Volume 10, nomor 2, tahun 2025

Biogenerasi

Jurnal Pendidikan Biologi

https://e-journal.my.id/biogenerasi

EX-SITU CONSERVATION STRATEGY OF *Cervus timorensis* IN WEST JAVA, INDONESIA

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Abstract

This research was carried out to identify inhibiting and supporting factors with the aim of knowing internal and external factors and determining the ex-situ conservation strategy of *Cervus timorensis* in West Java, based on the calculation of the driving and inhibiting aspects in the management identified in the study using the SWOT analysis method. The results of the data were processed using SWOT analysis and calculating the value of internal factors (strengths, weaknesses) and external factors (opportunities - threats), the final score for internal factors was 1.18 and for external factors 0.44. These results determine the strategic direction of ex-situ conservation for *Cervus timorensis* in West Java which is located in quadrant I, which means a very favorable situation because it has opportunities and strengths with a high score so it must take advantage of the opportunities it has by maximizing existing strengths, and strategies that can implemented in this condition is to support an aggressive growth policy.

Keywords: *Ex-situ conservation, Breeding, SWOT analysis, West Java, Strategy.*

Abstrak

Riset ini dilaksanakan untuk mengidentifikasi faktor penghambat dan penunjang dengan tujuan mengetahui faktor internal dan eksternal serta menetapkan strategi konservasi ex-situ untuk *Cervus timorensis* di Jawa Barat berdasarkan perhitungan aspek-aspek pendorong dan penghambat dalam pengelolaan yang teridentifikasi dalam penelitian menggunakan metode analisis SWOT. Hasil data yang diolah dengan menggunakan analisis SWOT dan melakukan perhitungan terhadap nilai faktor internal (kekuatan, kelemahan) dan faktor eksternal (peluang, ancaman) maka didapatkan nilai akhir untuk faktor internal 1,18 dan untuk faktor eksternal 0,44. Hasil tersebut menetapkan arah strategi konservasi ex-situ rusa *Cervus timorensis* di Jawa Barat terletak pada kuadran I yang berarti situasi yang sangat menguntungkan karena memiliki peluang dan kekuatan dengan skor yang tinggi sehingga harus memanfaatkan peluang yang dimiliki dengan memaksimalkan kekuatan yang ada, dan strategi yang dapat diterapkan dalam kondisi ini adalah mendukung kebijakan pertumbuhan yang agresif..

Kata Kunci: *Konservasi Ex-situ, Penangkaran, Analisis SWOT, West Java, Strategi.*

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p-ISSN 2573-5163
e-ISSN 2579-7085

INTRODUCTION

Forests provide many important ecosystem services, including wildlife habitat, recreation, soil protection, clean air and water, and timber production (Almulqu et al. 2021). Tropical forests in Indonesia are home to animals that live and live in them. Indonesia is known as a mega biodiversity country with a very high diversity of ecosystems, species, and genetics (Kumar & Verma, 2017). One of them are *Cervus timorensis*. The existence of the deer population that continue to decline in its natural habitat need conservation efforts, such as through ex-situ conservation. Deer captive breeding is one of the ex-situ conservation efforts to ensure the sustainability of wildlife from the threat of extinction. Captive breeding programs, and the associated translocation of wildlife, represent a powerful tool for conservation management (Lott et al. 2020). Fauna translocations, the movement of individuals to supplement or re-establish failing wild populations, can increase a species' geographical distribution and effective population size, while greatly reducing the threat of localized extirpation events due to demographic, environmental, or genetic stochasticity (Rahman et al. 2020).

Breeding of deer is interesting because of several advantages (Semiadi and Nugraha, 2004). Deer meat, which is called as venison, is popular because it contains low cholesterol and fat. Compared to beef, the venison cholesterol and fat was lower, beside that venison is soft and has low-calorie content (Puttoo, 1998), significant roles in ecology, economics, and socio-cultural, specifically since the species domesticated for commercial meat and antlers managed to be a game hunting animal and being invasive feral populations outside Indonesia (Ali et al. 2021). However, deer deal with extermination in many highly human-populated areas, including poaching, habitat loss, livestock competition, predator threats, diseases, and natural disasters (Rahman et al. 2020).

Conservation biology matured in the mid-20th century as ecologists, naturalists, and other scientists began to research and address issues pertaining to global biodiversity declines (Dyke, 2008). The conservation ethic advocates management of natural resources for the purpose of sustaining biodiversity in species, ecosystems, the evolutionary process, and human culture and society (Bowen, 1999).

Conservation of nature is a crucial aspect in maintaining the survival of all creatures on earth, both plants and animals, whose survival is increasingly threatened. Threats to this sustainability can come from natural factors, such as natural disasters such as landslides, floods, and tsunamis, or from human activities, such as forest fires and poaching. One important step to prevent extinction and maintain the existence of protected flora and fauna is through a captive breeding program. The purpose of this program is to protect and increase the population of certain species, so that their sustainability is maintained and they do not become extinct. Captivity is carried out in an environment that has been specially designed to resemble their natural habitat, both in terms of location, environmental conditions, and layout. Thus, flora and fauna in captivity can live, reproduce, and preserve their offspring well, so that their existence is maintained from the threat of extinction. In implementing a captive breeding program, in addition to the importance of selecting a suitable location so that flora and fauna can grow and develop optimally, selecting superior individuals also plays an important role in conservation efforts. The species to be cultivated need to come from individuals with high quality, both in terms of survival ability and in producing healthy and resilient offspring. These superior individuals are expected to be able to increase the population, have strong resistance to disease, and be able to maintain their existence in nature, so that the risk of extinction can be minimized (Basuni, 1989).

Many nations have government agencies dedicated to wildlife conservation, which help to implement policies designed to protect wildlife. Numerous independent non-profit organizations also promote various wildlife conservation causes. The study aim to understand the condition of breeding and also to see the management scenario of breeding at Jbound Bogor Nirwana Residence in West Java, Indonesia with the help of selected criteria and indicators related to the ex-situ conservation management of *Cervus timorensis* and based on the internal and external factors analysis, the

strengths-weaknesses and opportunities-threats. The formulation of the breeding management strategy is carried out using a SWOT analysis. Rangkuti (2000) stated that the SWOT analysis is based on the logic that maximize the strengths and opportunities,but simultaneously to minimize weakness and threats.

METHODOLOGY

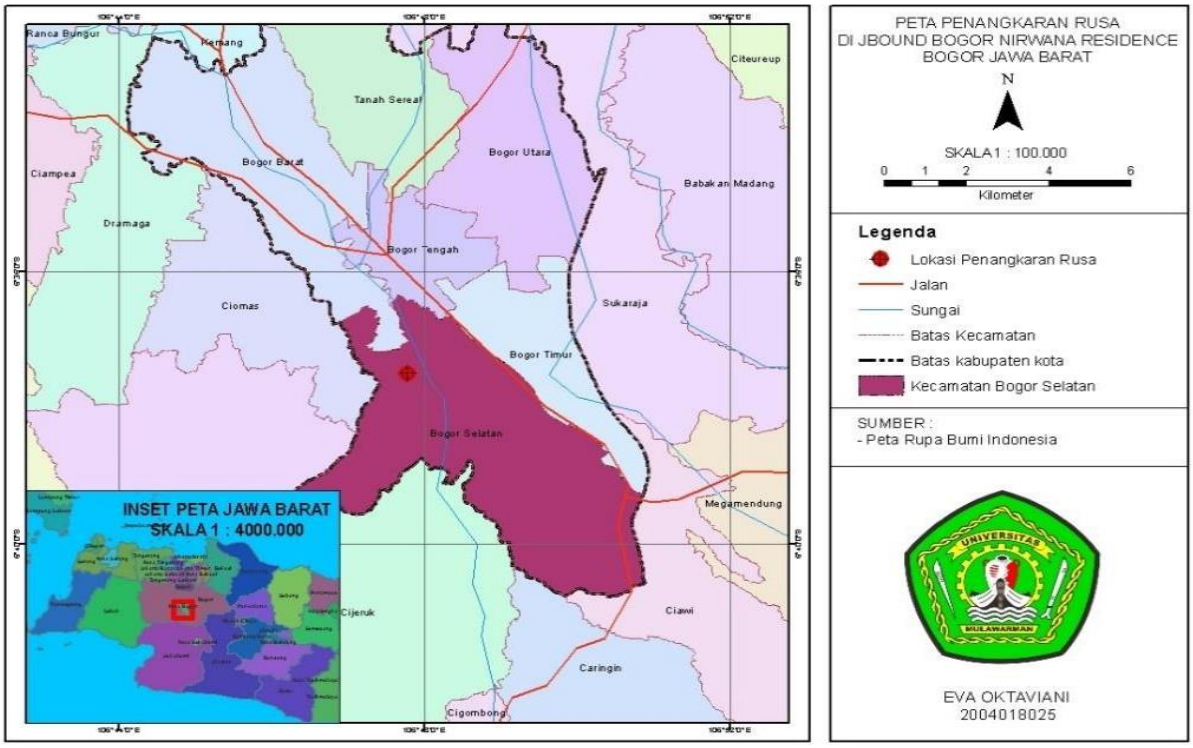

Figure 1. Research location.

In this study, there are several breeding in West Java considered well reputed. But we will only focus to describe the deer breeding at Jbound Bogor Nirwana Residence in West Java. We both use primary and secondary data during data collection. Primary data consist of questionnaire survey, observation, photography etc. Through questionnaire survey we collect various information on breeding. Such as, treatment, management and breeding condition. The questionnaires prepared according to several criteria and indicators. In order to determine the strengths and weaknesses of ex-situ conservation (breeding) management of *Cervus timorensis* at the breeding Jbound Bogor Nirwana Residence in West Java province, as well as the opportunities and threats that arise as a result of the activities done or to be carried out, the opinions of a total of 61 visitors consisting of 25 women and 36 men. Interviews were conducted. Observation helps us to understand the infrastructures, enclosures and different sections of breeding. Secondary data collected from register and record books of breeding, different Journals, books related to breeding management and wild life conservation, newspapers and through internet. In this study, SWOT analysis, which is a situation analysis, was used as a method in order to achieve the purpose of the study in terms of content and scope. Management development strategy analysis is carried out by Strength-Weakness-Opportunity-Threat (SWOT) analysis. The SWOT is a widely known scanning environment tool (Affandy, 2022). People use this tool to identify conditions as a strengths, weaknesses, opportunities, or Threats (Wang and Wang, 2020; Almulqu et al., 2024). The SWOT is a tool for analyzing both the internal and external conditions of individuals and organizations (Teoli et al., 2019). The SWOT matrix is a tool used to measure management strategy factors (Weihrich, 1982). This matrix can clearly describe how external

opportunities and threats are owned (Nasution et al., 2022).

SWOT results are then analyzed using Internal Strategy Factors Analysis Summary (IFAS) and External Strategy Factors Analysis Summary (EFAS). The results of the calculations from the IFAS and EFAS analysis are then compiled into a SWOT matrix to determine the appropriate strategy of ex-situ conservation management of *Cervus timorensis* at the breeding Jbound Bogor Nirwana Residence in West Java province.

The SWOT analysis is an overall evaluation of the strengths, weaknesses, opportunities, and threats of a plan (Figure 2) (Bull et al., 2016). Elements in the SWOT analysis are divided into two parts, namely:

- IFAS (Internal Strategy Factors Analysis Summary), strength is the main ability that has more value than the ability of the company's competitors. Weaknesses are factors that can reduce the ability of the company's operations. This must be minimized so as not to disrupt the running of the company.
- EFAS (External Strategy Factors Analysis Summary), opportunities are everything that certainly have the potential to generate profits through efforts aimed at taking advantage of these opportunities. The threat is something that is very likely to occur to the company's operations and has the potential to cause losses to the company.

The SWOT analysis diagram produces four quadrants which can be explained as follows:

- Quadrant I, this quadrant is a very favorable situation. The company has opportunities and strengths so that it can take advantage of existing opportunities. The strategy that must be implemented in this condition is to support an aggressive growth policy (growth oriented strategy).
- Quadrant II, despite facing various threats, the company still has internal strength. The strategy that must be implemented is to use strength to take advantage of long-term opportunities by way of a diversification strategy (product/market).
- Quadrant III, the company faces huge market opportunities, but on the other hand, it also faces some internal constraints or weaknesses. The focus of the company's strategy is to minimize the company's internal problems so that it can seize bigger market opportunities.
- Quadrant IV, this is a very unfavorable situation, the company faces various external threats and internal weaknesses.

RESULTS AND DISCUSSIONS

Description of *Cervus timorensis*

Timor deer is one of four types of deer that are native to Indonesia, along with other types of deer such as sambar deer, Bawean deer, and muncak (*Cervus timorensis* Blainville, 1822; Thohari, 2011). Its physical characteristics include a relatively small body, short legs, long tail, concave forehead, large incisors, and yellowish brown fur. Male deer have large, long, slender, and branched antlers. This species is an animal native to Indonesia and is believed to originate from Java, the Lesser Sunda Islands, and Malacca, although some experts say it originated only from Java and Bali (IUCN 2008). Along the way, Timor deer have spread to eastern Indonesia through human migration. In Indonesia, this species is protected by Government Regulation No. 7 of 1999 concerning the Preservation of Plant and Animal Species. However, utilization through captivity is permitted in accordance with Government Regulation No. 13 of 1994 concerning Hunting of Wild Animals and PP No. 8 of 1999 concerning Utilization of Plant and Animal Species. Timor deer prefer open habitats such as light forests, grasslands, savannas, bushes, and areas near watercourses and swamps (Garsetiasih & Takandjandji, 1996). According to IUCN (2008), Timor deer behave as grass eaters when in grasslands, and become bush or leaf eaters when in bushes and forests. As herbivores, Timor deer consume various types of grass, herbs, and fruits that fall to the ground. In the Menipo Island Wildlife Sanctuary, East Nusa Tenggara, these deer are known to use mangrove areas and palm tree stands to rest (Thohari, et. Al., 2011). Vegetation cover is an important part of the

habitat because it provides protection from extreme weather, predators, and less supportive environments. Vegetation is not only a source of food, but also a place of shelter. Timor deer are classified as diurnal animals, which are more active during the day (Thohari et al. 1991). However, these deer can adapt to being active at night (nocturnal) if the situation requires it or to adapt. This flexibility makes Timor deer an easy species to manage because they are able to adapt to environments outside their natural habitat.

SWOT Analysis

Goals and strategies to reach them are developed through the application of SWOT analysis (strengths, weaknesses, opportunities, and threats) (Culp et al. 2016). Based on an examination of the possibilities and threats in the external environment as well as the strengths and weaknesses within the group of visitors, the SWOT analysis yielded these results. After collecting information and data related to the continuity of the research, all of the information/data is used in quantitative strategy formulation models.

These internal elements have an impact on how strengths and weaknesses (S and W) develop. When it comes to the circumstances surrounding the ex-situ conservation of *Cervus timorensis*, this element also affects how decision-making methods are formed for the various roles that the parties involved in the ex-situ conservation. All forms of functional management are included in these internal aspects, including facilities, management, human resources, local community and development.

These external variables have an impact on how opportunities and threats develop (O and P). Where this factor is concerned with conditions that occur outside the ex-situ conservation of *Cervus timorensis* which influence the decision-making of the strategic roles of the parties in the *Cervus timorensis* conservation. These factors include planning, potential, population, and social. External and internal factors in the SWOT perspective have an assessment of the condition of the *Cervus timorensis* conservation, while this assessment is measured based on several conditions (Table 1).

Table 1. SWOT variables of *Cervus timorensis* ex-situ conservation

Internal Factors				**External Factors**			
Strengths		**Weaknesses**		**Opportunities**		**Threats**	
S_1	Attraction of captivity	W_1	Lack of human resources	O_1	Access	T_1	Market potential
S_2	Organization	W_2	Natural resource sensitivity	O_2	Environment	T_2	Transportation
S_3	Service	W_3	Source of funds	O_3	Local community	T_3	Social economy
S_4	Maintenance	W_4	Information media	O_4	Facility development	T_4	Infrastructure
S_5	Water sources	W_5	Area planning	O_5	Other support	T_5	Visitor activity
		W_6	Security			T_6	Flood
		W_7	Clean water			T_7	Forest fires

Figure 2 showed that the intersection point of the diagram is on the X and Y axis (1.18; 0.44) in diagram I, where this position is in quadrant I, namely supporting aggressive strategies. The *Cervus timorensis* ex-situ conservation in West Java is in a favorable situation and has strengths and opportunities to take advantage of existing opportunities. The strategy that can be implemented in Quadrant I with the SO strategy, where the SO strategy supports an aggressive, which is the most profitable situation because it has strengths and opportunities. According to Maclean et al. (2020), the SO (Strength and Opportunity) strategy is a strategy that uses strengths to take advantage of opportunities.

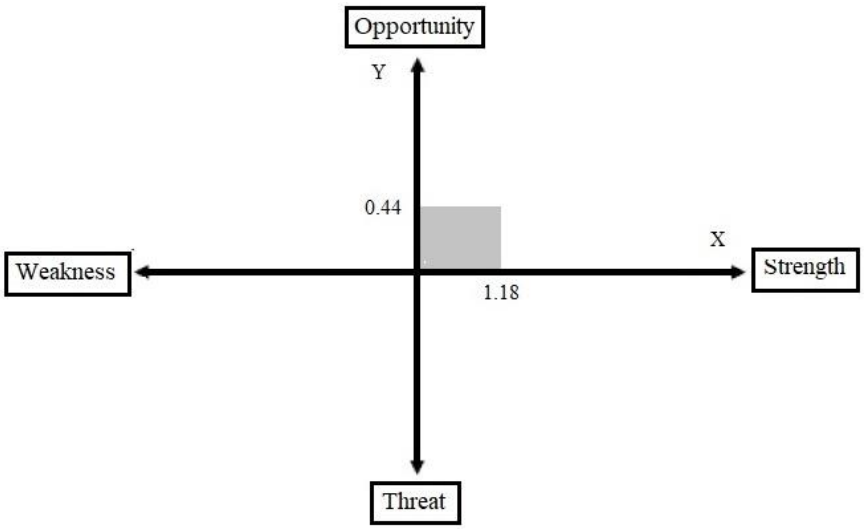

Figure 2. Data SWOT diagram

After formulating each strength, weakness, opportunity, and threat, *Cervus timorensis* and *Axis axis* ex-situ conservation strategy factors are then prepared using the SWOT Matrix, namely by combining strengths with opportunities (SO) and, weaknesses with opportunities (WO), and strengths with threats (ST) and opportunities with threats (WT). However, this study only focuses on the SO strategy. The results show that deer breeding institutions can utilize internal strengths to obtain existing opportunities. Minimizing weaknesses to anticipate threats from external parties. It is known that the deer breeding institutions must maintain captivity attraction, organization, service and water resources quality and immediately create jobs by recruiting additional employees who are more experienced. Deer breeding institutions must also add more access, local engagement, facility development and other support.

Table 2 SWOT Analysis Matrix Diagram

EFAS \ IFAS	*Strengths* (S) • Attraction of captivity • Organization • Service • Maintenance • Water sources
Opportunities (O) • Access • Environment • Local community • Facility development • Other support	S-O Strategy • Maintaining attraction of captivity, organization, service, water resources, and access (S1, S2, S3, S4, S5, O1) • Optimizing environmental services to foster community creativity to improve welfare levels (O2,O3, O4, O5)

The deer breeding Jbound, precisely in the Bogor Nirwana Residence (BNR) is located in the South Bogor area, Bogor City, West Java. This location is in a housing complex and is quite popular among the people of Bogor. The deer species cultivated in this breeding is the Timor deer (*Cervus timorensis*). The breeding area has an area of around 1,500 square meters. Jbound is a natural tourist destination that offers various attractions, ranging from breeding various types of animals such as deer, goats, geese, rabbits, and guinea pigs, to game rides such as flying fox, walking in a giant ball, ball pool, camping area, entertainment stage, and others. The variety of activities offered makes Jbound a tourist spot that is crowded with tourists. The deer breeding is one of the main attractions because it provides visitors with the opportunity to interact directly with deer, feed them, and take pictures with the animals. The

Timor deer in this breeding have a body length of around 120 to 130 cm. The deer population consists of 11 adult females, 2 female calves, 11 adult males, and 1 male calves. The feed given to the deer includes elephant grass, carrots, kale, and various other types of green plants planted around the enclosure area. From the results of interviews with the breeding managers, it is known that Timor deer rarely drink and have a habit of licking salt as a way to neutralize the tongue and ward off poison. Therefore, special salt blocks are provided in the enclosure for deer. The deer breeding in Jbound has been established since 2007. However, in 2013 there was an attack by wild dogs which caused the death of many deer. At that time, the number of deer was quite large, estimated to reach around 50, and the attack caused deaths almost every day. To prevent similar incidents, the management has now strengthened the security system by installing a sturdy iron fence. Deer are also animals that are susceptible to diarrhea. To overcome this, deer with diarrhea are usually given a solution of palm sugar and guava leaves. In addition, regular health checks are carried out by veterinarians, and deer are cared for by officers who monitor their condition intensively, in order to maintain health and prevent disease. The deer mating cycle usually occurs in July to August. The characteristics of a pregnant female deer include a stomach that looks more pointed and enlarged, a genital area that looks red and swollen, and breasts that are starting to enlarge.

CONCLUSION AND RECOMENDATION

Identification of SWOT internal and external factors shows the position of the *Cervus timorensis* ex-situ conservation strategy at the breeding Jbound in West Java is in quadrant I or in a to support aggressive growth policies (Strength-Opportunity) development strategy. The formulation of recommended priority strategies for the ex-situ conservation of *Cervus timorensis* in West Java is; Maintaining attraction of captivity, organization, service, water resources, and access (S1, S2, S3, S4, S5, O1) Optimizing environmental services to foster community creativity to improve welfare levels (O2,O3, O4, O5). Based on the results of interviews conducted in this study with respondents, it is known that the majority of the community gave positive support to the existence at the breeding Jbound Bogor Nirwana Residence in West Java. They also showed high enthusiasm for the breeding as one of the tourist attractions and this deer breeding is also one of the efforts that can be made in maintaining the sustainability of timor deer.

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