STRATEGIES FOR REVITALIZING UNIVERSITAS MULAWARMAN BOTANICAL GARDEN (KRUS) AS A FLORA AND FAUNA EDUCATIONAL TOURISM DESTINATION UTILIZING SWOT ANALYSIS

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Abstract

Mulawarman University Botanical Garden Samarinda or Kebun Raya UNMUL Samarinda (KRUS) has an important role in biodiversity conservation, environmental education, and flora and fauna-based ecotourism. However, in recent years, KRUS has faced challenges in management and tourist attraction so that it has decreased its function. This study aims to analyze the revitalization strategy of KRUS as a conservation-based edu-tourism using SWOT analysis. The method used is a literature study with a qualitative approach based on content analysis of various scientific sources related to botanical garden management strategies. The analytical process connected each SWOT element to specific management actions, such as developing educational tourism packages, designing participatory conservation programs, and enhancing collaboration with local institutions. The study found that KRUS's biodiversity and educational value represent its main strengths, while infrastructure limitations and weak stakeholder involvement are key weaknesses. Opportunities arise from the increasing trend of edu-tourism and government support for conservation, whereas threats include environmental degradation and competition with other destinations. The findings emphasize that SWOT analysis not only describes conditions but guides the formulation of practical strategies for sustainable botanical garden management. The implications of this research emphasize the importance of synergy between academics, government, and the community in sustainable botanical garden management. Further research is needed to evaluate the effectiveness of the strategies implemented and their impact on environmental conservation and the local economy.

Keywords: *Revitalization, Botanical Garden, Educational Tourism, Conservation, SWOT*

INTRODUCTION

Botanical gardens play an important role in biodiversity conservation, environmental education, and nature-based tourism. Mulawarman University Botanical Garden Samarinda or Kebun Raya UNMUL Samarinda (KRUS) is located on Tanah Merah Street, North Samarinda, Samarinda City, is one of the important assets owned by Mulawarman University in East Kalimantan. Situated within an urban ecosystem, KRUS holds strategic value for preserving endemic species of Kalimantan and promoting environmental literacy among the public. However, its management performance has declined since 2017, leading to reduced visitation and limited operational functions. Therefore, revitalization is urgently needed to restore KRUS's role as a living laboratory and a sustainable educational tourism destination.

Several previous studies have highlighted the urgency of revitalizing the KRUS as a center for flora and fauna education. Keliwar (2011) emphasized the need for improved facilities and management to attract visitors, while Asa et al. (2017) identified 1,436 endemic Kalimantan species that could serve as key educational tourism assets. Pattiwael (2018) proposed a conservation-based edu-tourism model integrating environmental learning with visitor engagement. Meanwhile, Kusuma & Iswahyudi, (2022) demonstrated how revitalization initiatives in Bogor Botanical Garden have proven effective in strengthening both research and recreational functions. Furthermore, Nilasari (2023) recommended facility enhancement, and Nurcahyo et al., (2019) suggested promotional strategies to sustain visitor interest. Nevertheless, no previous research has formulated an integrated revitalization strategy for KRUS using a structured analytical tool such as SWOT (Strengths, Weaknesses, Opportunities, and Threats).

To fill this gap, this study applies SWOT analysis to develop a comprehensive and context-specific management strategy for KRUS. The proposed revitalization framework considers local biodiversity potential and community involvement, while also addressing ecological and socio-economic challenges unique to East Kalimantan. Thus, this research contributes to existing conservation and eco-tourism literature by presenting a botanical garden revitalization approach that remains underexplored.

This article aims to formulate strategies for revitalizing KRUS as a flora and fauna-based educational tourism destination. The focus of this study includes infrastructure and facility development, enhancement of environmental education programs, and strategic marketing supported by community participation. The findings are expected to provide practical recommendations for KRUS managers, local governments, and academics in developing botanical gardens as sustainable educational tourism centers. With appropriate strategies, KRUS can enhance its conservation function, strengthen environmental education, and contribute to the local economy through eco-tourism while supporting biodiversity protection in East Kalimantan.

RESEARCH METHODS

This research constitutes a literature study that investigates diverse strategies for revitalizing botanical gardens as educational destinations, focusing on flora and fauna, with particular emphasis on the KRUS. The methodology employed in this research is qualitative, utilizing content analysis to examine scientific literature pertinent to the topic under discussion. This research is classified as descriptive-exploratory with a qualitative approach based on a literature review. According to Snyder (2019), literature studies are an efficacious method for synthesizing various research findings and developing a comprehensive understanding of a particular topic, especially in a field that is still evolving or has not been extensively explored. The research data were collected through document study techniques, utilizing diverse sources of scientific literature, including national and international scientific journal articles, conference proceedings, reference books and handbooks, research reports, and relevant policy and regulatory documents.

Literature searches were conducted using academic search engines such as Google Scholar, ScienceDirect, Scopus, and national journal portals such as SINTA, Garuda, and DOAJ, employing specific keywords such as: "botanical garden revitalization," "botanical garden revitalization," "flora fauna educational tourism," "educational tourism in botanical garden," "botanical garden conservation," "tourist destination development," and various combinations of related keywords. The primary focus of this research is on publications issued within the last 10 years (2015-2025), which address strategies for the development and revitalization of botanical gardens, the concept of educational tourism, nature-based tourism destination management, and biodiversity conservation. Only full-text publications in Indonesian and English were considered for analysis, while literature that did not meet these criteria were excluded from the analytical process. To comprehend the complexity of the KRUS revitalization strategy as flora and fauna eco-tourism, this study applied the SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis framework integrated with the triple bottom line approach encompassing environmental, social, and economic aspects (Elkington, 1998; Helms & Nixon, 2010) and adapted it to the context of botanical gardens.

The analysis employed a SWOT analytical matrix, which systematically categorized internal and external factors derived from the reviewed literature. Internal factors were grouped into Strengths and Weaknesses, focusing on institutional capacity, biodiversity potential, and management issues. External factors were grouped into Opportunities and Threats, emphasizing policy support, educational tourism trends, and environmental challenges. Each element was then cross-compared within the matrix to identify strategic intersections (SO, ST, WO, and WT strategies). This process enabled the formulation of integrated and practical strategies for KRUS revitalization based on literature evidence and contextual adaptation to local conditions.

RESULT AND DISCUSSION

KRUS faces various challenges in in fulfilling its role as a conservation and education center for flora and fauna. Based on recent research, KRUS has great potential in the conservation of rare plant species, such as Red Meranti (*Shorea pauciflora*) and Ulin (*Eusideroxylon zwageri*). However, maintenance and management efforts are still limited, especially in the aspects of species data collection and ecosystem care. One of the main challenges is the growing number of endangered species caused by deforestation and resource exploitation in East Kalimantan. This scenario reflects broader tensions in conservation science between ex-situ preservation efforts and in-situ habitat protection, where botanical gardens must balance their role as species repositories with active ecosystem management (Purnomo et al., 2015).

Figure 1. Current condition of KRUS
(Source : https://teropongnews.com/2024/)

Previous studies converge on the critical integration of conservation and economic sustainability in protected areas, though they diverge in implementation approaches. Luo et al. (2025) examined how national parks can integrate ecological conservation with economic development through sustainable natural resource utilization. This study emphasizes the importance of conservation zoning, traditional use, and education and recreation-based management to improve the welfare of local communities (Luo et al., 2025). Complementing this macro-level perspective, Hernandez et al. (2022) highlighted conservation methods based on bio-ecological analysis and quantitative models to prioritize flora and fauna species in conservation area management. Synthesizing these frameworks, we observe that effective conservation-based educational tourism requires both strategic spatial planning and species-level prioritization mechanisms (as per Hernandez et al., 2022), yet a gap remains in applying these dual approaches to medium-scale botanical gardens in biodiversity hotspots like Kalimantan.

Biodiversity and Conservation Value of KRUS as Strategic Strengths

KRUS is a place rich in flora and fauna diversity. In this area, a variety of plant and animal species can be found, creating a unique ecosystem that is important both in terms of conservation and education. From a conservation biology perspective, KRUS functions as a critical ex-situ conservation node within the broader Kalimantan biodiversity corridor, addressing what Wilson's (1988) biodiversity crisis framework identified as the "preservation bottleneck" where habitat loss outpaces conservation capacity. KRUS has become a center for research and conservation of flora and fauna, focusing on the management of plant collections and addressing related environmental issues.

One of the prominent flora components in KRUS is orchids. The diversity of orchids *Dendrobium sp.*, on the island of Borneo is so high that it requires special attention to maintain its sustainability. According to Mahfut et al., the presence of natural orchids is very important and requires disease control, such as viral infections that can damage the diversity of orchids (Mahfut et al., 2021). Aliri et al. (2018) reported various species of Soil Orchids found in Samarinda Botanical Garden which can be seen in table 1, with *Phaius tankervillie* as the species with the highest diversity index. This dominance pattern aligns with island biogeography theory (MacArthur, R. H. and Wilson, 1967), where isolated populations in fragmented habitats often exhibit skewed abundance distributions favoring generalist species. Because of its diversity, orchids can be one of the most attractive flora that can be highlighted as potential educational plants for visitors. These orchid protection efforts reflect attempts to ensure these valuable species continue to grow and thrive. Besides orchids, trees of the family *Dipterocarpaceae* are also the focus of study in this botanical garden. Through ecosystem exploration, identifying the morphology and characteristics of tree species can provide useful information for conservation and environmental education.

Table 1. Terrestrial orchids diversity in KRUS (Aliri et al., 2018)

Species name	Family	Abundance	Habitat Type
Phaius tankervillie	Orchidaceae	Dominant (242 clumps)	Terrestrial
Dipodium palodosum	Orchidaceae	Present (201 clumps)	Terrestrial
Arachis flos-aeris	Orchidaceae	Present (193 clumps)	Terrestrial
Cymbidium atropureum	Orchidaceae	Present (37 clumps)	Terrestrial
Vandopsis lowii	Orchidaceae	Present (32 clumps)	Terrestrial

In addition to flora, fauna is also an integral part of the KRUS ecosystem. Wild animals, birds, reptiles, amphibians and aquatic species still inhabit this area. Some endemic species typical of Borneo should also be professionally preserved in botanical gardens for eduactional tourism purposes. Lariman, (2022)

reported that the composition of the order Anura in the KRUS consists of 18 species which can be seen in table 2. The presence of indicator species such as *Limnonectes paramacrodon* and *Pulchrana picturata* in relatively healthy populations suggests that KRUS maintains ecological integrity despite surrounding habitat pressures—a finding consistent with the "refuge effect" documented in urban conservation islands (Ives et al., 2016). This is an interesting finding and can serve as an educational attraction for visitors to KRUS. The diversity of species of both flora and fauna at KRUS further demonstrates how important this area is for conservation and research.

Table 2. Ranidae genus diversity in KRUS (Lariman, 2022)

Species name	Family	Population size	Habitat Type
Limnonectes paramacrodon	Ranidae	28 individuals	Small rivers and swamps
Pulchranapicturata	Ranidae	26 individuals	Small rivers and swamps
Chalcoranachalconota	Ranidae	1 individuals	Small rivers and swamps
Chalcoranaraniceps	Ranidae	1 individuals	Small rivers and swamps
Polypedatesotilophus		1 individuals	Small rivers and swamps
Odorranahosii	Ranidae	1 individuals	Small rivers and swamps

The transformation of KRUS into a recognized research and conservation center aligns with the "networked conservation" model proposed by Miller & Hobbs (2002), where successful biodiversity preservation requires multi-stakeholder collaboration rather than isolated institutional efforts. Through synergy between academics, government, and society, the development of KRUS will strongly support the sustainability of its vision and mission (Rahmadani et al., 2021). This synergy includes facilitating deeper research into plant and animal habitats, as well as understanding their impact on the wider ecosystem. Furthermore, the development of ecotourism in the KRUS has potential that should be explored. Nugroho et al. (2021) state that botanical gardens can attract visitors while still preserving nature and providing education through direct experience in a natural environment (Berliandaldo et al., 2021). Helping visitors understand and appreciate the flora and fauna in KRUS can encourage them to actively participate in conservation. This dual function exemplifies Tilden's (2007), interpretive principles, where effective environmental education occurs through experiential engagement rather than passive information transmission.

Table 3. Conservation status of flora and fauna in KRUS.

Topic	Major Findings	References
Orchid Conservation	- Identified five terrestrial orchid species. - *Phaius tankervillie* showed the highest abundance and dominance. - Findings highlight KRUS's potential importance in orchid conservation.	(Aliri et al., 2018)
Threats to Anura Species	- Several environmental threats: Tourism activities and coal mining causing habitat fragmentation. -Broader challenges: deforestation, forest clearing for plantations, forest fires, river pollution, loss of natural springs. - These factors pose significant risks to the Anura community and potentially other biodiversity in KRUS.	(Lariman, 2022)
Native Plant Diversity Preservation	- 194 types of native Borneo fruit trees were inventoried. - Several species were represented by only single individuals. - Findings underscore KRUS's role in preserving native plant diversity. - Presence of rare species highlights the garden's potential importance as a conservation site.	(Megawati et al., 2015)
Conservation Implications	- The studies suggest KRUS serves as a refuge for diverse plant and animal species. - Some species in KRUS may be under threat in their natural habitats. - Environmental challenges indicate that active conservation measures may be necessary to protect and maintain biodiversity in KRUS.	(Lariman, 2022)

The convergence of findings across these studies reveals a paradox: while KRUS demonstrates measurable success in maintaining population viability for multiple taxa (orchids, anurans, fruit trees), external anthropogenic pressures simultaneously threaten the long-term sustainability of these conservation gains**.** In the aspect of orchid conservation, Aliri et al. (2018) identified five species of terrestrial orchids, with *Phaius tankervillie* as the most abundant and dominant species, confirming the potential of KRUS as an orchid conservation area. Meanwhile, Megawati et al. (2015) recorded 194 species of fruit trees native to Kalimantan, some of which are represented by only one individual, highlighting the role of KRUS in maintaining the diversity of rare flora. However, threats to biodiversity are also found, especially in the Anura community, where Lariman (2022) notes habitat fragmentation due to tourism and coal mining activities, as well as other environmental challenges such as deforestation, land clearing for plantations, forest fires, river pollution, and the loss of natural springs. These threats have the potential to endanger the Anura community and other biodiversity in the KRUS. Overall, various studies show that the KRUS functions as a refuge for various plant and animal species, although active conservation measures are needed to protect and maintain existing biodiversity. This pattern of concurrent conservation success and escalating threats exemplifies the "conservation treadmill" phenomenon (Redford et al., 2013), where protective efforts must continuously intensify merely to maintain existing biodiversity levels.

The Potential of the KRUS as a Flora and Fauna Educational Tourism Destination

Building on the biodiversity assets documented above, KRUS's potential for educational tourism can be theoretically framed within the experiential learning paradigm (Kolb, 2015) and place-based education principles (Sobel, 2005) where direct engagement with local ecosystems facilitates deeper environmental literacy than classroom-based instruction. KRUS has significant potential for the development of flora and fauna-based educational tourism. However, in recent years, the botanical garden has faced a number of challenges, including environmental degradation, limited supporting infrastructure, and low levels of community promotion and involvement. Therefore, the revitalization of this botanical garden is urgently needed to optimize its role as a conservation and education center based on nature tourism. This situation demands a comprehensive strategy to revive the KRUS as a center for flora and fauna edu-tourism that functions not only as a tourist destination, but also as a means of education and research. Edu-tourism, or educational tourism, integrates elements of education and recreation, where visitors not only obtain entertainment, but also knowledge and valuable learning experiences (Bodger, 1998; Teemant et al., 2024). This integration reflects constructivist learning theory, where knowledge construction occurs through active participation in authentic contexts rather than passive reception of information. Thus, the KRUS has great potential to become an educational and tourist site that focuses on the conservation of flora and fauna. Various factors, including the plant collection, biodiversity, and environmental education programs, can contribute to the development of this botanical garden as an educational tourist destination.

Cross-case analysis of successful botanical garden models reveals three convergent success factors: comprehensive species documentation, active research partnerships, and culturally-responsive programming**.** First, it should be noted that botanical gardens function as conservation institutions that play an important role in research, education, and preservation of flora. As an illustration, the Bannua Botanical Garden in South Kalimantan is known for its well-documented collection of plants, which supports research and education in the fields of botany and ecology (Fatmalia et al., 2024). Based on this, the KRUS can adopt a similar model to expand the plant collection and support research on local flora and conservation management. In addition, botanical gardens also function as tourist attractions, as reflected in the Baturraden Botanical Garden in Central Java, which develops educational tours by offering interactive activities that educate visitors about biodiversity (Hotimah et al., 2021). Rather than simple replication, KRUS can synthesize these models while adapting to its unique Bornean context, creating what organizational learning theory terms a "best practice hybrid" (Szulanski, 1996).

Furthermore, optimal maintenance of the plant collection is an important factor in increasing the attractiveness of the UNMUL Botanical Garden as a tourist attraction. Previous research has shown that land characteristics and soil fertility play a significant role in plant growth (Rachmadiyanto et al., 2020). This ecological foundation connects to habitat suitability theory, where ex-situ conservation success depends on replicating the edaphic and microclimatic conditions of species' natural habitats (Primack & Miller-Rushing, 2009)**.** If necessary, the implementation of an efficient information system in botanical garden management can contribute to increasing the attractiveness of KRUS. For example, the Bali Botanical Garden has implemented an information system in facility management that has been proven to improve the visitor experience (Alamsyah & Voutama, 2024).

In addition, integrating conservation values with local culture addresses the documented gap in conservation practice where Western-centric preservation models often fail in non-Western contexts due to cultural misalignment (West & Brockington, 2006). The application of the Tri Hita Karana concept in the Bali Botanical Garden has been proven to build a harmonious relationship between humans and nature, and this can be adapted in Samarinda (Wirawan & Pendit, 2017). For KRUS, this suggests developing a parallel framework grounded in Dayak ecological knowledge systems, creating what Berkes (1999) termed

"bridging organizations" that mediate between traditional and scientific conservation paradigms. By promoting local cultural values and creating environmental awareness, an interesting edu-tourism program can be developed. In the context of education, the KRUS can be an ideal place to develop students' critical thinking skills. The use of plant encyclopedias and the development of interactive information systems can support multidisciplinary learning processes (Adawiyah et al., 2023; Fatmalia et al., 2024), which in turn can increase students's interest in studying flora and fauna.

The diversity of plant and animal species in the KRUS positions it within the emerging "living laboratory" model of botanical gardens where research, conservation, and education functions synergistically reinforce each other rather than competing for resources. Various studies have demonstrated that botanical gardens, in addition to functioning as collection sites, can serve as research centers that support the development of science in various disciplines related to the environment (Irawanto, 2023; Murdiyanti et al., 2022). Consequently, botanical gardens can be considered strategic locations for research that yields positive societal impact. Furthermore, the active participation of the community in the management of the KRUS is of paramount importance. This aligns with the co-management framework in conservation (Berkes, 2009), where local community involvement transitions from token consultation to substantive decision-making authority, increasing both conservation effectiveness and social equity. Collaboration between managers and the local community can enhance environmental awareness and support efforts to conserve biodiversity (Berliandaldo et al., 2021). Community involvement in the development of educational programs that focus on local flora and fauna will provide substantial benefits for all stakeholders involved.

Overall, KRUS possesses significant potential for development into an educational tourist destination that emphasizes flora and fauna. Through a holistic approach to management, research, and educational development, this botanical garden can offer a rewarding and educational experience for visitors. To realize this potential, a comprehensive evaluation of the plant collection, infrastructure, and existing programs is essential. Developing the KRUS as an educational tourist destination will not only contribute to the preservation of biodiversity but also empower the surrounding community through education and environmental awareness. Considering all these aspects, the KRUS has the potential to become a primary location for the development of educational tourism in East Kalimantan.

Theoretical Implications and Contributions

This study advances conservation education theory by demonstrating how botanical gardens in biodiversity hotspots face a unique "triple mandate tension": they must simultaneously preserve threatened species (conservation function), generate revenue through visitation (economic sustainability), and provide educational experiences (social mission). Existing frameworks typically address these functions in isolation or assume complementarity; our KRUS case reveals inherent trade-offs requiring explicit prioritization.

Furthermore, we contribute to place-based education theory by showing that the "local biodiversity paradox" operates in tropical settings: while species richness creates extraordinary educational opportunities, this same diversity—combined with habitat fragmentation—generates conservation urgencies that can conflict with public access goals. This finding challenges the assumption in temperate-zone literature that local environmental education straightforwardly supports conservation outcomes.

Finally, our analysis extends SWOT methodology by demonstrating its utility not merely as a diagnostic tool but as a framework for identifying theoretical contradictions. The KRUS case reveals how institutional "strengths" (e.g., high biodiversity) simultaneously constitute "threats" (e.g., management complexity), suggesting that static categorizations must be supplemented with dynamic, dialectical analysis.

Strategy for Revitalizing KRUS Through SWOT Analysis for Educational Tourism Purposes

The strategic planning approach employed here integrates classical SWOT analysis with stakeholder theory (Freeman, 2010) and the resource-based view of organizational capability (Barney, 1991), recognizing that KRUS's competitive advantage lies in its unique biodiversity assets combined with institutional partnerships. The effort to revive KRUS as a flora and fauna educational tourism site can be formulated using SWOT analysis to identify Strengths, Weaknesses, Opportunities, and Threats. The strength of the KRUS lies in the diversity of flora and fauna indigenous to Indonesia, which constitutes a valuable asset for environmental education for the community and students. SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis is a strategic management tool employed to evaluate internal and external factors affecting organizations. It facilitates decision-making, policy formulation, and strategy development (Affandy, 2022). SWOT analysis has been applied in various contexts, including businesses, education, and religious organizations. Educational institutions utilize SWOT analysis to enhance quality and create distinctive advantages (Masmudah et al., 2022). The results of the SWOT analysis are as follows.

a) Strengths

- Significant role in conservation: KRUS plays a crucial role in maintaining biodiversity through research, education, and preservation of flora.
- Educational tourism potential: With a comprehensive and well-documented collection of plants, this botanical garden has the potential to become an attractive educational tourist destination.
- Educational attractions: Interactive activities and educational programs can attract visitors while raising awareness of the importance of conservation.
- Interest of researchers and academics: The diversity of plant and animal species can serve as an attraction for further research in various scientific disciplines.

b) Weaknesses

- Environmental degradation: Challenges such as environmental degradation need to be addressed to maintain the quality and sustainability of botanical gardens.
- Infrastructure limitations: Adequate infrastructure development is necessary to support the function of botanical gardens as conservation and education centers.
- Lack of community promotion and involvement: More vigorous promotional efforts and active community involvement are required to increase visits to and support for botanical gardens.

c) Opportunities

- Conservation awareness: Increased awareness of the importance of nature conservation creates relevant educational programs.
- Educational tourism trend: A tourism trend that focuses on education provides an opportunity for KRUS to become a leading destination for educational tourism.
- Government support: Government support for tourism development can facilitate increased investment and infrastructure development.
- Local community collaboration: Involving the local community in the management and development of educational programs can enhance environmental awareness and support for biodiversity conservation.

d) Threats

- Competition from tourist destinations: Competition with other tourist destinations necessitates that KRUS continue to innovate and increase its appeal.
- Lack of investment: Limited investment can impede infrastructure development and the establishment of new programs.
- Animal sustainability issues: If animals are an attraction, their sustainability issues must be properly managed to maintain ecosystem balance.

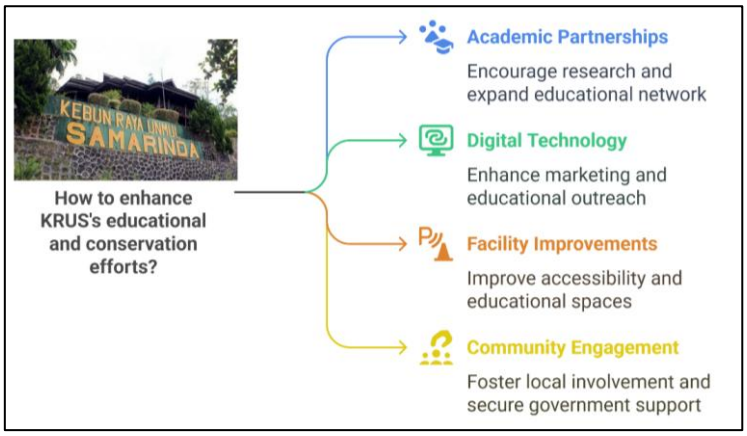

Figure 2. Strategy to revive KRUS as a flora and fauna educational tour based on SWOT analysis results

Based on the SWOT analysis and informed by successful botanical garden revitalization models globally (Wyse Jackson & Sutherland, 2013), we propose four synergistic intervention strategies that address the documented weaknesses while leveraging existing strengths:

1. Development of Conservation-Centered Educational Tourism Packages

This strategy operationalizes experiential learning theory (Kolb, 2015) by creating immersive programs that transform visitors from passive observers to active participants in conservation science. The development of edu-tourism attractions is a key strategy in the revitalization of KRUS. This involves developing conservation-based tour packages that offer direct experience in familiarizing visitors with rare flora and fauna. This program may encompass orchid garden tours, exploration of Anura ecosystems, and

small-scale research on biodiversity. Such citizen science integration follows the successful model of biodiversity monitoring programs in botanical gardens worldwide(Ballard et al., 2017), where public participation generates both educational outcomes and scientifically valuable data.

2. Multi-Stakeholder Collaboration Networks

Drawing on the collective impact framework (Kania & Kramer, 2011), this strategy establishes formalized partnerships that pool complementary resources and expertise. Inviting universities, schools, and research institutions to conduct conservation-based studies, practicums, or internship programs at KRUS aims to encourage visitors not only to visit but also to conduct studies on the flora and fauna found in KRUS. This approach aims to increase research activities and expand KRUS's educational network. This approach creates what organizational theory terms "strategic complementarity" (Milgrom & Roberts, 1995), where each partner's contributions amplify others' effectiveness, generating synergistic outcomes unattainable through isolated efforts. Utilization of Digital Technology for Promotion and Education: Develop digital platforms such as websites, social media, and interactive applications to disseminate information about species in KRUS, provide virtual tours, and implement ecology-based tour reservation systems. Additionally, collaboration with travel agents and conservation organizations is necessary.

3. Digital Technology Integration for Accessibility and Engagement

This strategy responds to the documented shift toward digital-mediated learning and the "experience economy" (Pine & Gilmore, 2011), where memorable experiences are co-created through technology-enabled personalization. Develop digital platforms such as websites, social media, and interactive applications to disseminate information about species in KRUS, provide virtual tours, and implement ecology-based tour reservation systems. Mobile applications featuring augmented reality species identification and gamified learning modules can address the "attention economy" challenge facing educational institutions (United Nations, 2023), making biodiversity education compete effectively with alternative entertainment options. Additionally, collaboration with travel agents and conservation organizations is necessary. To ensure the effective implementation of this strategy, programs aimed at increasing public engagement are necessary.

One approach involves introducing flora and fauna through interactive games for children, which can serve as an initial step in fostering environmental awareness (Shobirin et al., 2024). By familiarizing the younger generation with local biodiversity, it is anticipated that their appreciation and concern for nature will develop. Furthermore, the KRUS needs to adapt to advancements in information technology. The utilization of mobile applications or other digital platforms in educational activities can serve as an innovative approach to expand access to information while enhancing the visitor experience. This aligns with research indicating that individuals are increasingly reliant on technology when seeking information about tourist destinations (Rafdinal, 2021).

4. Infrastructure Enhancement and Community Co-Management

This strategy synthesizes the social-ecological systems framework (Ostrom, 2009), with community-based conservation principles, recognizing that physical infrastructure improvements must be coupled with institutional arrangements that empower local stakeholders. Enhance access roads, parking facilities, and create more interactive educational areas. Encourage local community participation in nature conservation and secure full support from local government in terms of funding and policies. Moving beyond consultation to genuine co-management addresses the documented failure of top-down conservation models (Kimengsi et al., 2019) while building local capacity and ensuring long-term sustainability through distributed ownership.

Regular evaluation of edu-tourism programs is also crucial. Collecting data on visitor responses to various programs will facilitate the improvement and development of future initiatives. Several studies, including research by Sahupala, emphasize that meticulous monitoring is a critical aspect of conservation area management (Sahupala, 2023). By utilizing the results of the SWOT analysis within this theoretically-informed strategic framework, KRUS can formulate a comprehensive strategy that explicitly navigates the documented tensions between conservation, education, and economic sustainability. Robust collaboration, community involvement, and the utilization of information technology are key factors in the successful implementation of a sustainable edu-tourism program that supports environmental conservation.

CONCLUSION

Based on the results of the study, the UNMUL Botanical Garden Samarinda (KRUS) has great potential as a flora and fauna based educational tourism site based on flora and fauna, especially for the conservation of Borneo's endemic species. However, its management faces various challenges, such as limited infrastructure, environmental degradation, and a lack of promotion. The SWOT analysis shows that the main strengths of the Botanical Garden are its biodiversity and potential as an environmental education center, while weaknesses include insufficient infrastructure support and suboptimal management. Opportunities for the development of the Botanical Garden including a trend toward educational tourism and government support, but threats remain in the form of competition with other tourist destinations and

the negative impact from natural resources exploitation. To address these challenges, the proposed revitalization strategy includes strengthening management, improving infrastructure, diversifying tourist attractions, and empowering the community in the management of botanical gardens.

This research is significant in developing an educational tourism-based conservation area management strategy that can be applied in other areas facing similar challenges. Proper implementation of the strategy will sustain KRUS's role as a center for conservation, education, and research. In the future, further research is needed into the effectiveness of conservation-based education programs and the economic impact of the revitalization of KRUS on the surrounding community. In addition, collaboration among academics, government, and the private sector is crucial to establishing KRUS as a sustainable and competitive botanical garden management model in East Kalimantan.

REFERENCES

Adawiyah, R., Zaini, M., & Kaspul, K. (2023). Keefektifan Ensiklopedia Famili Myrtaceae Koleksi Kebun Raya Banua Untuk Melatihkan Keterampilan Berpikir Kritis Mahasiswa. *Jurnal Jeumpa*, *10*(1), 83–95. https://doi.org/10.33059/jj.v10i1.7385

Affandy, S. (2022). Impementasi Analisis SWOT (Strenght, Weakness, Opportunity, Threat) pada Organisasi Dakwah. *INTELEKSIA - Jurnal Pengembangan Ilmu Dakwah*, *4*(1), 179–194. https://doi.org/10.55372/inteleksiajpid.v4i1.241

Alamsyah, T., & Voutama, A. (2024). Rancang Bangun Sistem Informasi Peminjaman Alat Kebun Raya Bali Untuk Efisiensi Operasional. *Jurnal Informatika Dan Teknik Elektro Terapan*, *12*(2). https://doi.org/10.23960/jitet.v12i2.4245

Aliri, Sujalu, A. P., & Biantary, M. P. (2018). Keanekaragaman Anggrek Tanah di Hutan Pendidikan Fakultas Kehutanan Universitas Mulawarman. *Ulin: Jurnal Hutan Tropis*, *2*(1), 1–5.

Anonim. (2024). Kebun Raya UNMUL Wisata Edukatif dan Rekreatif di Samarinda. Retrieved 12 June 2024, from Teropong News website: https://teropongnews.com/2024/06/kebun-raya-unmul-wisata-edukatif-dan-rekreatif-di-samarinda/

Asa, K., Budiman, E., & Pakpahan, H. S. (2017). Pengembangan Sistem Informasi Keanekaragaman Hayati Data Pohon Dan Endemik Pada Hutan Hujan Tropis Kalimantan. *Prosiding Seminar Nasional Ilmu Komputer Dan Teknologi Informasi*, *2*(September), 85–90.

Ballard, H. L., Robinson, L. D., Young, A. N., Pauly, G. B., Higgins, L. M., Johnson, R. F., & Tweddle, J. C. (2017). Contributions to conservation outcomes by natural history museum-led citizen science: Examining evidence and next steps. *Biological Conservation*, *208*, 87–97. https://doi.org/https://doi.org/10.1016/j.biocon.2016.08.040

Berkes, F. (2009). Evolution of co-management: Role of knowledge generation, bridging organizations and social learning. *Journal of Environmental Management*, *90*(5), 1692–1702. https://doi.org/10.1016/j.jenvman.2008.12.001

Berliandaldo, M., Chodiq, A., & Fryantoni, D. (2021). Kolaborasi Dan Sinergitas Antar Stakeholder Dalam Pembangunan Berkelanjutan Sektor Pariwisata Di Kebun Raya Cibinong. *Inobis Jurnal Inovasi Bisnis Dan Manajemen Indonesia*, *4*(2), 221–234. https://doi.org/10.31842/jurnalinobis.v4i2.179

Bodger, D. (1998). Leisure, Learning, and Travel. *Journal of Physical Education, Recreation & Dance*, *69*(4), 28–31. https://doi.org/10.1080/07303084.1998.10605532

Education, T. S. (2005). *C lassrooms and C ommunities T he SEER R eport*. 25–35.

Elkington, J. (1998). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. *Environmental Quality Management*, *8*(1), 37–51. https://doi.org/https://doi.org/10.1002/tqem.3310080106

Fatmalia, F., Zaini, M., & Rezeki, A. (2024). Validitas Dan Daya Tarik Buku Ensiklopedia Famili Piperaceae Dalam Melatih Keterampilan Berpikir Kritis. *Jupenji Jurnal Pendidikan Jompa Indonesia*, *3*(2), 1–11. https://doi.org/10.57218/jupenji.vol3.iss2.1046

Freeman, R. E. (2010). *Strategic Management*. Cambridge University Press. https://doi.org/10.1017/CBO9781139192675

Helms, M. M., & Nixon, J. (2010). Exploring SWOT analysis – where are we now? *Journal of Strategy and Management*, *3*(3), 215–251. https://doi.org/10.1108/17554251011064837

Hernandez, J. O., Buot, I. E., & Park, B. B. (2022). Prioritizing Choices in the Conservation of Flora and Fauna: Research Trends and Methodological Approaches. *Land*, *11*(10), 1645. https://doi.org/10.3390/land11101645

Hotimah, O., Iskandar, R., & Husmiati, R. (2021). Strategi Pengembangan Kebun Raya Baturraden Sebagai Objek Wisata. *Jurnal Pengelolaan Sumberdaya Alam Dan Lingkungan (Journal of Natural Resources and Environmental Management)*, *11*(1), 32–38. https://doi.org/10.29244/jpsl.11.1.32-38

Irawanto, R. (2023). Pengelolaan Kebun Raya Dalam Konservasi Tumbuhan Indonesia. *Prosiding Semsina*,

4(01), 322–329. https://doi.org/10.36040/semsina.v4i01.8116

Ives, C. D., Lentini, P. E., Threlfall, C. G., Ikin, K., Shanahan, D. F., Garrard, G. E., Bekessy, S. A., Fuller, R. A., Mumaw, L., Rayner, L., Rowe, R., Valentine, L. E., & Kendal, D. (2016). Cities are hotspots for threatened species. *Global Ecology and Biogeography*, *25*(1), 117–126. https://doi.org/10.1111/geb.12404

Kania, J., & Kramer, M. (2011). Collective Impact. *Stanford Social Innovation Review*, *97*, 36–41.

Keliwar, S. (Politeknik N. (2011). SAMARINDA SEBAGAI SALAH SATU OBYEK WISATA ALAM. *Jurnal Eksis*, *7*(2), 1945–1953.

Kimengsi, J. N., Aung, P. S., Pretzsch, J., Haller, T., & Auch, E. (2019). Constitutionality and the Co-Management of Protected Areas: Reflections from Cameroon and Myanmar. *International Journal of the Commons*, *13*(2), 1003–1020. https://doi.org/10.5334/ijc.934

Kolb, D. A. (2015). *Experiential Learning: Experience as the Source of Learning and Development*. Pearson Education, Incorporated. https://books.google.co.id/books?id=o6DfBQAAQBAJ

Kusuma, A., & Iswahyudi, S. (2022). Revitalisasi Kebun Raya Bogor. *IONIC Jurnal Arsitektur Institut Teknologi Budi Utomo* , *1*(1), 13–15. https://ionic.itbu.ac.id/index.php/ion/article/view/4

Lariman. (2022). Community Structure and Distribution of the Ordo Anura in the Unmul Samarinda botanical Gardens (KRUS), Samarinda City, East Kalimantan. *International Journal of Research and Innovation in Social Science*, *05*(12), 529–534. https://doi.org/10.47772/ijriss.2021.51230

Luo, H., Sun, G., Zhou, W., Lian, J., Sun, Y., & Hu, Y. (2025). Promoting Rural Revitalization via Natural Resource Value Realization in National Parks: A Case Study of Baishanzu National Park. *Land*, *14*(2), 298. https://doi.org/10.3390/land14020298

MacArthur, R. H. and Wilson, E. O. (1967). *The Theory of Island Biogeography*. Princeton University Press.

Mahfut, M., Heningtyas, Y., & Sukimin, S. (2021). Penerapan Teknologi Kesehatan Tepat Guna Di Era Industri 4.0 Dalam Perlindungan Anggrek Alam Terhadap Infeksi Penyakit Di Kebun Raya. *Jurnal Solma*, *10*(1), 133–140. https://doi.org/10.22236/solma.v10i1.5439

Masmudah, M., Rosanthi, M., Susiyanti, S., Tombi, E. A., & Mulawarman, W. G. (2022). Implementasi Model Analisis SWOT di SDIT Istiqamah Balikpapan. *Jurnal Ilmu Manajemen Dan Pendidikan (JIMPIAN)*, *2*(2), 51–56. https://doi.org/10.30872/jimpian.v2i2.2334

Megawati, T. F., Kamarubayana, L., & Endayani, S. (2015). INVENTARISASI DAN PEMETAAN POHON BUAH (EDIBLE FRUITS) ASLI KALIMANTAN DI KEBUN RAYA UNMUL SAMARINDA (KRUS) Hutan Indonesia merupakan salah satu hutan hujan tropis terluas di dunia Keanekaragaman dari sudut ekologi dan niaga , dimana Dipterocarpaceae s. *Jurnal AGRIFOR*, *14*(2), 269–286.

Milgrom, P., & Roberts, J. (1995). Complementarities and fit strategy, structure, and organizational change in manufacturing. *Journal of Accounting and Economics*, *19*(2–3), 179–208. https://doi.org/10.1016/0165-4101(94)00382-F

Miller, J. R., & Hobbs, R. J. (2002). Conservation Where People Live and Work. *Conservation Biology*, *16*(2), 330–337. https://doi.org/10.1046/j.1523-1739.2002.00420.x

Murdiyanti, R., Soendjoto, M. A., & Zaini, M. (2022). Kajian Etnobotani Famili Rubiaceae Di Kebun Raya Banua Banjarbaru, Kalimantan Selatan, Indonesia. *Agro Bali Agricultural Journal*, *5*(2), 274–288. https://doi.org/10.37637/ab.v5i2.944

Nilasari, N. (2023). Strategi Pengembangan Daya Tarik Wisata Oleh Taman Borneo Kota Samarinda. *Jurnal Administrasi Bisnis FISIPOL UNMUL*, *11*(2), 91–98. https://e-journals.unmul.ac.id/index.php/jadbis/article/view/9858

Nugroho, R. A., Syafitri, E. D., & Yorika, R. (2021). Konsep Pengembangan Kebun Raya Balikpapan Sebagai Destinasi Wisata Alam Unggulan. *Jurnal Pembangunan Wilayah Dan Kota*, *17*(3), 307–315. https://doi.org/10.14710/pwk.v17i3.33569

Nurcahyo, A., Nor, I., Pariwisata, J., Negeri, P., Lipan, K. G., Timur, K., Derawan, J., Batu, T., & Berau, D. (2019). Strategi Promosi Kebun Raya Unmul. *Journal of Tourism Research*, *01*(01), 19–23.

Ostrom, E. (2009). A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science*, *325*(5939), 419–422. https://doi.org/10.1126/science.1172133

Pattiwael, M. (2018). Konsep Pengembangan Ekowisata Berbasis Konservasi di Kampung Malagufuk Kabupaten Sorong. *Journal of Dedication to Papua Community*, *1*(1), 42–54. https://doi.org/10.34124/269163

Pine, B. J., & Gilmore, J. H. (2011). *The Experience Economy*. Harvard Business Review Press. https://books.google.co.id/books?id=edtOyzyKgXUC

Primack, R. B., & Miller-Rushing, A. J. (2009). The role of botanical gardens in climate change research. *New Phytologist*, *182*(2), 303–313. https://doi.org/10.1111/j.1469-8137.2009.02800.x

Purnomo, D. W., Magandhi, M., Kuswantoro, F., Risna, R. A., & Witono, J. R. (2015). Developing Plant Collections on the Regional Botanic Gardens in Framework of Plant Conservation Strategy in Indonesia. *Buletin Kebun Raya*, *18*(2), 111–124.

Rachmadiyanto, A. N., Wanda, I. F., Rinandio, D. S., & Magandhi, M. (2020). Evaluasi Kesuburan Tanah Pada

Berbagai Tutupan Lahan Di Kebun Raya Bogor. *Buletin Kebun Raya*, *23*(2). https://doi.org/10.14203/bkr.v23i2.263

Rafdinal, W. (2021). Is smart tourism technology important in predicting visiting tourism destination? Lessons from West Java, Indonesia. *Journal of Tourism Sustainability*, *1*(2), 102–115. https://doi.org/10.35313/jtos.v1i2.20

Rahmadani, N., Soendjoto, M. A., & Dharmono, D. (2021). Kajian Etnobotani Tumbuhan Famili Clusiaceae Di Kawasan Kebun Raya Banua Banjarbaru, Kalimantan Selatan, Indonesia. *Agro Bali Agricultural Journal*, *5*(1), 57–66. https://doi.org/10.37637/ab.v5i1.858

Redford, K. H., Adams, W., & Mace, G. M. (2013). Synthetic Biology and Conservation of Nature: Wicked Problems and Wicked Solutions. *PLoS Biology*, *11*(4), e1001530. https://doi.org/10.1371/journal.pbio.1001530

Sahupala, A. (2023). Identifikasi Potensi Daya Tarik Ekowisata Di Zona Pemanfaatan Taman Nasional Manusela Kecamatan Seram Utara Kabupaten Maluku Tengah. *Jurnal Hutan Pulau-Pulau Kecil*, *7*(1), 33–42. https://doi.org/10.30598/jhppk.v7i1.9001

Shobirin, M., Muttaqin, M. F., Sarwi, S., Wardani, S., & Doyin, M. (2024). Fostering Environmental Awareness Through Humanistic Education For Elementary School Students at Alam Tangerang. *ELEMENTARY: Islamic Teacher Journal*, *12*(1), 31. https://doi.org/10.21043/elementary.v12i1.26869

Teemant, A., Sherman, B. J., & Upton, T. (2024). Inclusive learning communities: An English learner framework for all educators. *TESOL Journal*, *15*(3). https://doi.org/10.1002/tesj.798

TILDEN, F. (2007). *Interpreting Our Heritage* (R. B. CRAIG (ed.)). University of North Carolina Press. http://www.jstor.org/stable/10.5149/9780807889091_tilden

United Nations. (2023). New Economics for Sustainable Development: Attention Economy. *United Nations Economist Network*, 1–13. https://www.un.org/sites/un2.un.org/files/attention_economy_feb.pdf

West, P., & Brockington, D. (2006). An Anthropological Perspective on Some Unexpected Consequences of Protected Areas. *Conservation Biology*, *20*(3), 609–616. https://doi.org/10.1111/j.1523-1739.2006.00432.x

Wirawan, I. G. N. P. D., & Pendit, I. M. R. (2017). Penerapan Tri Hita Karana Dalam Harmonisasi Konservasi Dan Budaya Di Daya Tarik Wisata Kebun Raya Bali. *Jurnal Master Pariwisata (Jumpa)*. https://doi.org/10.24843/jumpa.2017.v04.i02.p02

Wyse Jackson, P., & Sutherland, L. (2013). *Wyse Jackson Peter, and Sutherland Lucy A. (2013) Role of Botanic Gardens. In: Levin S.A. (ed.) Encyclopedia of Biodiversity, second edition, Volume 6, pp. 504-521. Waltham, MA: Academic Press.* (pp. 504–521).