Bontomarannu Education Park Reviewed from Conservation, Social, and Environmental Aspects

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Abstract. The Animal park considers have many functions where these can be categorized into conservation, social, and environmental aspects. This study was undertaken in Bontomarannu education park (BEP) located in Sokkolia Village, Gowa regency. This study assesses the potential of BEP based on conservation, social, and environment aspect as well as determine the potency classification of BEP. The methods used are literature studies, interviews, and field observations. The results revealed that the animal conservation aspect (26,89) and the environment aspect (8,16) played a lesser potency than did the social factor (25,71). The findings indicate that BEP from all aspects had average potential category was at 60,76. All aspects still need to be improved. However, animal conservation and environmental aspects need to get priority in management because they are considered moderate and slight potential, respectively. Meanwhile, the social aspect that focuses on education, research, and recreation has good potential. Implications for management to improve in each aspect. In the conservation, is animal welfare, while in the social aspect, BEP needs to complete the information board on each existing cage, and in the environmental aspect it is necessary to add variety in vegetation to maximize comfort for both animals and visitors.

1. Introduction

Currently conservation efforts are carried out both in their natural habitat (in situ), or in captivity in conservation institutions (ex situ) such as zoos, safari parks, and animal parks [1] Regulation of the Minister of Environment and Forestry number P.22/ MENLHK/SETJEN/KUM.1/5/2019 outlines the definition of an animal park as a form of conservation institution with the provision that the place for keeping animals is at least 2 (two) taxa classes in areas with an area of at least 2 Ha (two hectares) as a zoo that carries out care and breeding efforts for animal species maintained based on the ethics and principles of animal welfare as a means of species protection and preservation and used as a means of education, research, development of science and technology, as well as recreational facilities healthy [2].

Sulawesi, the largest island in the Wallacea region, has the largest number of mammals, 132 species, 83 (63%) of which are endemic [4] but the government's and public interest in forming conservation institutions is not comparable to the species richness that Sulawesi has. It is proven that three of the conservation institutions in Sulawesi one of them is Bontomarannu Education Park (BEP) in Gowa Regency, South Sulawesi. This study aims to analyze the potential of the Bontomarannu Education Park in Gowa Regency based on conservation, social and environmental aspects and whether the management
of Bontomarannu Education Park can be improved based on conservation, social and environmental aspects in Gowa Regency.

Based on the background of the problems that have been described, and to maintain the survival and sustainability of these rare species in the animal park, of course, an assessment of the animal park is needed so that its potential for conservation, social and environmental aspects can be identified so that this animal park can survive to be more optimal and sustainable.

2. Materials and Methods

This research was conducted in Bontomarannu Education Park (BEP), Sokkolia Village, Bontomarannu District, Gowa Regency. Data collection was carried out from July to August 2020.

There are three aspects used to assess the size of an animal's potential, namely conservation, social and environmental issues. Data related to conservation aspects includes two groups of data, namely (1) data related to species conservation including data on the number and percentage of animals collected, number of endemic Indonesian animals, protection status, percentage of animal births and deaths; (2) data related to the principle of animal welfare includes data on the number and percentage of animals free from hunger and thirst, free from discomfort, free from pain, disease and injury, free from fear and pressure, and free to display natural behavior. Data related to social aspects consists of two power groups, namely (1) data related to education covering the educational value of animal parks and open access to research and development of knowledge; (2) recreational data includes data on the types of facilities and infrastructure owned by BEP, security of visitors and the variety of activities in the animal park. The data related to environmental aspects are (1) data on the percentage of trees controlling pollution including data on the percentage of trees absorbing carbon dioxide, the percentage of trees that prevent dust, and the percentage of trees that can absorb noise; (2) data on the percentage of trees aesthetic requirements includes the percentage of shade trees and aesthetic enhancement.

All data were collected by interviewing using a questionnaire with the manager, direct observation and measurement in the field, and searching literature and documents related to BEP management. Interviews with managers were conducted with BEP leaders and representative elements related to animal collection and animal welfare management. The questionnaire used is a Likert scale giving a score interval of 1 - 5 on each assessment parameter for each group of data collected [5]. Field observations were carried out to see environmental conditions, especially vegetation in the BEP.

The collected data were processed and classified according to their importance in the potential assessment and analyzed using qualitative descriptive analysis. Assessment of the size of the potential value is carried out by assigning weights to each aspect of the assessment and giving a score of 1-5 on each assessment parameter for each group of data collected. The determination of the size of the weight for each assessment is based on the function of the animal park in accordance with the Regulation of the Minister of Environment Number P.22 / MENLHK / SETJEN / KUM.1 / 5/2019 as the basis for determining the weight for each aspect of the assessment, namely the conservation 38%, social aspects 50%, and environmental aspects 12%.

Based on the scoring and weight for each aspect of the assessment, then the weighted value is calculated for each aspect, using the following formula[6]:

\[
\text{Value} = \frac{\text{Total Score} \times \text{Weight}}{\text{Maximum Scoring}} \times 100
\]

The determination of the potential value of BEP is calculated by adding up the weighted value of each aspect, then classified into five value categories, namely very good (80.00-100), good (70.00-79.99), average (60.00-69.99), and poor (<60.00) refer to the Regulation of the Directorate General of PHKA Number P.6 / IV-SET / 2011.
3. Results and Discussion

3.1. General Condition of Bontomarannu Education Park

One of the tourist attractions in Gowa Regency, Bontomarannu District, Sokkoalia Village is Bontomarannu Education Park (BEP). Before BEP, this animal park was known as Citra Satwa Celebes. BEP is located 10.44 km from the capital city of Gowa Regency and 19.25 km from Makassar City. The Sokkoalia is located at an altitude of 25 m above sea level (masl). The area of this Village is 952.06 Ha. In general, the livelihoods of the villagers are farmers, laborers, civil servants/military/police, private employees, traders, entrepreneurs, retirees, breeders, drivers, and ojek. Total Population and Growth based on census data for the ranking of community welfare, the total population recorded was 3,428 people. With details of the male population, totaling 1,647 people, while the female totaled 1,781 people [7]

3.2. The Potential of BEP from a Conservation Aspect

BEP as a recreation area designated as an educational park certainly has another function that is no less important, namely the function of conservation. In this study, the observed conservation function includes two things, conservation and animal welfare. Based on data analysis, it shows that the conservation aspect of BEP is 26.89 which is in the Average category, as shown in Table 1. as follows:

| Indicators | Mean | Value | Score |
|------------|------|-------|-------|
| 1. Percentage of endemic animals from Indonesia | 50% | 68.66% | 4 |
| 2. Percentage of protected animals | 50% | 63.58% | 4 |
| 3. Percentage of protected species IUCN Red list threatened category (CR, EN, VU) | 50% | 36.72% | 2 |
| 4. Number of taxa collected | 3 | 3 | 3 |
| 5. Percentage of nonendemic animals | 50% | 31.34% | 2 |
| 6. Percentage of giving birth and/or laying eggs of all species | 50% | 8.7% | 1 |
| 7. Percentage of dead animals from total individuals | 50% | 2.17 | 5 |
| 8. Number of animals received as donations from the community or other parties | 50% | 45.54 | 3 |
| 9. Free from hunger and thirst | 50% | 80% | 5 |
| 10. Free from temperature and physical discomfort | 50% | 79% | 4 |
| 11. Free from pain, disease, and injury | 50% | 50% | 3 |
| 12. Free from fear and depression | 50% | 99.7% | 5 |
| 13. Free to display natural behavior | 3 | 3 | 5 |

Total Value: 46
Weight: 38%

Weight value (Total value x weight x 100)/(65)*: 26.89

Potential Category: Average

*65 = maximum score; Classification of the potential assessment of animal parks in the aspect of animal conservation = very good (52.00-65.00), good (39.00-51.99), average (26.00-38.99), and poor (13.00 - 25.99).

Based on the table above, it can be seen that the most influential indicator on the aspect of conservation is freedom from fear and depression with a value of 99.7%, followed by freedom from hunger and thirst by 80%, free from temperature and physical discomfort by 79%. The three highest levels are all in the welfare of animals. Meanwhile, we can analyze that the lowest percentage of parents giving birth from the total individuals is 2.17%.

3.2.1. Animal Conservation

The existence of conservation organizations, especially animal parks, has a strategic and important role in relation to the protection and rescue of animals, especially endemic animals. Especially now that animal trafficking or land degradation is rampant, thus narrowing the space for wildlife to fulfill their daily needs. This can have an impact on the extinction of species and habitats [8]. The important role of endemic animals in their ecosystem is very important in forest regeneration, namely as seed dispersers
and many other roles so that it needs to be prioritized to support efforts to conserve this endemic animal [9].

![Figure 1. Animal Status in BEP Collection, Sokkolia Village, Bontomaranuu District, Gowa Regency.](image)

The results showed that BEP has three taxa classes with their conservation status. Figure 1 shows that the dominant animal inhabiting BEP is the Aves class with a total of 276 (82%) followed by Mammals 53 (15.8%) and the least animal is the reptile class, which is only 6 (1.79%) of the total. BEP collecting animals that are endemic to Indonesia are higher than non-endemic animals. Non-endemic animals are animals that are introduced to other countries that are not their natural habitat [10]. The high endemicity of Indonesian animals in BEP indicates the role of BEP in preserving Indonesian animals in the midst of rampant hunting both for sale and for consumption, as well as due to habitat destruction [11].

BEP as a place for animal collection has the potential to conserve several endemic species in Indonesia. According to the International Union for Conservation of Nature (IUCN) Red List, the conservation status of species is threatened if it is estimated to experience extinction in the near future. The Government of Indonesia protects these animals through the Minister of Environment and Forestry Regulation Number P.106. Even though BEP has not been able to fully support the preservation of the natural habitat of these animals, the step in prioritizing endemic animals as one of the needs to fulfill the collection is one of the potentials that can be provided so that animals continue to develop and prevent extinction. BEP has 336 individual animals with conservation efforts managing 230 endemic species unique to Indonesia, 123 endemic animals based on the IUCN Red list 2020, and 213 protected species based on P.106

3.2.2. Animal Welfare

Authentically, the definition of animal welfare is based on the Regulation of the Director General of PHKA No. P.9 / IV-SET / 2011 is the survival of animals that need to be considered by managers so that animals live healthy, have enough food, can express normal behavior, and grow and reproduce properly in a safe and comfortable environment. Meanwhile, according to PP. 95 of 2012 Animal Welfare is all matters related to the physical and mental state of Animals according to the measure of Animal's natural behaviour that needs to be applied and enforced to protect animals from the improper treatment of animals by humans.

The minimum standard for animal welfare is based on Perdirjen PHKA No. P.9 / IV-SET / 2011 in article 6 paragraph 3, are (1) free from hunger and thirst, (2) free from environmental discomfort, (3) free from pain, injury, and disease, (4) free from fear and depression, and (5) free to express natural behaviour.
These five standards are criteria that become indicators of the adequacy of animal welfare in a conservation institution. The maintenance and welfare of animals is very important for the manager to pay attention to, because if they are ignored, they can cause losses, including in the form of animals that are sick, depressed, and even cause death [12].

The success of animal breeding requires innovation from managers in caring for the animals they care for. According to Hunt (2015), there are five domains that constitute standard requirements that every animal must have, namely the fulfillment of nutrition, a conducive environment, the physical health and fitness of animals are maintained, animals show their natural behavior, and the mental of animals is maintained.

### 3.3. The Potential of BEP Reviewed from Social Aspect

The potential of BEP in the social aspect in this study by looking at the aspects of recreation and education. The role and function of the animal park in the social sub-aspect is education. Its role and function are (1) As a means of education in science and technology, (2) Providing education and knowledge to the wider community about the importance of nature and environmental conservation through demonstrations and animal shows, (3) Cultivating a sense of love and care for animals and nature and flora and fauna from an early age to students in schools and various other circles of society, through the introduction of wildlife and the environment, (4) Carrying out education on the conservation of natural resources in a sustainable manner to the wider community in all corners of Indonesia.

#### Table 2. The potential value of BEP for social aspects.

| Indicators                                           | Mean Value | Score |
|------------------------------------------------------|------------|-------|
| 1. The existence of animal information boards        | 50%        | 3     |
| 2. Opening the widest possible access to conduct research and development of science | 50% 100%   | 5     |
| 3. The area of the children's playground              | 3%         | 0     |
| 4. The area of open space (field) for gathering       | 6%         | 0,31% |
| 5. Types of means for supporting visitors            | 6 vehicles | 5 vehicles |
| 6. Visitor safety for recreation                      | >3 criteria | 7 criteria |
| 7. Variations of recreational activities              | 6 variation | 3 variation |
| Total Value                                          | 18         |
| Weight                                               | 50%        |
| Weight value (Total value x weight x 100)/(35)^a      | 25.71      |

| Potential Category |
|--------------------|
| Good^                 |

^35 = maximum score; ^Classification of the potential assessment of animal parks in the social aspect = very good (28,00-35,00), good (21,00-27,99), average (14,00-20,99), poor (7,00-13,99).

BEP as a conservation institution has a social function as a place for education, research and development of science, demonstrations and healthy recreational facilities. Animal parks are places of interaction between visitors and animals that are impossible to find in everyday life [13]. In addition, it also has social value for the local community, which can be used as an economic center by conducting sale and purchase transactions and access to education for the wider community and also as a vehicle for healthy recreation [14].

Based on the results of the study for a review of the social aspects, it can be seen that the potential for BEP is categorized as having good potential with a value of 25.71 which can be seen in Table 2. The highest criterion from the social aspect includes 100% research access, the results of the interview show that during this research, from July to August 2020 there were 5 students who also conducted research at BEP. The safety of the BEP is also a potential value-enhancing factor. On the other hand, things that still need to be improved are the existence of an animal information board (13.79) which, due to the transfer of several animals to new drums, generally the animal information board has not been installed or does not match the animals in the cage.
3.4. The potential for BEP in environmental aspects
The results of the assessment and calculation of all environmental parameters obtained the lowest value of the other three aspects, namely 8.16 which is classified as the low category, as presented in Table 3.

Table 3. The potential of BEP for environmental aspects.

| Indicator                                      | Mean   | Value  | Score |
|-----------------------------------------------|--------|--------|-------|
| 1. Percentage of trees absorbing carbon dioxide \((\text{CO}_2)\) | 50%    | 97%    | 5     |
| 2. Percentage of trees absorbing dust         | 50%    | 34%    | 2     |
| 3. Percentage of trees to reduce noise        | 50%    | 30%    | 2     |
| 4. Percentage of shade trees                  | 50%    | 52%    | 3     |
| 5. Aesthetic enhancement                      | 50%    | 83%    | 5     |
| Total Value                                   | 17     |        |       |
| Weight                                        |        |        | 12%   |
| Weight value \((\text{Total value} \times \text{weight} \times 100)/25\) | 8.16   |        |       |
| Potential Category                            | Poor   |        |       |

\(^a25 = \text{maximum score}; \ ^b\text{Classification assessment of animal parks in environmental aspects} = \text{very good (20.00-25.00), good (15.00-19.99), average (10.00-14.99), poor (5.00-9.99).}\)

Environmental aspects are important referring to the study conducted by Puspitasari (2016) because in addition to supporting BEP as an animal park that offers green open spaces with diversity of vegetation, morphological, aesthetic and useful characteristics to visitors and the surrounding community as well as creating a comfortable atmosphere for the animals. Suhendar (2020) states that the bio-ecological requirements of a park must pay attention to the morphological and physiological properties of plants or trees, the consequences for environmental ecological conditions include the level of tolerance to pollutants, being able to suppress or reduce the level of air pollution around it, be able to trap dust, can reduce odors with its distinctive aroma, reduce noise, and resist wind and rainwater exposure. In addition, the beauty indicator refers to the nature of a tree that is able to show its aesthetic value including the shape and size (morphology) of roots, stems, twigs, leaves, and flowers and fruits that can provide an atmosphere of beauty for recreational and educational purposes [15].

Some of vegetation include umbrella tree \((\text{Terminalia mantally})\), Monoon longifolium, the false Ashoka \((\text{Polyalthia longifolia})\), mango \((\text{Mangifera indica})\), Norfolk pine \((\text{Araucaria heterophylla})\), Christmas palm tree \((\text{Veitchia merillii})\), fishtail palm \((\text{Caryota mitis})\), breadfruit \((\text{Artocarpus altilis})\) and blackboard tree \((\text{Alstonia scholaris})\), raintree \((\text{Samanea saman})\). These vegetation stands have characteristics that make BEP beautiful and luscious.

The existence of vegetation provides a protective function, to protect biodiversity, both plants and animals, soil and water conservation, as catchment areas and others [16]. Assessments were also carried out at BEP regarding the important functions of absorbing pollutants, preventing dust, and reducing noise due to motor vehicle combustion.

The ability to absorb different pollutants in the air is influenced by several factors such as the relatively dense canopy shape between 90-100%, stomata density, leaf thickness, and leaf density, plant age and environmental factors where the plant grows.

The results of identification of tree vegetation in BEP resulted in data in the form of criteria with the highest score in the environmental aspect, namely 97% trees absorbing carbon dioxide and 83% trees enhancing beauty. Conversely, those with the lowest scores were the percentage of noise-canceling trees with 30%, 34% for dust-proof trees, and 52% for shade trees.

Climate change mitigation efforts, namely reducing greenhouse gas emissions can be done, among others by utilizing the existence of trees in urban areas which have an important role as carbon sinks. This adds to the benefits of trees in urban areas, apart from being a spatial conditioning, oxygen producer, animal habitat, and water catchment area [16].
3.5. Value and Potential Category of Bontomarannu Education Park

Assessment of the potential for BEP is important because in addition to being a routine to continuously evaluate the implementation of the BEP's function, it is also used as data to develop the Institute. PHKA Perdirjen No. P.6/IV-SET/2011 emphasized that conservation institution assessment is a technique for evaluating the quality of programs or activities that are carried out periodically through appropriate methods in the conservation organization unit.

The results of the assessment of the parameters that have been made will then produce a weighted value. The weight value prioritizes the social aspect which plays the highest role because it has more social functions than the conservation function itself. The weights, scoring, and weighted values for BEP can be seen in the following table:

| Table 4. Weights, scoring, and weighted scores for the BEP potential assessment. |
|---|
| Aspects | Potential Aspects | Scoring | Weight | Weighted value |
| Conservation | Species conservation | 19 | 38% | 7.34 |
| | Animal welfare | 27 | | |
| | Total scoring 1 | 46 | 0.38 | 26.89 |
| Social | Education | 6 | 50% | 3.00 |
| | Recreation | 11 | | |
| | Total scoring 2 | 17 | 0.50 | 8.50 |
| Environmental | Pollution control | 9 | 12% | 1.08 |
| | Aesthetic | 8 | | |
| | Total scoring 3 | 17 | 0.12 | 2.04 |
| | Weight value total (1+2+3) | | | 60.76 |
| | Potential category | | | Average |

The results of the analysis and calculation of the potential value of BEP for each of the aspects mentioned above turned out to still have a sufficient potential classification category with a conservation aspect of 26.89 with a sufficient predicate, 25.71 good category, and 8.16 with a low predicate. Overall, the potential value of BEP is 60.76 with a sufficient predicate. This level of potential illustrates that the social aspects of BEP management have the most positive potential because they are in the good category and what needs to be improved is the conservation and environmental aspects that have the lowest potential.

4. Conclusion

Based on the research results, it can be concluded that the potential for BEP from the conservation, social, and environmental aspects studied in this study was 60.76, including the category of average classification. Detailed as follows: Animal conservation potential is 26.89 including average potential, social aspects are 25.71 and classified as good, and environmental aspects are at poor classification values with a value of 8.16.

The results of this adequate assessment indicate the need for improved management in each aspect. The thing that needs to be considered in the aspect of conservation is animal welfare. In order for BEP to become a place for community education, it is necessary to complete an information board on each existing drum, and in the environmental aspect it is necessary to add variations to the vegetation in order to maximize comfort for animals and visitors.

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