JURNAL PENELITIAN Saintek
Volume 30, Nomor 2, 2025 (83-96) p-ISSN:1412-3991 | e-ISSN: 2528-7036

Artificial habitat design *(Dogania subplana)* the area *Turtle Learning Center* (TLC) Universitas Bengkulu

Milzen Adriataspen*, Bhakti Karyadi, Deni Parlindungan, Aceng Ruyani , Euis Nursa'adah
Universitas Bengkulu, Indonesia
Email: milzenbkl@gmail.com

Abstract: Malayan soft- shelled Turtle (*Dogania subplana*) is a species of freshwater softshell turtle that inhabits streams and swamps. This species is considered threatened with extinction and is listed in Appendix III of CITES and as Least Concern by the IUCN. This study aims to design an artificial habitat as a conservation effort and to identify the behavioral adaptations of *Dogania subplana*. The research method used an ecology-based design. The research subjects were five individuals of *D. subplana*, consisting of three females and two males. Data collection methods included field observation, literature review, and documentation. Research instruments involved environmental sensors to measure abiotic data. Data analysis was conducted both qualitatively and quantitatively. Qualitative data were analyzed descriptively through systematic and accurate reviews based on field findings and supported with photographic documentation. Quantitative data were analyzed using the average percentage of observed behaviors, presented in graphs, and supported by measured environmental abiotic data. The study results outline the stages of artificial habitat design for *D. subplana*, which include: location design, area division based on function, addition of supporting biota, fencing, and acclimatization. Observations revealed three behaviors feeding, basking, and aggression which were influenced by environmental temperatures from 26–31°C. *D. subplana* behaviors were observed only in aquatic areas with sandy and rocky substrates, indicating that such behaviors are strongly influenced by both terrestrial and aquatic environmental conditions. The study concludes that the artificial habitat at the Turtle Learning Center (TLC) of the University of Bengkulu, designed with three zones land, mud, and water effectively supports the natural adaptations and activities of *D. subplana*, as indicated by their feeding, basking, and aggressive behaviors.

Keywords: *dogania subplana*, artificial habitat, conservation, behavior.

How to Cite (APA 7th Style): Adriataspen, M., Karyadi, B., Parlindungan, D., Ruyani, A., & Nursa'adah, E. (2025). Artificial habitat design (Dogania subplana) in the Turtle Learning Center (TLC) Universitas Bengkulu. *Jurnal Penelitian Saintek, 30*(2), 83-96. https://doi.org/10.21831/jps.v30i2.86213.

INTRODUCTION

Softshell turtles are freshwater turtles commonly found in freshwater habitats such as rivers and swamps. A distinctive characteristic of the *Trionychidae* family is the presence of a soft carapace and delicate skin tissue. *Trionychidae* consists of two subfamilies: *Trionychina*e, comprising 11 genera with 21 species, and *Cyclanorbinae*, comprising 3 genera with 6 species (Munawaroh, 2021). According to D. Oktaviani (2008), there are five species of *Trionychidae* found in Indonesia:the Asian narrow-headed softshell turtle (*Chitra chitra*), the forest softshell turtle (*Dogania subplana*), the Irian softshell turtle (*Carettochelys insculpta*), *asian giant softshell turtle* (*Pelochelys cantorii*), and the Asiatic softshell turtle (*Amyda cartilaginea*). In Sumatra and Bengkulu Province, three species can be found: the giant *A. cartilaginea*, *P. cantorii*, and the *D. subplana*. *Malayan soft- shelled turtle* is a softshell turtle with an elongated, flat, scaleless body. Its carapace is dark gray or brownish with fine patterns or spots, while the plastron (underside) is dark gray and thick. Its snout has black stripes extending to the neck. The front and rear feet are fully webbed, each with three claws. It has a relatively short tail and a trunk-like small snout (Dayeni et al., 2020). *D. subplana* has a long neck that can extend up to half the length of its carapace and features four pairs of spots on its carapace.

D. subplana was last evaluated in the IUCN Red List of Threatened Species in 2018 and is currently listed as "Least Concern" (IUCN 2025). According to CITES, it is included in Appendix III, meaning it is protected in at least one country and requires international cooperation for conservation (CITES, 2025). Based on the Indonesian Regulation of the Minister of Environment and Forestry No. P.106/MENLHK/SETJEN/KUM.1/12/2018, *D. subplana* is not yet legally protected in Indonesia. Population threats observed in the field, particularly in the tributaries of Pal Tujuh Village, Rejang Lebong Regency, Bengkulu Province, include human interventions such as hunting and habitat destruction due to land conversion for coffee plantations and residential areas. Natural predators such as monitor lizards (*Varanus sp.*), crows (*Corvus sp.*), and hawks (*Spilornis cheela*) also prey on these turtles, contributing to the decline of *D. subplana* populations (Premono & Izmiarti, 2015). Therefore, conservation efforts are needed to preserve and maintain the population of this species.

Conservation is the act of protecting, preserving, and maintaining species according to prevailing conditions. Conservation efforts include preserving natural habitats, maintaining cleanliness, ensuring environmental sustainability, establishing conservation zones, breeding programs, and research. The conservation of *D. subplana* can be conducted both in-situ (in its natural habitat) and ex-situ (outside its natural habitat). Ex-situ conservation involves creating a living environment outside the natural habitat that mimics the necessary environmental conditions for the species. Artificial habitats for *D. subplana* must include biotic components such as plants and animals to maintain ecological balance and support its natural behavior and lifestyle. A successful artificial habitat is one that allows *D. subplana* to carry out natural behaviors such as foraging, showing aggression, and basking (Saputra *et al*., 2024). The University of Bengkulu has established an ex-situ conservation effort called the Turtle Learning Center (TLC). Besides conservation, TLC also serves as an educational facility for the public to learn about Sumatran turtles. The TLC has been developed since 2013 by the Master's Program in Science Education with support from the Dean of FKIP and the Rector of UNIB. Five species of turtles are released into artificial habitats in this area, including the Southeast Asian box turtle (*Cuora. amboinensis*), the black marsh turtle (*Siebenrockiella. crassicollis*), the Asian forest tortoise (*Manouria emys*), asian leaf turtle *(Cyclemys dentata)* and the spiny turtle (*Heosemys spinosa*) (Karyadi et al., 2021). The Sumatran turtles conserved at TLC in artificial habitats have successfully bred. This study aims to design an artificial habitat and observe the behavior of *D. subplana*. It is hoped that through the artificial habitat at TLC, the preservation of *D. subplana* can be maintained, contribute to broader conservation efforts, and serve as a learning resource for students.

METHOD

Artificial Habitat Design

This study used an ecology-based method, including area division based on function, addition of biotic components, creation of nests/shelters, fencing, acclimatization and adaptation, and environmental monitoring (Augustine, 2019). The research was conducted from September to October 2024 at the TLC, University of Bengkulu. The research subjects were five individuals of *D. subplana* obtained from Pal Tujuh Village, Curup District, Bengkulu Province. Data collection methods included field observation, literature review, and documentation. Research instruments included environmental sensors to measure abiotic data such as temperature (air, water, soil, mud substrate, sand substrate), humidity (air, soil, sand substrate, mud substrate), pH (soil, sand substrate, mud substrate, water), dissolved oxygen in water, and total dissolved solids (TDS) in water.

Behavioral Observation

Observastions were conducted for 38 following the desigof the artificial habitat and an intial acclimatization period of day. Data from this period were recorded for use ini subsequent behavioral observastions. The observation times were divided into four periods: morning, noon, afternoon, and night. The observed behaviors included feeding, aggression, mating, and basking. Observations were recorded using a BARDI Smart Outdoor STC IP camera, and each turtle was using a Snowman-Paint Marker:A, C and E for females, and B and D for males.

Abiotic Observation

Abiotic data were observed periodically at four different times each day: morning, noon, afternoon, and night. Tools used included a pH meter, thermometer, lux meter, soil tester, dissolved oxygen (DO) meter, and total dissolved solids (TDS) meter.

Data Analysis

Collected data were analyzed descriptively, systematically, and accurately according to field findings and supported by photographic documentation. Behavioral data were analyzed by calculating the percentage of each *D. subplana* behavior observed and presented in graphs and tables.

FINDINGS AND DISCUSSION

Artificial Habitat Design

The artificial habitat is located in the ex-situ conservation area of the University of Bengkulu at the TLC. The conservation area also serves as the Sumatran Turtle Conservation Study Center. It is home to several Sumatran turtle species (Karyadi et al., 2021), making the ecosystem supportive for *D. subplana*. According to Premono & Izmiarti (2015), *D. subplana* typically inhabits small forest streams or clear highland rivers with slow currents. The artificial habitat designed for this study measures 707 cm in length and 235 cm in width (see Figure 1). The research area was divided into three zones: land area, muddy area, and water area. This setup provides sufficient space for *D. subplana* to adapt and move freely, allowing researchers to observe its natural behaviors.

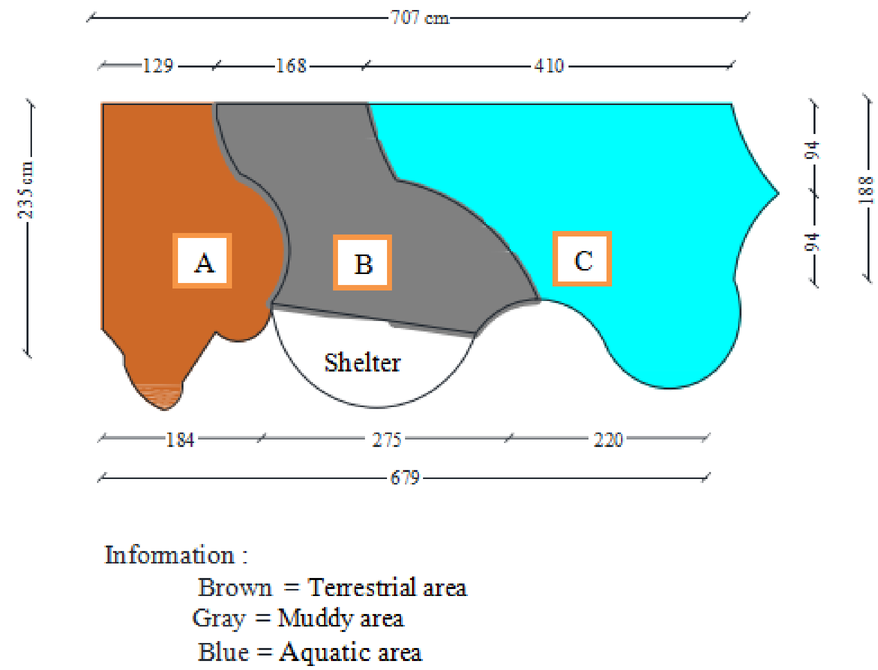


Figure 1. Research location maps

Division of Areas and Provision of Supporting Biota

The division of areas and provision of supporting biota are crucial steps in designing an artificial habitat. The artificial habitat is divided into three zones: terrestrial, muddy, and aquatic areas (Figure 2). The artificial habitat for *D. subplana* is designed by adding several supporting biota such as vegetation and animals, which help create an environment that closely resembles its natural habitat. This enables *D. subplana* to adapt to its new environment and supports its survival in the artificial habitat as part of conservation efforts.

(a) (b) (c)

Figure 2. The artificial habitat design area is divided into 3 parts representing its natural habitat; A) land as a place to bask; B) mud representing the river bank; C) water representing the river flow.

Table 1. Plant and Animal Biota of the Artificial Habitat

Artificial habitat area	Existing biota
1. Terrestrial area	Plants: Colocasia esculenta, melastoma malabathricum, asplenium nidus , diplazium esculentum, musa salaccensis zoll. Animal: Eutropis multifaseciata, lumbricina, insecta,aves.
2. Muddy area	Plants: Eichhornia crassipes, asplenium nidus, ludwigia octovalvis, limnicharis flava, cleome rutidosperma. Animal: Triochopodus pectoralis, rasbora argryotaenia, macrobrachium lanchesteri, rasbora lateristriata, fejervarya raja, pomacea canaliculata, pila ampullacea.
3. Aquatic area	Plants: Colocasia esculenta, aspelium nidus, papilionanthe hookerina, epipremnum aureum, ludwigia octovalvis, diplazium esculentum ,heliconia, Hydrilla verticillate. Animal: Triochopodus pectoralis, rasbora, channa gachua, clarias nieuhofil, barbodes binotatus, aplochelius panchax, macrobrachium ianchesteri, Bufo, filopaludina javanica,.

Fencing of the Artificial Habitat

The fencing of the *D. subplana* artificial habitat aims to protect it from external threats while also creating a controlled environment. With fencing in place, disturbances from predators, humans, and undesirable environmental factors can be minimized, allowing the species to breed and live more safely. The fencing for the *D. subplana* artificial habitat uses concrete material, intended to control the presence and activities of *D. subplana* so they do not escape. Concrete was chosen for the pond structure due to its durability and strength (Griselda et al., 2023). To date, there is no established ideal enclosure size required for each turtle species; instead, it is adjusted based on the pond's carrying capacity (Porwonto et al., 2017). The designed enclosure for *D. subplana* has a minimum wall height of 40 cm with smooth vertical concrete walls perpendicular to the ground surface. Adult *D. subplana* individuals have a carapace length of 13–35 cm. *D. subplana* will not escape the artificial habitat due to the height and steepness of the enclosure walls, which limit their movement.

1. Terrestrial Area

The terrestrial area in the artificial habitat is designed to resemble the natural habitat, which includes vegetation that provides shelter for *D. subplana*. Reboul et al. (2021) stated that the terrestrial zone should be constructed in a way that ensures the long-term survival of turtle populations. The substrate used for the terrestrial area is humus soil, which supports vegetation growth and development. Vegetation such as *Melastoma malabathricum* (seduduk), edible ferns, wild banana, and shrubs is added (Table 1). According to Naharuddin (2017), vegetation protects the soil surface from raindrop impact, and plant debris such as leaves and twigs on the ground helps form a humus layer.The leaves of *Melastoma* serve as a refuge for *D. subplana* from predators, while wild banana plants help balance the water availability for surrounding vegetation by absorbing and storing water in their stems, maintaining environmental humidity.

2. Muddy Area

The muddy area is designed to resemble parts of a stream bank, based on field observations indicating that *D. subplana*inhabits muddy riverbanks. According to Saputra et al. (2024), mud substrate has a soft texture and high moisture content, which helps maintain humidity. This substrate also supports vegetation growth in the muddy area, which consists of 20 cm of mud and 5 cm of water. Adding mud also benefits aquatic plants growing in it, as they receive nutrients from decomposed organic matter, aiding their development. This vegetation not only serves as part of the food chain but also provides shelter for aquatic species such as fish that use mud as refuge. The addition of mud and vegetation reduces potential predator threats to turtles and serves as an indicator of successful adaptation in the artificial habitat. Vegetation also supports the ecosystem of the artificial habitat, including water hyacinths and *Limnocharis flava* (genjer). The inclusion of *Limnocharis flava* in the muddy area benefits *D. subplana* and small animals (such as insects) as a food source and is suitable for phytoremediation methods in artificial environmental setups (Salim et al., 2024). Water hyacinths function as absorbers of pollutants and heavy metals, helping maintain ecosystem balance by filtering harmful substances from the water. Additionally, their leaves and roots provide habitat for microorganisms and small animals that support the *D. subplana* food chain. *Limnocharis flava* also stabilizes the muddy substrate with its strong roots while serving as a natural food source for various animals like fish and other aquatic species. The presence of this plant not only enhances biodiversity but also aids in natural environmental remediation processes. A shaded area within the muddy zone is shown in Figure 3.

Figure 3. Shade/nest

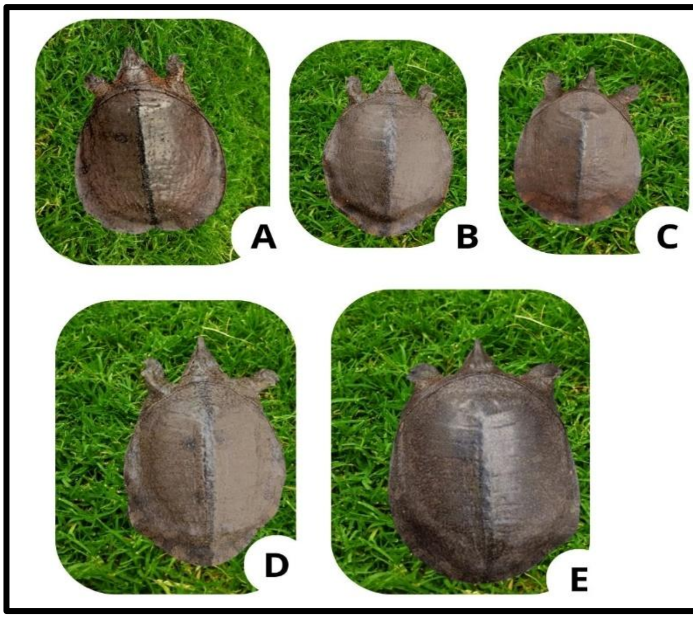
The shelter in the artificial habitat is designed with a concrete structure measuring 129 cm in length and 56 cm in width. The shelter features concrete walls and a square-shaped entrance. It is placed in the muddy area near the water zone because *D. subplana* is an aquatic animal that spends most of its time in the water. Placing the shelter near this area facilitates the softshell turtle's nesting activities. The shelter substrate consists of a 1:1 mixture of sand and soil, with the addition of dry leaves. The addition of dry leaves aims to loosen the substrate for easier digging and egg laying. The optimal temperature for egg incubation ranges from 25–35°C. This shelter provides safety for *D. subplana* during the egg-laying process, protecting them from predators and extreme weather. A container filled with sand inside the shelter serves as a nesting place, and vegetation around the shelter helps maintain suitable humidity for egg development.

3. Aquatic Area

The aquatic area is designed to resemble a river stream with sandy substrate and water. The depth is tailored to meet the needs of *D. subplana*, with a sand depth of 10 cm and water depth of 10 cm. The addition of sandy substrate is based on preliminary observations from the natural habitat along a tributary of the Melintang River in Pal Tujuh Village, Curup, Bengkulu Province, which has a sandy substrate. Premono & Izmiarti (2015) stated that *D. subplana* is often found in natural habitats with sandy and rocky substrates. The sandy-bottomed aquatic area is where *D. subplana* spends time ambushing prey such as small fish, insects, and snails. Water temperature and quality are also crucial, as *D. subplana*, being a cold-blooded reptile, relies on environmental temperature to regulate its metabolism. Additionally, vegetation (see Table 1) and overhead shelter in the aquatic area help maintain water temperature and humidity. Plant selection for the artificial habitat is based on factors such as their ability to maintain water quality and humidity, provide shelter, and serve as a food source for *D. subplana*. *Hydrilla verticillata*, a submerged plant with emergent tips, is used due to its high capacity to accumulate heavy metals, including mercury (Rondonuwu, 2014).

Other plants, such as ferns, help maintain ecosystem balance by producing oxygen and absorbing rainwater. The addition of these plants is vital for the designed habitat. According to Warwick et al. (2023), relative humidity should be maintained above 70% for nearly all reptile species, including *D. subplana*. A water filter is also installed to maintain water quality by filtering dirt and harmful substances, creating a healthier environment. The filter also increases dissolved oxygen levels, which supports the physiological activity of *D. subplana*and reduces the risk of waterborne diseases, such as those caused by the bacterium *Ichthyophthirius multifiliis*. Stone mounds and wooden logs are added as basking spots basking and hunting behaviors are indicators of the success of the artificial habitat design. The diversity of animals in the artificial habitat, such as fish, insects, frogs, and shrimp, plays a role in the food chain within this ecosystem. The animals in the artificial habitat include *ikan sepat* (trichogaster), *ikan wader* (barb), *ikan seluang* (rasbora), *ikan timah*, catfish (*ikan lele*), snakehead (*ikan gabus*), paddy shrimp, and snails. Earthworms, insects, and frogs are other creatures that may naturally enter the habitat. These animals are essential in supporting the food availability and survival of *D. subplana*.

Release of *D. subplana* into the Artificial Habitat



Sign	Gender	Size and weight
A	Female	Length and width (110 mm and 93 mm) heavy; 169 grams
B	Male	Lenght and width (102 mm and 100 mm heavy; 129 gram
C	Female	Lenght and width (104 mm and 92 mm) heavy; 115 gram
D	Male	Lenght and width (127 mm and 95 mm) heavy; 196 gram
E	Female	Lenght and width (185 mm and 142 mm heavy; 207

Figure 4. Samples of D. Subplana released into the artificial habitat area

Based on observations of five *D. subplana* individuals (Figure 4), the sex ratio was found to be 2:3 between males and females. Two male individuals (coded B and D) and three female individuals (coded A, C, and E) were identified. Body sizes varied, with carapace lengths ranging from 102 mm to 185 mm and weights ranging from 115 grams to 207 grams. Female individuals were generally larger, particularly individual E, which had the largest size with a carapace length of 185 mm and a weight of 207 grams. In contrast, the male individuals had smaller body sizes.
Morphologically, the sex of the individuals could be distinguished by body size, with males having longer tails than females. All individuals exhibited intact carapaces with no wounds or deformities and showed active body movement responses when observed, indicating that they were in good health and suitable for further behavioral research.

D. subplana individuals were transferred from an aquarium where they had undergone an initial acclimatization period to an artificial habitat prepared as a research site. This was to allow further adaptation and acclimatization to their new environment. Acclimatization refers to the ability of an organism to adjust to new environmental conditions. According to Lestari et al. (2021), successful acclimatization in turtles is marked by their ability to reproduce, exhibit normal feeding behavior, and adapt effectively to the environment. During the first stage of acclimatization in the aquarium, recommended food items included wader fish, seluang fish, and shrimp (Table 1). These food items were also released into the artificial habitat to support dietary needs. The next phase of acclimatization involved observing behavior in the artificial habitat for seven days. The acclimatization of *D. subplana* in an artificial habitat plays a significant role in supporting the species' successful adaptation to new surroundings. This process enables the turtles to adjust to the physical, chemical, and biological conditions of the habitat, including temperature, water quality, and food availability. With successful acclimatization, stress from relocation can be reduced, thereby enhancing the turtles' immunity and survival potential. Hunting or foraging behavior—one of the natural behaviors of *D. subplana*—was observed, indicating the species' ability to adapt to the constructed habitat.

Daily Behavior of *D. subplana*

The behavior of *D. subplana* in the artificial habitat was observed to fall into three categories: feeding, basking, and aggression. Feeding behavior was indicated by active foraging and hunting. Basking behavior was characterized by individuals resting on wooden surfaces at the water's edge. Aggressive behavior included fighting and chasing other individuals in the aquatic area.

A B C

Figure 5. Behavior (A) eating,(B) basking, (C) aggression.

Feeding Behavior

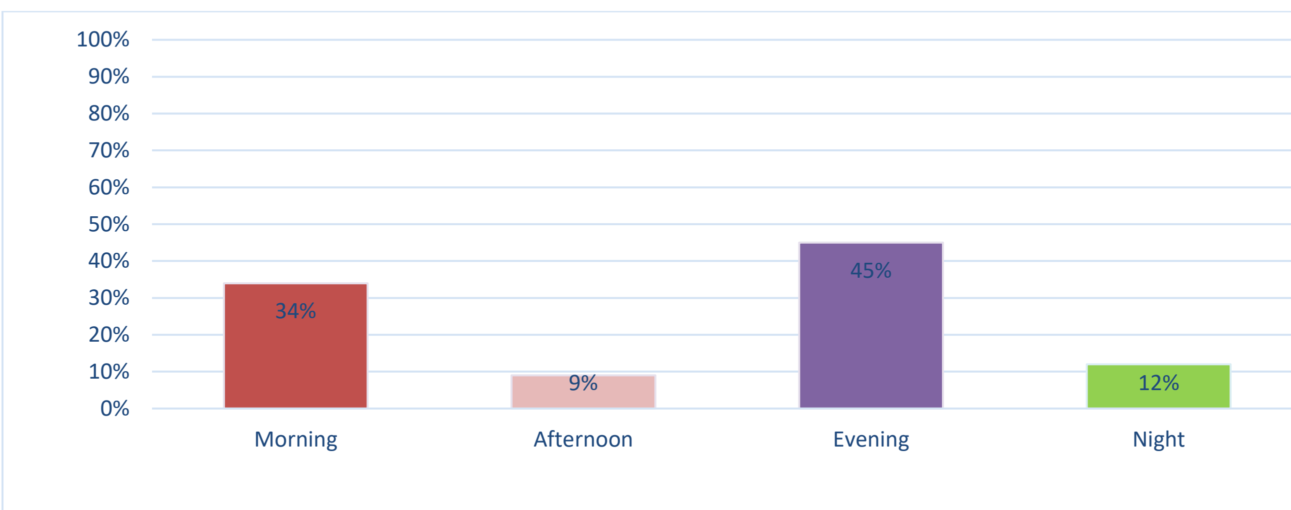


Figure 6. Percentage of *D. Subplana* eating behavior based on time

Based on the graph of feeding behavior percentages in *D. subplana*, it is evident that feeding activity is most dominant in the afternoon, with a percentage reaching 45%. This indicates that *D. subplana* tends to be more active in foraging during the late afternoon, influenced by environmental factors such as stable water temperatures and reduced disturbances from predators.

Morning feeding behavior is also relatively high, at 34%, while feeding activity during the daytime is the lowest, at only 9%, and slightly increases at night to 12%. This pattern suggests that *D. subplana* tends to avoid feeding during midday, which may be related to physiological, thermal, or ecological interaction factors. *D. subplana* shows a tendency to feed more actively in the morning and late afternoon, which can be classified as crepuscular behavior—active during transitional periods of the day. This is important to consider in behavioral ecology studies and habitat management. This feeding behavior also indicates that *D. subplana* is nocturnally active.

Basking Behavior

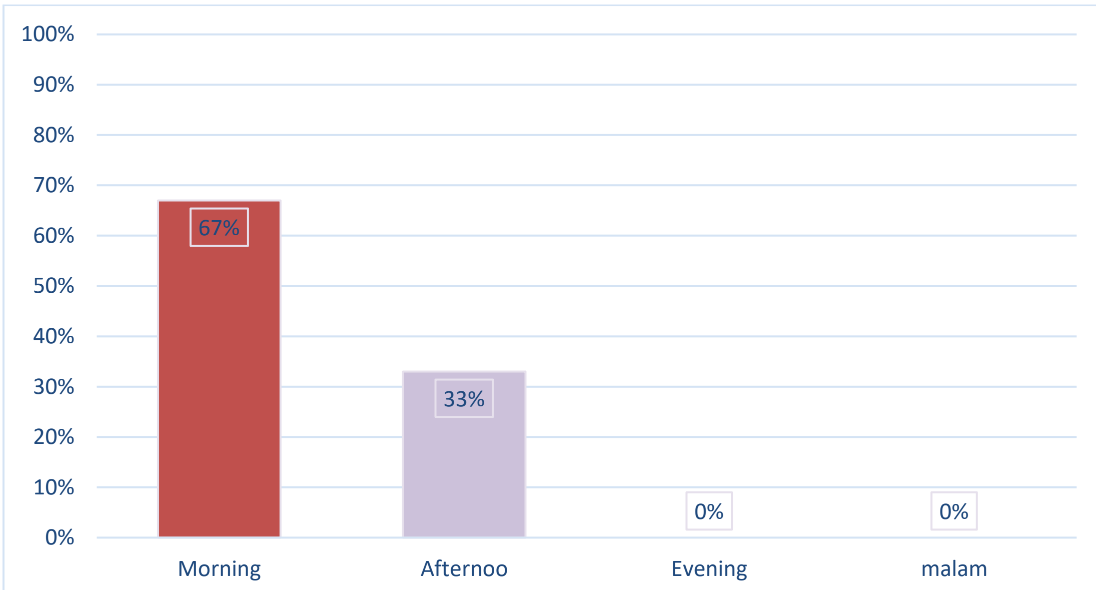


Figure 7. Percentage of sunbathing behavior *D. Subplana* based on time

The percentage graph of basking behavior in *D. subplana* shows that basking activity occurs most frequently in the morning, reaching 67%, followed by the afternoon at 33%. No basking activity was observed in the evening or night. This pattern indicates that basking primarily occurs from morning to noon. According to Prayogo *et al*. (2024), basking behavior is influenced by morning abiotic factors related to thermoregulation needs, in which the morning sunlight is utilized to increase body temperature after the relatively cold night. The exposure to mild morning sunlight allows them to gain maximum benefits without the risk of overheating, making this behavior an essential part of the species' physiological and ecological adaptation strategy.

Aggressive Behavior

Aggressive behavior in *D. subplana* was observed only in the late afternoon, while no aggression was recorded in the morning, afternoon, or night. This pattern indicates that *D. subplana* tends to display aggressive behavior at specific times, with an increase toward the end of the day. This may correspond with increased interactions as daily activity declines, triggering aggressive responses as a form of defense or dominance.

The observed aggression was primarily food-related, showing an interesting tendency where individuals of this species can exhibit aggression toward each other while foraging. This behavior generally emerges as a form of competition to defend or dominate feeding areas. Such actions reflect a defense mechanism against competitive threats and a strategy to maximize nutritional intake. The pattern of aggression may also be influenced by environmental factors such as activity timing, food availability, and population density in the habitat. Therefore, the aggressive behavior displayed by *D. subplana* during foraging is an important indicator for understanding the species' social and ecological dynamics. The success of its conservation is supported by optimal environmental conditions. Supportive environmental conditions play a significant role in the behavior of *D. subplana* in the designed artificial habitat, which should closely resemble their natural habitat. According to Suhendar et al. (2019), softshell turtles can live in water temperatures ranging from 25°C to 30°C, while air humidity levels of 70%–80% strongly support the daily behavior of *D. subplana*.

Table 2. Abiotic Data from September to October

Observation parameters	Location			Average	Quality standards class II water (PP RI N0.82 years 2001)
	Water area	Muddy area	Terrestrial area		
Air temperature (◦C)	32	31	32	31	-
Soil temperature (◦C)	-	-	28	28	-
Water temperature (◦C)	29	27	-	28	Deviasi 3
Mud substrate sand (◦C)	-	28	-	28	-
Sand substrate temprature (◦C)	28	-	-	28	-
pH of the mud substrate		7	-	7	-
pH sand substrate	7	-	-	7	-
Water pH	9	8	-	8,5	6-9
Soil pH	-	-	7	7	-
Ari humidity	70	69	72	70	-
Soil moisture	-		73	73	-
Mud substrate moisture	-	71		71	-
Sand substrate	80		-	80	-
Intisitas light (Lux)	7.660	1.700	1.700	3.510	-
DO	5	5	5	5	>4
TDS	300	308	-	304	-

Abiotic factors such as temperature, pH, humidity, and dissolved oxygen content in the water (Table 2) play an important role in influencing the behavior of *D. subplana* in the artificial habitat. With an air temperature averaging between 26–31°C, *D. subplana* basks on land to raise its body temperature. Meanwhile, the average water temperature of 28°C remains within the optimal range for soaking activity, which helps regulate temperature and hydration. The presence of mud and sand substrates with stable temperatures also provides options for *D. subplana* to hide or rest according to its physiological needs.

Besides temperature, other factors such as pH and dissolved oxygen also affect *D. subplana* behavior. The water pH averaging 7–8 is still within the tolerance range for this species, although values around this range can influence metabolism. Dissolved oxygen (DO) content of 5 mg/L indicates good water quality, supporting respiratory activity and the movement of softshell turtles in the water. The substrate humidity varies, with mud at 71% and sand at 80%, indicating that *D. subplana* selects locations suitable for resting or hiding from potential threats. With these appropriate abiotic conditions, the daily behavior of *D. subplana* in the artificial habitat can proceed optimally, supporting growth and adaptation in a controlled environment. The combination of these environmental factors contributes to the success of ex-situ conservation efforts for *D. subplana*. Humidity in the designed habitat location must also consider the maintenance of plants, avoiding overly dense vegetation through proper site management. These findings can form the basis for further research on factors affecting *D. subplana* activity patterns, such as seasonal variations, individual differences, or environmental change impacts. More in-depth studies can also aid conservation efforts for this species, especially in maintaining its natural habitat to support ecological needs.

CONCLUSION

The artificial habitat at the Turtle Learning Center (TLC), Universitas Bengkulu, is designed into three areas: land, mud, and water. The designed artificial habitat can adequately support the natural adaptations and activities of *D. subplana*, as indicated by the percentages of feeding behavior (morning, afternoon, evening, night), basking, and aggression. These behaviors are mostly found in the aquatic area. *D. subplana* prefers aquatic areas with sand and rocky substrates. Feeding behavior in the artificial habitat is highly influenced by environmental conditions on land, mud, and water. Overall, the design of the artificial habitat for *D. subplana* provides a sufficiently optimal environment

ACKNOWLEDGMENTS

We thank FKIP UNIB for supporting funding through the PPKP Postgraduate research contract number 3790/UN30.7/PP/2024; the Center for Ex-Situ Biodiversity Studies, Universitas Bengkulu, for providing the research site; SBIH RUYANI for facilitating tools and materials throughout the research; and everyone who has helped in this study.

REFERENCES

Augustine, L., & Haislip, N. (2019). Husbandry and Reproduction of the Indochinese Box Turtle Cuora galbinifrons, Bourret's Box Turtle Cuora bourreti and Southern Vietnam Box Turtle Cuora picturata in NorthAmerica. International Zoo Yearbook, 53(1), 238-249. https://doi.org/10.1111/izy.12214

[CITES] Convention on Internasional Trade in Endangers Species of Wild Fauna and Flora. Cheklist of CITES Species. checklist.cites.org. diakses tanggal 1 Mei 2025. https://cites.org/eng

Dayeni, F., Ruyani, A., & Suhartoyo, H. (2020). Development of E-Module Based on Morphometric Studies of the Diversity of Sumatran Turtles for High School Students. *Journal of Science Education and Technology*, *1*(2), 61–68.

https://d1wqtxts1xzle7.cloudfront.net
Griselda, A, Marta, M. E., & Hbnul, W. (2023). Perancangan Wisata edukasi hewan peliharaan eksotis dengan pendekatan arsitektur tropsi. *Jurnal Sains Dan Teknologi*, *18*(02), 133–141. https://doi.org/10.59637/jsti.v18i2.218
Karyadi, B., Ruyani, A., Sundaryono, A., Parlidungan, D., & Aswin, P. (2021). *The Heosemys Spinosa Monitoring Model in Conservation Areas as the Conservation Practicum for Postgraduate Science Education in Bengkulu University*. *532*, 103–107. https://doi.org/10.2991/assehr.k.210227.017
[IUCN] International Union for Conservation Of Nature and Natural Resourseces. 2018 IUCN Red List of Threatened Species. www.iucnredlist.org. diakses tanggal 1 Mei 2025. https://www.iucnredlist.org/
Kementerian Lingkungan Hidup dan Kehutanan Republik Indonesia. (2018). Peraturan Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia Nomor P.106/MENLHK/SETJEN/KUM.1/12/2018 tentang Perubahan Kedua atas Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor P.20/MENLHK/SETJEN/KUM.1/6/2018 tentang Jenis Tumbuhan dan Satwa yang Dilindungi. Jakarta: KLHK. https://jdih.menlhk.go.id/
Lestari, L., Ruyani, A., & Suhartoyo, H. (2021). *Studi Aklimatisasi Heosemys spinosa di Area Konservasi Ex-situ Universitas Bengkulu*. *5*(2), 244–250. https://pdfs.semanticscholar.org/
Munawaroh, P. and A. F. (2021). Characterization of whole mitochondrial genome Amyda cartilaginea from Dharmasraya , West Sumatera Characterization of whole mitochondrial genome Amyda cartilaginea from Dharmasraya , West Sumatera. *IOP Conf. Series: Earth and Environmental Science 744*, *744*, 1–8. https://doi.org/10.1088/1755-1315/744/1/012047.
Naharuddin. (2017). Komposisi dan struktur vegetasi dalam potensinya sebagai parameter hidrologi dan erosi. *Jurnal Hutan Tropis*, *5*(2), 6–12. https://dx.doi.org/10.20527/jht.v5i2.4367
Oktaviani, D., Andayani, N., Kusrini, M. D., & Nugroho, D. (2008). Idendifikasi dan distribusi jenis labi-Labi (Famili: Triocyhidae) di Sumatera Sealatan. *J. Lit. Perikanan*, *14*(2), 145–157. https://d1wqtxts1xzle7.cloudfront.net/
Porwonto, Kursin Dikari Mirza, M. B. (2017). Manajemen Penangkaran Empat Jenis Kura-Kura Peliharaan dan Konsumsi di Indonesia (Captive Breeding Management of Four Species Turtle for Pet and Consumption in Indonesia). *Jurnal Penelitian Hutan Dan Konservasi Alam*, *October*. https://doi.org/10.20886/jphka.2016.13.2.119-135
Prayogo, B., Karyadi, B., Parlindungan, D., Ruyani, A., & Dewi, R. (2024). Adaptasi perilaku Cuora amboinensis pada habitat buatan (Artificial Habitat) Di area Konservasi Ex-situ Universitas Bengkulu. *Jurnal Hutan Tropis*, *12*(2), 251–261. https://dx.doi.org/10.20527/jht.v12i2.19776
Premono, B., & Izmiarti, R. (2015). Kelimpahan Populasi dan Kondisi Habitat Labi-Labi (Dogania subplana : Reptilia : Trionychidae) di Kawasan Kampus Universitas Andalas Padang. *Jurnal Biologi Universitas Andalas (J.Bio.UA)*, *4*(November 2014), 26–30. https://jbioua.fmipa.unand.ac.id/index.php/jbioua/article/view/114/106
Reboul, I., Booth, D., & Rusli, U. (2021). Artificial and natural shade : Implications for green turtle (Chelonia mydas) rookery management. *Ocean and Coastal Management*, *204*(February), 105521. https://doi.org/10.1016/j.ocecoaman.2021.105521.
Rondonuwu, S. B. (2014). Phytoremdiation waste merkury using plant and system reactor. *Jurnal Ilmiah Sains*, *14*(1), 53–59. https://doi.org/10.35799/jis.14.1.2014.4951
Salim, E., Leka, K., & Nasution, R. K. (2024). Metode Fitoremediasi Dalam Pengelolaan Air

Asam Tambang Batubara (Fe Dan Mn) Berdasarkan Literatur Review Phytoremediation Method in Management of Coal Mine Acid Water (Fe and Mn) Based on Literature Review. *Jurnal Kimia Dan Ilmu Lingkungan*, *2*(1), 97–104. https://ojs.ejournalunigoro.com/index.php/CHEMVIRO/article/download/809/589/

Saputra, F. E., Karyadi, B., & Parlindungan, D. (2024). Desain habitat buatan kura-kura batok (Cauora ambonensis) di area konservasi eksitu Universtias Bengkulu. *Jurnal Ilmiah Biologi*, *12*(1), 436–452. https://doi.org/10.33394/bioscientist.v12i1.11097

Suhendar, D., & Supartono, T. (2019). karakteristik habitat labi-labi (Amyda cartilaginea) di desa. *Cool for Papers Dan Seminar Nasional 1*, 108–114. https://journal.uniku.ac.id/index.php/prosiding-fahutan/article/view/3659

Warwick, C., Arena, P. C., & Editors, G. M. B. (2023). *Health and Welfare of Captive Reptiles* (Springer (ed.). https://doi.org/10.1007/978-3-030-86012-7