Jurnal Arsitektur Zonasi 9(1) (2026) 131-142

Jurnal Arsitektur Zonasi

Journal homepage:
https://ejournal.upi.edu/index.php/jaz

The Development of Research and Edu-Tourism Functions at Bali Starling Sanctuary Unit in Buleleng Regency, Bali

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ABSTRACT

The Bali Starling Sanctuary Unit (BSSU) is a conservation institution to preserve Bali Starling birds from extinction. Despite its critical role in animal conservation, the current state of buildings and infrastructure at BSSU is insufficient to support scientific operations and educational tourism. The purpose of this study is to identify the development of BSSU a research and edu-tourism function. The research took a descriptive qualitative approach, with data collected through interviews, field observations, and document reviews connected to the research location. The discussion includes spatial zoning analysis, analysis of facilities at BSSU, and analysis of area development. The results show that BSSU facilities are functionally sufficient as a conservation area but physically quite alarming. Existing activities have not been able to accommodate research and edu-tourism activities although these two activities have the embryo to be developed further. The spatial zoning finding shows that the BSSU site zoning is still mixed between public and restricted zones. Security aspect is also low due to the existence of a restricted zone directly adjacent to the forest area outside the site. This increases the security risk on the site.

ARTICLEINFO

Article History:
Submitted/Received 5 Oct 2025
First Revised 10 November 2025
Accepted 16 December 2025
First Available online 2 Feb 2026
Publication Date 2 February 2026

Keywords:
conservation
edu-tourism
zoning
facilities
Bali Starling

1. INTRODUCTION

Endemic animals in Indonesia are the largest in the world, especially endemic bird species. Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 106 of 2018 stipulates that 187 bird species are classified as endemic, or 35% of the total 557 bird species protected by the government. The Bali Starling (*leucopsar rothschildi*) or locals called Curik Bali is widely known by the public and is one of the protected endemic birds. This bird can only be found on the island of Bali, Indonesia. It is known for its charming appearance and melodious voice, making it one of the symbols of Bali's natural beauty. Despite its high ecological and cultural value, the Bali Starling bird population has declined significantly in recent decades. Factors such as illegal hunting, habitat destruction due to development, and climate change have threatened the survival of this species (Maharani, 2024; Noerdjito, 2011). The Bali Starling is classified as critically endangered by the IUCN (International Union for the Conservation of Nature and Natural Resources) (Wulandari. S, Ichsan. A. C, Syahputra, M, 2019). The Bali Starling is very important, not only for the local ecosystem but also as a representation of Balinese culture. The Indonesian government has designated this species as a protected bird under Government Regulation No. 7 of 1999. The Balinese people consider this bird a symbol of identity and pride, so its preservation is a shared responsibility. Therefore, conservation efforts are being made to preserve it.

Conservation efforts to preserve the Bali Starling include the establishment of the Bali Starling Sanctuary Unit (BSSU). The BSSU is located within the West Bali National Park (WBNP) with road access in the middle of the forest. Administratively, the USSCB is located in Sumber Klampok Village, Gerokgak District, Buleleng Regency. In addition to functioning as a conservation facility for protected animals, in line with Law No. 5 of 1990 about Conservation of Living Natural Resources and Their Ecosystems, the BSSU has the potential to be a facility for research and education, but the existing facilities and infrastructure do not support this potential. The existing conditions show several physical conditions that cause for concern. Moreover, the BSSU has the potential for connectivity with various important points in the WBNP area, such as the WBNP facilities, bird release locations, and other nature tourism destinations around the WBNP. This opens up opportunities for the integration of conservation research as well as edu-tourism functions. According to Maulidiah et al. (2023) and Siyoto & Sodik (2015), research facilities serve as essential instruments in the systematic pursuit of empirical evidence and objective truth. In a related educational context, educational tourism represents a form of non-formal pedagogy, delivering instructional content through immersive, experiential engagement at specific locales (Priyanto et al., 2018; Sifa, 2011).

This study aims to identify the potential of the BSSU area as a conservation area as well as a research and educational tourism area through qualitative analysis. Studies on the conservation function of wildlife sanctuary facilities have been conducted by many researchers in the field of architecture (Alfianto, 2020; Hardiwibawa, 2019; Haris et al., 2017; Kaspriyo & Gandha, 2024; Rahmaningtyas Aisyah, 2024; Sifa, 2011), but the integration of the three functions of conservation, research, and edu-tourism is still limited due to the unique characteristics of each animal and the different development concepts in each location. In general, the design of conservation and tourism facilities is carried out in zoos, one of which is the Surabaya Zoo, with the main problem being poor animal health (Hardiwibawa, 2019). Research on conservation and tourism facilities has also been conducted at in-situ animal breeding sites, with the main problems being the lack of conservation facilities to support the animals' well-being and human disturbance (Aditya et al., 2018; Alfianto, 2020; Rahmaningtyas Aisyah, 2024). This study seeks to identify the development potentials of

DOI: http://doi.org/10.17509/jaz.v9i1.94342
p- ISSN 2621-1610 e- ISSN 2620-9934

three functions of wildlife sanctuary areas in BSSU that already have the beginnings of conservation, research, and edu-tourism activities but still lack facilities to support these three activities.

2. RESEARCH METHOD

This research was conducted at the Bali Starling Sanctuary Unit (BSSU) and is administratively located in Sumber Klampok Village, Gerokgak District, Buleleng Regency, Bali Province. The research uses a descriptive qualitative approach with a data collection strategy through key informant interviews, field observations, and a review of documents related to the study location. The interview process involved the managers of WBNP and BSSU to find out the policies that apply in the area, the regional government's area development plans, and to confirm the results of the field observations that had been carried out (Figure 1).

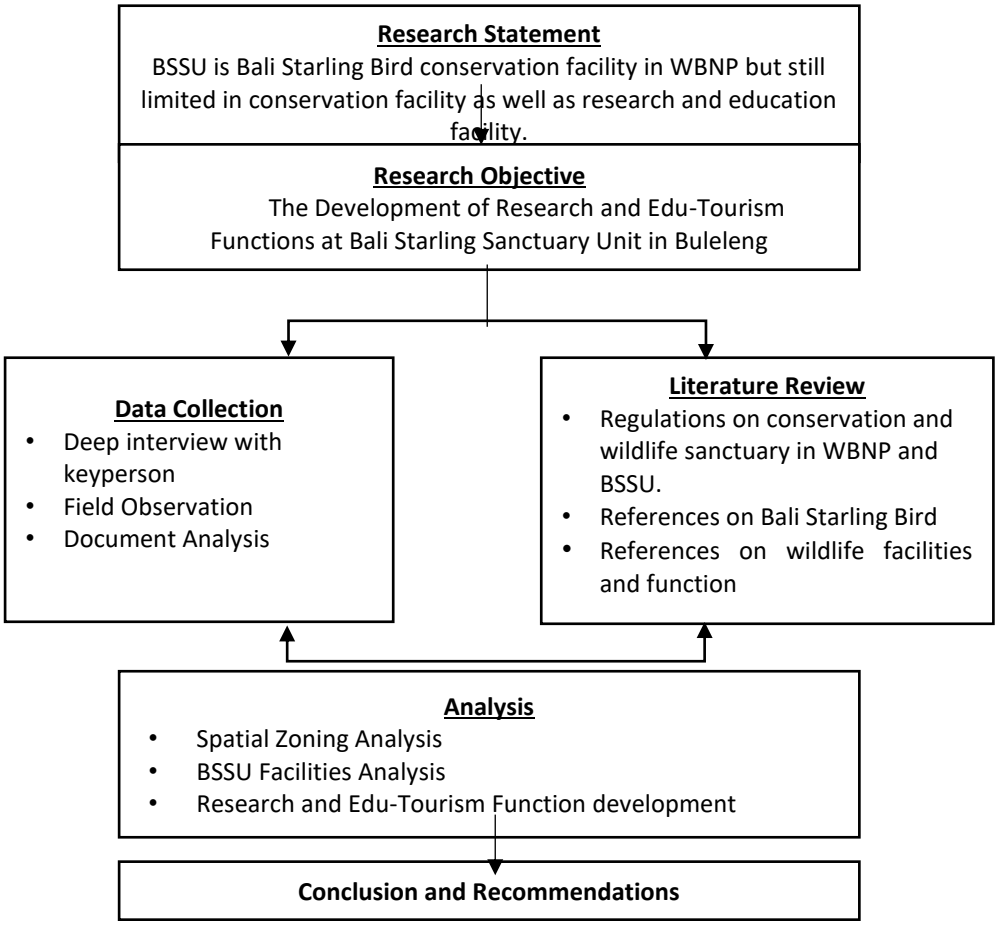

Figure 1. Research Framework
(Source: Author, 2025)

The research steps began with the licensing the research process in February 2025 related to the observation activities to be carried out in the BSSU area. This license is important because the BSSU site is an area that is restricted to the public in the bird breeding enclosure, so the observation process from the university is very limited. Field observations and in-depth interviews with area managers constitute the primary data for this research. Qualitative data in the form of field notes and supporting documents are then analyzed descriptively to reveal the development potential of the BSSU area. The results of the analysis

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p- ISSN 2621-1610 e- ISSN 2620-9934

in this article provide input for the redesign process in the next design phase. This input is outlined in the recommendations section of this article.

3. RESULT AND DISCUSSION

3.1 Bali Starling Sanctuary Unit (BSSU)

The Bali Starling Sanctuary Unit (BSSU) is a unit for the rescue, rehabilitation, and breeding of Bali Starlings, which are protected by the government. The Bali Starling Sanctuary Unit is a unit under the supervision of the West Bali National Park Office. Basically, Bali Starling breeding is not only carried out at the BSSU but also at several locations in Indonesia under the supervision of the BKSD-national conservation agency (Maharani, 2024). The BSSU itself is located within the West Bali National Park (WBNP) and is the location for the release of this endemic species. This facility is located in the West Bali National Park (WBNP) in the middle of a conservation forest (Figure 2).

Figure 2. Map of BSSU Location within West Bali National Park (WBNP)
(Source: btnbalibarat.com)

The BSSU itself covers an area of approximately 1 hectare with several animal protection facilities, including breeding cages, weaning cages, release cages, and management facilities. This conservation unit plays an important role in biodiversity conservation efforts, particularly in the rescue, breeding, and education of protected species. Regulations governing the establishment and management of conservation institutions are stipulated in Regulation of the Director General of Forest Protection and Nature Conservation Number 6/IV-SET/2011 and Regulation of the Minister of Forestry of the Republic of Indonesia Number P.31/Menhut-II/2012. These two regulations provide a legal basis and technical guidelines on licensing procedures, classification of conservation institutions, facility standards, and management in accordance with conservation principles. Conservation units, as referred to in these regulations, can be organized by the government or private parties, and are required to carry out conservation functions through ex-situ conservation activities, which include maintenance, breeding, education, and research. In addition, animal welfare, the adequacy of facilities and infrastructure, and periodic reporting are important indicators in the operation of conservation institutions.

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p- ISSN 2621-1610 e- ISSN 2620-9934

In this context, the Bali Starling Sanctuary Unit (BSSU) is categorized as both a conservation institution and an animal rehabilitation center. Based on the standards set out in the regulations, facilities such as breeding cages, rearing cages, display cages, quarantine rooms, and release areas must be available and meet certain technical requirements. These requirements include the physical suitability of the cages, safety, the availability of veterinary experts, and feed management, sanitation, and health monitoring systems.

3.2 Spatial Zoning Analysis of BSSU

Currently, BSSU is still actively operating as Bali Starling breeding facility. It is located on flat ground, with dense forest vegetation, a hot climate tempered by trees, prevailing winds from the south, and low noise levels. Access to the site is only available from a single 3-meter-wide road. Currently, BSSU is only permitted for limited visits; however, some visitors are still able to enter the area with authorization from officials. Observations regarding the spatial zoning within BSSU indicate a conflict between the public and private zones. Zoning in conservation areas is critical for the protection of endangered species and for ensuring there is no conflict with utilization outside of conservation interests (Kwatrina & Antoko, 2007).

Spatial zoning in BSSU is still unclear, particularly regarding the clarity of its hierarchical structure. The current zoning scheme lacks adequate organization, exhibiting a mixture of public, conservation, and management zones. Specifically, key facilities, such as the information center and guest accommodation areas, are co-located, and animal enclosures are scattered along separate circulation paths. Concurrently, management area is concentrated within the central zone, lacking clear functional separation (Figure 3).

The aspect of circulation is also an important consideration, especially in terms of visitor circulation. Figure 2 shows the general circulation flow of BSSU visitors, marked in red. The visitor experience is characterized by passive, linear movement, limited to a single straight path passing various cages without interactive engagement. Visitors enter from the south entrance and tend to move linearly northward through the area and then return, with no additional activities other than walking and viewing the birds. There are stopping points at several locations, such as the display cage, the central breeding cage, and the rear breeding cage. In addition, the yellow area is the main area where managers generally carry out their activities. The absence of physical boundaries between visitor circulation and conservation areas increases the risk to the quality of life of the animals. The cages for conservation purposes are still located in areas that are easily accessible to visitors, making them prone to noise. This can disturb the lives of Bali Starlings, which prefer quiet conditions for breeding.

DOI: http://doi.org/10.17509/jaz.v9i1.94342
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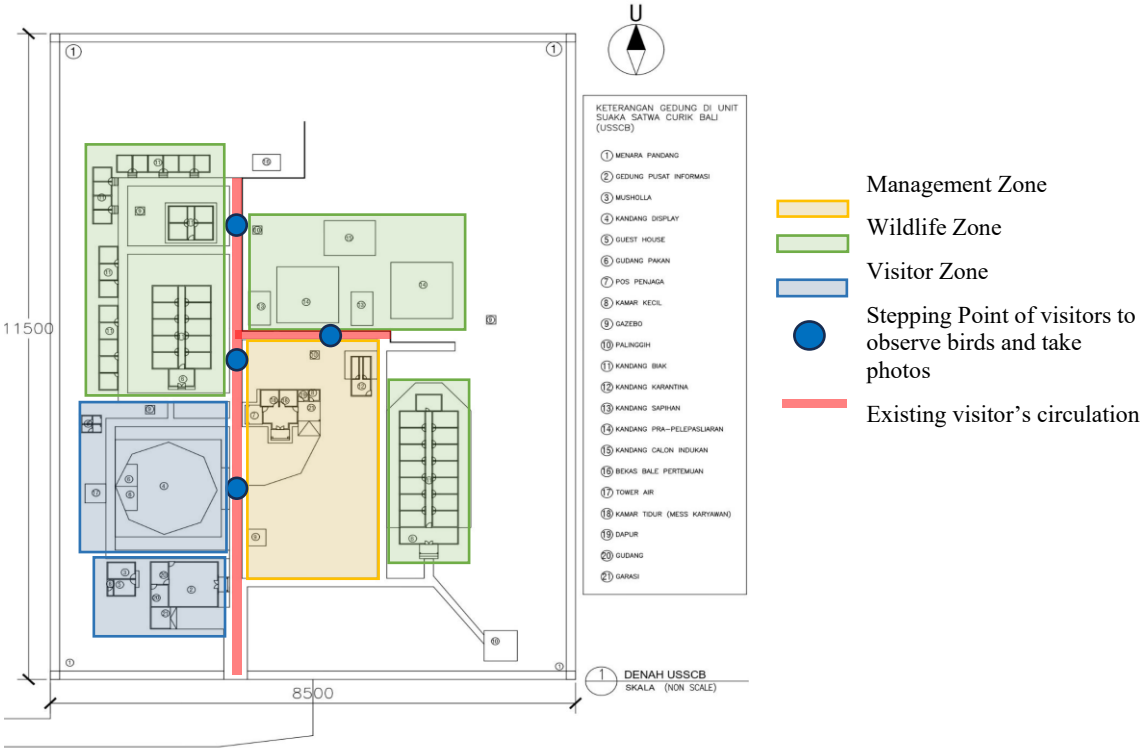

Figure 3. BSSU Layout and Visitors Circulation
(Source: Author Analysis from BSSU Data, 2025)

Furthermore, security analysis is also an important aspect of the site, particularly in relation to the potential risk of theft of Bali Starlings, which has occurred several times due to the high value of these animals. The BSSU site is bordered by restricted Production Forest at the north, the BSSU access road at the south, restricted Production Forest at the west, and restricted Production Forest at the east. The site is surrounded by forest with fairly dense vegetation, resulting the outer edges of the BSSU being an area with low security even there are several control towers at every side of the area. This issue results in weakened security factors within the site.

Summary from the discussion, there is still conflict on spatial zoning. There no separation between the animal zone and the visitor zone, so visitors can enter the animal area without supervision or barriers. The security is become an important factor (Kwatrina & Antoko, 2007; Rastandeh et al., 2018) but the area still under performed in security issue. Furthermore, from Kwatrina and Antoko, security aspect is important in determining the hierarchy of activity zoning within the site to prevent security disturbances from outside the site and disturbances to wildlife from visitor activities within the site.

3.3 Analysis of BSSU Facilities

The facilities at BSSU are still being utilized to protect, breed, and grow animal populations before they are released into the WBNP forest. Management buildings, breeding cages, quarantine cages, display cages, halls, prayer rooms, and other support facilities remain in use in this area. The breeding cage is built with a fence and a combination of brick and wire mesh to prevent moisture and predators. Based on field observations, the majority of breeding cages work effectively but have flaws such as poor foundations, exposed entrances, and a lack of visual barriers between cages (Figure 4). Meanwhile, the quarantine cages are broken and cannot be used, and the display cages do not contain educational information related the bird (Figure 4). Inside the exhibition cages are birds that are no longer productive and are designed for interaction with visitors. As a result, educational information

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p- ISSN 2621-1610 e- ISSN 2620-9934

plays a vital role in visitor interaction. Several additional facilities, including the conference hall, are in bad shape due to the building's age and lack of care. Toilets, guard posts, and prayer rooms, on the other hand, are still operating but require additional space and capacity to accommodate future educational and research operations.

Figure 4. The Breeding Cage
(Source: Author, 2025)

Figure 5. Meeting Hall and Display Cage
(Source: Author, 2025)

The research facilities consist of a 3x3 room connected to the quarantine cage area. The quarantine cages appear to be poorly maintained both inside and outside, requiring a redesign to accommodate bird research and care activities. Based on interview, several bird researchers from different institutions find it difficult to conduct in-depth research due to limited space and research facilities. In addition, the reception area at BSSU does not provide adequate parking spaces, so visitors' vehicles are parked on the road outside the BSSU area.

Based on the above analysis, the facilities at BSSU appear to be adequate in terms of function but still underperform due to their poor condition. Conservation is the main function of the area's activities. Several facilities and infrastructure appear to be damaged, such as the roof, the field guard post, which is no longer usable, and the lack of parking space. Based on this, the BSSU needs to optimize the area first before adding facilities and infrastructure for research and educational tourism activities to introduce the Bali Starling to the general public.

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p- ISSN 2621-1610 e- ISSN 2620-9934

3.4 Research and Edu-Tourism Function Development

Based on the Director General of Forest Protection and Nature Conservation Number: P.6/IV-Set/2011 concerning Guidelines for the Assessment of Conservation Institutions and the Regulation of the Minister of Forestry of the Republic of Indonesia Number: P.31/Menhut-II/2012 concerning Conservation Institutions, BSSU has evolved beyond its initial function as solely a wildlife rehabilitation center. Its current mandate involves establishing itself as a Special Animal Park focused on a singular species collection: the Bali Starling. This expanded role is strategically designed to facilitate and support educational initiatives, scientific research, and community outreach efforts regarding the Bali Starling. Crucially, this development requires the provision of adequate supporting facilities and infrastructure, while simultaneously ensuring that the core objective of animal conservation activities remains balanced, efficient, and unimpeded. Therefore, in accordance with this revised mandate, the BSSU's functional development should prioritize the implementation of research and education programs alongside its primary conservation duties.

The primary focus of BSSU remains the conservation of the endemic Bali Starling; however, activities related to research and educational tourism are currently underutilized. The necessity for these secondary functions inherently presents a significant opportunity for the BSSU's developmental expansion. Conservation is formally defined as the sustainable management, protection, and preservation of natural resources and their associated environments (Darmayani et al., 2022). The conservation program at the Bali Starling Sanctuary and Unit (BSSU) encompasses a series of sequential activities aimed at species preservation, including captive breeding, general animal husbandry, medical care for sick specimens, pre-release conditioning, and the final crucial step of releasing the Bali Starlings into their native habitat within the West Bali National Park (WBNP). These activities have historically been supported by comprehensive enclosure infrastructure. Crucially, ethical considerations dictate that animals must be regarded as subjects whose inherent needs must be met, rather than as mere objects or resources for human utilization or visitor viewing (Aditya et al., 2018). Consequently, as a dedicated breeding facility for an endemic species, the BSSU's core institutional objective is to prioritize and fulfil the comprehensive requirements of the animals to ensure successful propagation. This functional expansion aligns directly with the WBNP's strategic management goals, as outlined in its 2023 performance report, which mandates a 100% increase in the wild Bali Starling population relative to the 2018 baseline. This ambitious target suggests a probable future increase in the BSSU's functional scope and the scale of its conservation activities and population management efforts.

From the management aspect, the management maintains that the current facilities and infrastructure are adequate for fundamental conservation requirements, several deficiencies have been identified, particularly concerning the lack of suitable supporting infrastructure and the general condition of existing assets. The BSSU management currently deems the existing personnel sufficient for core conservation tasks. However, additional staff are required to address managerial duties and the increasing demands of facility and area maintenance. Thus, the primary operational needs for optimizing conservation output are focused on enhancing the quality of the enclosures and augmenting the enclosure maintenance team.

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Based on USSCB visit data obtained from the visitor documentation book, tourist visits were not properly recorded, with many daily data missing, making it impossible to draw conclusions about data collection for estimating daily visits. Daily visits were only recorded during 2024; there is no visitation data for previous years. During 2024, a total of 383 visitors were recorded over 48 days of visits. Based on this data, the average daily visitation was 8 people, and the highest number of visitors was on February 24, 2024, with 52 people.

In addition to its potential as a medium for introducing the Bali Starling to the general public, this place also strongly supports research or observational studies related to the Bali Starling. Activities are already taking place in the field but are still limited in capacity. Based on the results of visitor documentation observations, research activities focused on this bird are carried out by various groups, including conservation research institutions and universities both domestically and internationally. For now, the research conducted is limited to observation due to the lack of adequate research facilities such as laboratories and guest houses, even though the potential of these interesting animals requires good special research facilities so that the research conducted can be more optimal and broader. Based on interviews with BSSU officials, this function can be ascertained that a lot of research is conducted at this place and most of it is by students completing their final projects. The process of recording researchers who come to the BSSU is based solely on the guest book.

Currently, the function of the BSSU is still limited to conservation and research without any educational activities that can introduce these birds to visitors. In fact, the BSSU has great potential to be the right medium for introducing the Bali Starling to the general public in terms of educational tourism. As the official conservation center in West Bali National Park (WBNP), the BSSU can be an effective educational tourist attraction in raising public awareness about the importance of preserving this species. The development of sanctuary facilities that integrate conservation and tourism functions can increase collective public awareness of biodiversity (Kaspriyo & Gandha, 2024). The need for knowledge about endemic animals is very important through various media as knowledge and also to spark the responsibility of future generations in their conservation (Setiawan, 2022).

Basically, BSSU is a protected animal conservation area that supports research and educational tourism activities for the general public. However, besides existing visitor activity, to support the smooth running of animal conservation activities, this place is still limited to public visits. Zoning issue is limiting the BSSU development. Visitor welcoming is visible from signage along the site. Various items related to the Bali Starling are found around the WBNP area, such as promotional billboards with photos of the Bali Starling, Bali Starling statues, and so on. The local governance is trying to implement the Bali Starling as a tourism icon, and it is a strategic effort to introduce this rare endemic species to the wider community, while also raising awareness of the importance of endemic animal conservation. As a symbol of Bali's biodiversity, the Bali Starling is the main attraction in the BSSU area development concept so that knowledge about this animal is more accessible to the local and international communities.

Developing this wildlife sanctuary unit is not merely human needs but also arising awareness to protect the species and its habitat within human area. A critical tension arise while wildlife reserves offer unique "primitive" aesthetic and educational value, the traditional methods of landscape design often conflict with the biological needs of the the wildlife (Yao & Zhao, 2019). Developing BSSU for public visit must be considered in wildlife-priority design. Furthermore, Yao & Zhao proposed several interventions related to tourism development in wildlife sanctuary; still limiting human activity in core habitats, using low impact construction such as elevated boardwalks, and integrating local culture and biodiversity education into the design so that the landscape itself "tells the story" of the

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ecosystem, enhancing visitor satisfaction without physical intrusion. Considering structures is also essential. Structure of wildlife sanctuary are often designed solely for human utility or aesthetic preference, which can create "visual noise" or physical fragmentation that stresses the animals and disrupts the natural landscape. Ensuring that the wildlife and the natural habitat remain the "Figure" (the focus), while the architectural elements (visitor centers, observation decks) serve as the "Ground" (the secondary, unobtrusive background) (Gao & Cao, 2019; Hassan & Sharma, 2017).

4. CONCLUSION

Areas such as the Bali Starling Sanctuary Unit (BSSU) have certain restrictions in terms of land use, types of activities, and development intensity. Permitted activities are generally non-extractive, such as conservation, research, and education. Developing the research and tourism function in BSSU basically have been supported by existing activities. The needs are arising from the visitors. In general, the needs for conservation activities are adequate, while for research functions, it is necessary to activate conservation enclosures that have been damaged or redesign them to be better. The aspect of spatial zoning is important because there is still no separation between public and restricted zones. Research activities are in their infancy, but due to limited facilities, the capacity for these activities is still very limited but can be increased. Educational tourism activities also have an embryo, but are not yet managed in the form of tour packages. Existing tourism facilities are also limited to bird observation in display enclosures. The potential for visitors from abroad and within the country shows interest in these facilities, but it is still limited due to the lack of information related to BSSU.

Several recommendations can be carried out through a redesign project while maintaining the function of the building. The design of the area must be adjusted to the zoning functions and conservation principles that have been established, so that it continues to support conservation objectives without disturbing the existing natural balance. To minimize disturbance to the conservation area, the best option is to provide off-site parking (near the Buleleng SPTN II Office) and use a shuttle system or pedestrian paths. The redesign needs to present a more organized, attractive, interactive, and safe zoning and circulation pattern to support the smooth functioning of conservation and enhance the educating tourism experience. The area zoning system needs to be reorganized with zoning and circulation systems to clearly separate public areas from conservation/restricted areas. Safe zoning, visual barriers, elevated boardwalks and planned physical barriers will help protect wildlife from disturbance or unauthorized access. The size of the conservation, management, educational tourism, and research areas needs to be adjusted to be more efficient and optimal. Information on the increase in the population of the Bali Starling in its natural habitat opens up opportunities for the BSSU to increase the capacity of its conservation enclosures.

DOI: http://doi.org/10.17509/jaz.v9i1.94342
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