDTK is in the ST quadrant, and this strategy is prepared using the AHP method. Decision-making systems are a scientific branch in the field of artificial intelligence that is part of computer-based information systems.

Sahani (2021) stated that the implementation of the decision-making system cannot stand alone but must also apply algorithms that support decisions that will be the final result of the program. In its application, this decision preparation system uses the AHP algorithm. AHP is a general theory of measurement used to find ratio scales, both from discrete and continuous pairs of comparisons. The AHP method is considered to be able to break down something unstructured into its components, give numerical value to subjective considerations about the relative importance of each variable, arrange the parts or variables in a hierarchical arrangement, and synthesize as a consideration to determine which variables have the highest priority and act to influence a situation (Darmanto et al., 2017).

A structure or hierarchy is built to give priority to the criteria used. The main hierarchy is the goal/goal to be achieved or the solution of the problem being studied. The second hierarchy is the criterion that all alternatives must meet in order to be worthy of being an ideal choice. The third hierarchy is a sub-criterion that is part of the criteria that all alternatives must meet. The fourth hierarchy is an alternative or problem-solving option. The structure of the decision preparation results of this study uses the AHP method and is intended to assist in decision-making to determine the choice of orchid management strategy in KHDTK Mungku Baru. In its determination, there are six criteria, namely habitat management and protection, ecology, inventory and monitoring, collaboration and partnership, and economic development. The sub-criteria of this research are the effectiveness of the management plan, the availability of funds and human resources, law enforcement, area management, environmental conditions, pollution and pollution, inventory data, monitoring programs, technology use, institutional partners, local communities, private partners, derivative products, and the potential for the development of the arboretum. Then the alternatives to this research are strategy 1, strategy 2,

strategy 3, and strategy 4. The determination of the preparation of the AHP method as a result of this study is based on the results of the strategy obtained in the space matrix which is an overview of the orchid management conditions in the Mungku Baru KHDTK, the space matrix obtained is in quadrant II which faces a number of threats but still has strength. The hierarchy used in orchid management in KHDTK Mungku Baru can be seen in Table 8.

Table 8. Decision Level of Data Classification

Level of Objective	Level of Criteria	Level of Sub Criteria	Alternative Levels
Orchid management at KHDTK Mungku Baru	Habitat management	Effectiveness of management plans	S1, S2, S3, S4
		Availability of funds and human resources	
	Habitat Protection	Law enforcement	S1, S2, S3, S4
		Area management	
	Ecology	Environmental conditions	S1, S2, S3, S4
		Pollution	
	Inventory and monitoring	Inventory data	S1, S2, S3, S4
		Program monitoring	
		Use of technology	
	Collaboration and partnership	Institutional Partners	S1, S2, S3, S4
		Local communities	
		Private partners	
	Economic Development	Derivative products	S1, S2, S3, S4
		Potential development of the arboretum	

Based on the results of the data analysis, input the data and run the software using the AHP application. Before entering the data, the researcher determines the priorities first, then determines the feasibility of the results of the factors obtained by measuring the level of consistency. In the end, the alternative with the highest number of scores was chosen as the best alternative. The weighting and calculation of factors in each criterion and subcriterion of the orchid management strategy in KHDTK Mungku Baru is carried out by several government agencies, managers of KHDTK Mungku Baru, and orchid experts, as shown in Table 9.

Table 9. Relationship Between Criteria and Subcriteria

Criteria	Weight	Sub Criteria	Weight	Global Weight
Habitat Management	0.132	Effectiveness of management plans	0.562	0.074
		Availability and Human Resource	0.438	0.058
Habitat Protection	0.215	Law enforcement	0.557	0.120
		Area management	0.443	0.095
Ecology	0.151	Environmental conditions	0.557	0.084
		Pollution	0.443	0.067
Inventory and Monitoring	0.104	Data Inventory	0.298	0.031
		Program monitoring	0.516	0.053
		Use of Technology	0.187	0.019
Collaboration and Partnership	0.145	Institutional partners	0.185	0.027
		Local communities	0.418	0.061
		Private partnership	0.397	0.058

Economic Development	0.254	Derivative product	0.401	0.102
		Potential development of the arboretum	0.599	0.152

Source: Processed Primary Data (2024)

The analysis at the criteria level indicates that habitat protection holds the highest priority value of 0.215, signifying that this aspect is the most crucial element in the orchid management strategy in KHDTK Mungku Baru. In contrast, the inventory and monitoring criterion ranks the lowest with a value of 0.104, reflecting its relatively lower urgency and impact compared to other criteria. On the other hand, the sub-criterion with the highest priority value, at 59.9%, is the potential for arboretum development, underscoring the importance of arboretums as strategic tools for enhancing environmental quality. The development of arboretums contributes to the optimization of green space, biodiversity enhancement, and the creation of a more sustainable ecosystem. This opportunity also presents economic added value, especially in research, education, and recreation. Moreover, derivative products from arboretums, such as non-timber forest products and ornamental plants, are also considered significant due to their potential to generate additional income that supports the financial sustainability of management efforts.

In terms of institutional aspects, the highest sub-criterion value of 56.2% is found in management plan effectiveness, indicating that the success of the management strategy heavily relies on thorough planning and proper implementation. This effectiveness includes the setting of clear objectives, efficient execution methods, and periodic evaluations to ensure alignment between plans and outcomes. The successful execution of these plans is significantly influenced by the availability of adequate funding and qualified human resources. Sufficient funding enables the optimal implementation of programs, including research activities, training, and facility maintenance. Meanwhile, competent human resources ensure that the designed strategies can be carried out effectively. The aspect of law enforcement also scores highly, at 55.7%, emphasizing the importance of regulatory clarity and legal certainty in safeguarding natural resources. Strong law enforcement minimizes the risk of violations, maintains the integrity of the area, and supports the effective management of conservation zones. Related sub-criteria, such as site management, are also highly relevant, as effective protection requires regulatory backing to prevent harmful activities such as illegal logging, pollution, or habitat destruction.

Environmental and social factors also play a pivotal role in resource management. A high priority value of 55.7% for the environmental condition sub-criterion highlights the importance of ecosystem quality, including air, water, soil, and biodiversity, as a fundamental element of sustainability. With a strong focus on environmental conditions, management efforts can prevent broader negative impacts on both ecosystems and local communities. The pollution and contamination sub-criterion supports this, as hazardous waste, water pollution, and air pollutants pose serious threats to human health and environmental quality. In terms of community participation, the role of local communities scoring 41.8% indicates that their involvement is vital. Their local knowledge and experience serve as valuable assets in planning and implementing conservation programs. Furthermore, partnerships with private sector actors and non-governmental institutions enrich the management approach by bringing in investment, innovation, and capacity building. Finally, the 51.6% value for the monitoring program highlights that systematic and continuous supervision is key to resource management. Effective monitoring allows managers to track environmental conditions, assess the impacts of implemented activities, and identify emerging issues early. Supporting sub-criteria such as inventory data and the use of technologies, including drones and sensors, play an essential role in developing data-driven policies, while also improving the accuracy and

efficiency of environmental monitoring efforts. Based on the results of the input data, the total evaluation value of the sub-criteria and alternative strategies in this study was obtained and can be seen in Table 10.

Table 10. Total Factor Evaluation

Sub Criteria	Strategy Alternative			
	S1	S2	S3	S4
Effectiveness of management plans	0.009	0.018	0.011	0.036
Availability and Human Resource	0.006	0.008	0.020	0.024
Law enforcement	0.037	0.029	0.027	0.027
Area management	0.013	0.035	0.028	0.019
Environmental condition	0.022	0.009	0.026	0.027
Pollution	0.028	0.016	0.011	0.013
Data inventory	0.003	0.004	0.012	0.012
Program monitoring	0.008	0.009	0.025	0.012
Use of technology	0.003	0.003	0.007	0.007
Institutional partnerships	0.002	0.006	0.008	0.011
Local communities	0.005	0.017	0.007	0.032
Private partnerships	0.004	0.011	0.018	0.025
Derivative product	0.011	0.021	0.016	0.053
Potential development of the arboretum	0.018	0.028	0.024	0.082

Source: Processed Primary Data (2024)

Based on the results of the ranking on alternative orchid management strategies in the Mungku Baru KHDTK in the sub-criteria of each alternative with a global weight, the result of multiplication between the weights is the weight of each criterion, with the weight of each sub-criterion can be seen in Table 11.

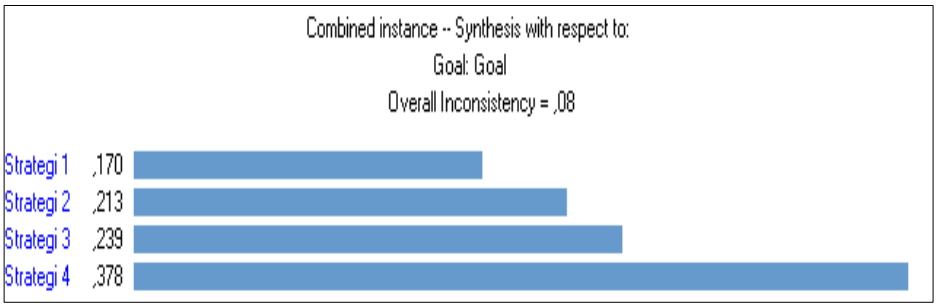
Table 11. Multiplication of the Total Weight Factor by the Evaluation Factor

Criteria	Sub Criteria	Global Weight	Strategy Alternative			
			S1	S2	S3	S4
Habitat Management	Effectiveness of management plans	0.074	0.009	0.018	0.011	0.036
	Availability and Human Resource	0.058	0.006	0.008	0.020	0.024
Habitat Protection	Law enforcement	0.120	0.037	0.029	0.027	0.027
	Area management	0.095	0.013	0.035	0.028	0.019
Ecology	Environmental condition	0.084	0.022	0.009	0.026	0.027
	Pollution	0.067	0.028	0.016	0.011	0.013
Inventory and Monitoring	Data inventory	0.031	0.003	0.004	0.012	0.012
	Program monitoring	0.053	0.008	0.009	0.025	0.012
	Use of technology	0.019	0.003	0.003	0.007	0.007
Collaboration and Partnerships	Institutional partnerships	0.027	0.002	0.006	0.008	0.011
	Local communities	0.061	0.005	0.017	0.007	0.032
	Private partnerships	0.058	0.004	0.011	0.018	0.025
Economic Development	Derivative product	0.102	0.011	0.021	0.016	0.053
	Potential development of the aboretum	0.152	0.018	0.028	0.024	0.082

Source: Processed Primary Data (2024)

The final results of the formulation of orchid management strategies in KHDTK Mungku Baru based on the order of priority at the alternative level can be seen in Figure 4.

Figure 4. Alternative Level Priority Values



Note: Strategy 1 = Forest patrol activities for monitoring and supervision of KHDTK Mungku Baru; Strategy 2 = Collaboration with the community; Strategy 3 = Development of Mungku Baru KHDTK management policy for climate change mitigation; Strategy 4 = Development of adaptive conservation for orchids.

The analysis results show an inconsistency value of 0.008%, which reflects a very high level of reliability in the evaluation of criteria and subcriteria. In multi-criteria decision-making, such a low inconsistency value indicates that the judgments made during pairwise comparisons are logically sound and dependable. This suggests that all participants in the decision-making process shared a consistent understanding of the relative importance and priorities of each criterion. Ensuring this level of consistency is crucial to accurately representing the objectives and needs in resource management. According to Yusuf et al. (2020), if the Consistency Ratio (CR) is below 0.1 (or 10%), the analysis is considered consistent. If the CR is 0.1 or higher, the results are deemed inconsistent, and the pairwise comparison matrix should be reassessed.

Based on the AHP method applied in this study, four prioritized management strategies have been identified for the Mungku Baru KHDTK. The highest priority is the development of adaptive conservation for orchids, which accounts for 37.8% of the total weight, reflecting its critical role in biodiversity preservation. This is followed by the development of a comprehensive management policy for climate change mitigation, with a weight of 23.9%, highlighting the importance of strategic planning in addressing environmental challenges. Collaboration with the community ranks third at 21.3%, emphasizing the need for inclusive and participatory approaches in conservation efforts. Lastly, forest patrol activities for monitoring and surveillance are assigned a weight of 17%, underscoring their continued relevance in safeguarding the area against illegal activities and environmental degradation. These priorities provide a structured framework for the sustainable management of the Mungku Baru KHDTK.

DISCUSSION

Based on the results of this study, a management strategy has been developed for the conservation of *Flickingeria bicostata*, emphasizing the importance of balancing ecosystem preservation with the sustainable use of natural resources. This strategy addresses the conservation challenges specific to the Special Purpose Forest Area (KHDTK) of Mungku Baru by integrating ecological, social, and policy dimensions into a cohesive management approach. The primary goal of this research was to design a conservation strategy for the habitat of *Flickingeria bicostata*, while simultaneously connecting the findings to previous studies in order to identify areas of consistency or divergence in orchid conservation practices.

The study identified several strategic priorities, including the implementation of regular forest patrols to monitor ecological conditions in KHDTK Mungku Baru, the development of management policies responsive to climate variability, and the application of species-specific conservation approaches tailored to the orchid's ecological needs. This

approach aligns with the concept of adaptive management introduced by Mardiyana et al. (2019), which highlights the need for flexible, learning-based responses to ecological uncertainty. Furthermore, the species-targeted conservation strategy is consistent with the recommendations of Petrus et al. (2021), who advocate for integrated in-situ and ex-situ approaches to safeguard vulnerable orchid species.

From an ecological perspective, *Flickingeria bicostata* serves as an important indicator of microhabitat quality and contributes to the broader biodiversity of tropical forest ecosystems. Petrus et al. (2021) emphasize that successful orchid conservation depends heavily on maintaining symbiotic relationships with mycorrhizal fungi and native pollinators, making intact habitat protection a key component of any conservation effort. Additionally, the study also argues that conserving orchids plays a role in sustaining wider ecological stability, including critical ecosystem services such as carbon sequestration and microclimate regulation.

Community engagement is a central element of the proposed strategy. Collaboration with local communities surrounding KHDTK Mungku Baru involves participation in forest patrols, environmental education, and the development of alternative livelihoods through the sustainable use of non-timber forest products (NTFPs), including orchid cultivation. This participatory approach is supported by Mardiyana et al. (2019), who assert that meaningful community involvement enhances the long-term effectiveness and legitimacy of conservation initiatives. In addition, community-based forest management (CBFM) practices across Southeast Asia have demonstrated the potential for integrating local knowledge with biodiversity conservation goals.

Overall, the strategy developed in this study reflects a consistent alignment with existing literature emphasizing the integration of ecological, social, and governance elements in endangered species conservation. What distinguishes this study is its localized focus on KHDTK Mungku Baru, an area that has received limited attention in species-specific orchid conservation research. As a result, this strategy not only contributes directly to the protection of *Flickingeria bicostata* but also reinforces participatory and adaptive forest governance at the local level.

CONCLUSION

The conclusion of this study presents a formulated management strategy for *Flickingeria bicostata* orchids that emphasizes a balance between ecosystem conservation and sustainable utilization. The strategy includes forest patrol activities for monitoring and supervision of KHDTK Mungku Baru, collaboration with local communities, the development of management policies aimed at climate change mitigation, and conservation approaches tailored to orchid species.

Contribution to the latest knowledge of the use of geographic information system technology for the creation of maps of orchid areas in KHDTK Mungku Baru, as a reference in the use of geographic information systems (GIS), Informing the potential of orchids in KHDTK Mungku Baru for further research to the southern region of KHDTK Mungku Baru, as a reference in terms of orchid management strategies in KHDTK Mungku Baru by the local government, provincial and central, and as a recommendation for the government to carry out orchid management in the Central Kalimantan region.

Further research needs to be carried out on the development of orchids in the southern Mungku Baru KHDTK area, whose orchid species have not been identified. So that orchid development can be carried out evenly in the Mungku Baru KHDTK area. In

addition, conservation efforts also need to be carried out in order to maintain the preservation of orchid species in KHDTK Mungku Baru.

ACKNOWLEDGMENT

The authors would like to express their sincere appreciation to all individuals who contributed, directly or indirectly, to the completion of this research. The completion of this work would not have been possible without the insights, encouragement, and support received throughout the research process. We also acknowledge the broader academic community whose literature and discussions have enriched the foundation of this study.

DECLARATION OF CONFLICTING INTERESTS

The authors have declared no potential conflicts of interest concerning the study, authorship, and/or publication of this article.

REFERENCES

Agus, F., & Subiksa, I. M. (2008). *Lahan Gambut: Potensi untuk Pertanian dan Aspek Lingkungan*. Balai Penelitian Tanah dan World Agroforestry Centre (ICRAF).

Christenhusz, M. J., & Byng, J. W. (2016). The number of known plants species in the world and its annual increase. *Phytotaxa*, *261*(3), 201-217. https://doi.org/10.11646/phytotaxa.261.3.1

Darmanto, I. (2017). Penggunaan analisis SWOT dan AHP untuk menentukan strategi sistem informasi pada 58 Karpet. *Infoman's*, *11*(1), 22-30. https://doi.org/10.33481/infomans.v11i1.37

Enyinda, C. I., Blankson, C., Cao, G., & Enyinda, I. E. (2023). Why cannot we all just get along? Resolving customer-focused team interface conflicts in a B2B firm leveraging AHP-based multi-criteria decision-making. *Journal of Business & Industrial Marketing*, *38*(3), 568-592. https://doi.org/10.1108/JBIM-02-2021-0104

Hanafi, N., Fahruni, F., & Maimunah, S. (2017). Sosialisasi pemanfaatan Hasil Hutan Bukan Kayu (HHBK) sebagai salah satu bentuk pengelolaan KHDTK Kota Palangka Raya: Socialization of non timber forest products utilization as one of the management of forest area with special purpose of Palangka Raya City. *PengabdianMu: Jurnal Ilmiah Pengabdian Kepada Masyarakat*, *2*(1), 31-36. https://doi.org/10.33084/pengabdianmu.v2i1.117

Juriyah, J., Widen, K., Heriamariaty, H., & Segah, H. (2024). Culture-based justice: Legal decisions on forest and land fires by indigenous people with local wisdom approach in the middle sentence. *Journal of the Community Development in Asia, 7*(3), 294-311. https://doi.org/10.32535/jcda.v7i3.3165

Kurttila, M., Kangas, J., Pesonen, M., Kajanus, M., & Heinonen, P. (2000). *Using AHP and SWOT analyses in assessing priorities of strategy alternatives in forest planning*. Luonnonvarakeskus. https://jukuri.luke.fi/bitstream/handle/10024/529280/metla-2015102210496.pdf?sequence=1

Kurttila, M., Pesonen, M., Kangas, J., & Kajanus, M. (2000). Utilizing the analytic hierarchy process (AHP) in SWOT analysis—a hybrid method and its application to a forest-certification case. *Forest Policy and Economics*, *1*(1), 41-52. https://doi.org/10.1016/S1389-9341(99)00004-0

Mamonto, S., Kandowangko, N. Y., & Katili, A. S. (2013). Keragaman dan karakteristik bio-ekologis anggrek di kawasan cagar alam gunung ambang sub-kawasan Kabupaten Bolaang Mongondow Timur berdasarkan ketinggian tempat. *Jurnal KIM Fakultas Matematika dan IPA*, *1*(1), 1-8.

Mardiyana, M., Murningsih, M., & Utami, S. (2019). Inventarisasi Anggrek (Orchidaceae) Epifit di Kawasan Hutan Petungkriyono Pekalongan Jawa Tengah. *Jurnal Akademika Biologi*, *8*(2), 1-7.

Maria, M., Ginting, G., Akbara, A. Z., & Ngarbingan, H. K. (2023). Enhanced the role of youth in participating the success of green economic practices: Behavioral perspective based model. *Journal of the Community Development in Asia, 6*(3), 314-330. https://doi.org/10.32535/jcda.v6i3.2525

Nugroho, G. D., Aditya, A., Dewi, K., & Suratman, S. (2018). Diversity of orchid (Orchidaceae) in Mount Merbabu National Park (TNGMb), Central Java. *Prodising Seminar Nasional Masyarakat Biodiversifikasi Indonesia, 4*(2). https://doi.org/10.13057/psnmbi/m040217

Petrus, S., Manurung, T. F., & Kartikawati, S. M. (2021). Identifikasi jenis pohon family Dipterocarpaceae pada hutan rawa gambut di Kawasan Hutan Dengan Tujuan Khusus (KHDTK) Universitas Tanjungpura Kecamatan Mandor Kabupaten Landak Kalimantan Barat. *Jurnal Hutan Lestari*, *9*(4), 584-598. https://doi.org/10.26418/jhl.v9i4.49103

Purnama, A., & Afitah, I. (2021). Motivasi masyarakat terhadap pengelolaan KHDTK Mungku Baru, Palangka Raya: Community motivation to management of the Mungku Baru KHDTK, Palangka Raya. *Anterior Jurnal*, *20*(2), 43-49. https://doi.org/10.33084/anterior.v20i2.2162

Saaty, T. L. (2008). Decision making with the analytic hierarchy process. *International Journal of Services Sciences*, *1*(1), 83-98. https://doi.org/10.1504/IJSSCI.2008.017590

Sahani, N. (2021). Application of hybrid SWOT-AHP-FuzzyAHP model for formulation and prioritization of ecotourism strategies in Western Himalaya, India. *International Journal of Geoheritage and Parks*, *9*(3), 349-362. https://doi.org/10.1016/j.ijgeop.2021.08.001

Setyaningsih, W., Hadiyanto, H., & Putranto, T. T. (2022). Improvement of waste management through community awareness of plastic controlling in Garang Watershed, Semarang City, Indonesia. *International Journal of Sustainable Development & Planning*, *17*(2), 531–538. https://doi.org/10.18280/ijsdp.170218

Sugiyarto, L., Umniyatie, S., & Henuhili, V. (2016). Keanekaragaman anggrek alam dan keberadaan mikoriza anggrek di Dusun Turgo Pakem, Sleman Yogyakarta. *Jurnal Sains Dasar*, *5*(2), 71-80. http://dx.doi.org/10.21831/jsd.v5i2.13715

Sundari, U. Y., Hidayatullah, M. A., & Girindraswari, N. A. (2025). Pengelolaan potensi sumber daya tanaman pangan berbasis pengetahuan ekologi rawa gambut untuk penguatan pangan Kalimantan Tengah. *Jurnal Penelitian UPR*, *5*(1), 17-25. https://doi.org/10.52850/jptupr.v5i1.19476

Susantoa, H., Sukoharsonob, E. G., Hendroyonoc, B., & Leksonod, A. S. (2020). Forest area management with special purpose (KHDTK) University of Brawijaya forest. *Systematic Reviews in Pharmacy*, *11*(11), 1953-1960.

Syahza, A., Bakce, D., Irianti, M., Asmit, B., & Nasrul, B. (2021). Development of superior plantation commodities based on sustainable development. *International Journal of Sustainable Development & Planning*, *16*(4). https://doi.org/10.18280/IJSDP.160408

Utomo, J., Nanere, M., & Sutono, S. (2017). The effect achievement motivation, leadership character and internal culture towards employee's performance a case corporate from Indonesia. *Jurnal Aplikasi Manajemen*, *15*(1), 1-9. https://doi.org/10.18202/jam23026332.15.1.01

Wardoyo, P. (2011). *Enam Alat Analisis Manajemen*. Semarang University Press.

Yuliastuti, I. A. N., Utama, M. S., Marhaeni, A. A. I. N., & Yuliarmi, N. N. (2024). Family welfare of micro, small, and medium entrepreneurs: A literature study review of

economics. *Journal of the Community Development in Asia, 7*(1), 105-120. https://doi.org/10.32535/jcda.v7i1.2576

Yusuf, M., Setiawan, Y., & Supeni, E. A. (2020). *Decision Support System di Era 4.0: Teori & Aplikasi Tools Analysis*. PT Penerbit IPB Press.

ABOUT THE AUTHOR(S)

1st Author
Kamaliah is affiliated with two academic institutions. She is a faculty member in the Forestry Study Program, Faculty of Agriculture and Forestry, University of Muhammadiyah Palangka Raya, located at Jl. RTA Milono KM 1.5, Palangka Raya City. In addition, she is a doctoral student in the Agricultural Sciences Doctoral Program at the Postgraduate Program of Lambung Mangkurat University, situated at Jl. Jenderal Achmad Yani KM 35.5, Banjarbaru, South Kalimantan – 70714. She can be contacted via email at kamaliahchua@gmail.com. Her ORCID ID is https://orcid.org/0000-0002-0802-6913.

2nd Author
Yudi Firmanul Arifin is affiliated with the Forestry Study Program, Faculty of Forestry, located at Jl. Jenderal Achmad Yani KM 35.5, Banjarbaru, South Kalimantan – 70714. He can be contacted via email at yarifin2014@gmail.com.

3rd Author
Zainal Abidin is affiliated with the Forestry Study Program, Faculty of Forestry, located at Jl. Jenderal Achmad Yani KM 35.5, Banjarbaru, South Kalimantan – 70714. He can be contacted via email at zainal.abidin@ulm.ac.id.

4rd Author
Mufidah Asyari is affiliated with the Forestry Study Program, Faculty of Forestry, located at Jl. Jenderal Achmad Yani KM 35.5, Banjarbaru, South Kalimantan – 70714. She can be contacted via email at mufie.ikhsan@ulm.ac.id.