# Project-Based Learning: Animal Diversity Survey in Turtle Conservation Area at Bengkulu University

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**Abstract.** This article describes the Project Based Learning (PBL) using for animal diversity survey were conducted by 12 students from 29 August to 11 October 2020 in Turtle Conservation Area at Universitas Bengkulu. The research method is through five phases: (1) Research planning and pre-survey preparation, (2) Guided observation (3) Survey and data collection, (4) Assessment, and (5) Follow-up. Observation results obtained 93 animal species which are divided into 9 classes, 26 orders, 46 families and 79 genera. Conclusion: The application of PBL in exploring the diversity of animals in the turtle conservation area of Universitas Bengkulu resulted in sufficient survey data and field activities providing an efficient and practical project-based learning experience but lots of cognitive, affective and psychomotor content for students.

**Keywords:** Animal · Bengkulu University · Diversity · Project Based Learning

## 1 Introduction

It is acknowledged that the inclination to learn more "textual" information just through literature review is a less advantageous scenario. A "textual" approach to teaching children that is "instant," as opposed to "contextual" and "conceptual" approaches to learning that involve real objects and situations [1]. As a result, both teachers and students appear to lose sight of why particular issues should be explored in the first place. Even if there is a curriculum with defined expectations, this does not guarantee that it will be implemented smoothly in the field.

Project-Based Learning (PBL) is a learning model that revolves around projects. A project is a complex task that engages students in design, problem solving, decision making, or investigative activities; allows students to work relatively independently over

long periods of time; and culminates in a realistic product or presentation. PBL is a type of learning in which students are directly involved in project activities. Students that participate in PBL will learn to collaborate and solve problems more effectively, as well as become more authentic. Project-based learning with many structured challenges, and it demands learning high-level skills and asking questions needed for problem solving, PBL learning at the student level is easier to implement compared to students [2, 3].

Employing the environment as a learning resource, one approach to bring students closer to the objective reality of life is to give learning resources that can lead students to learn about many things that are directly related to everyday phenomena. Environmental learning resources can boost student activities and learning outcomes, making students more aware of social problems in society, capable of solving problems, and capable of developing knowledge, skills, attitudes, and values to engage in their life [4]. Learning through using the environment as a learning resource through the inquiry method of student learning activities, both from the concept, usage in life, and the usefulness and importance to be utilized in teaching and learning activities. The social, psychological, and ecological environments are all valuable learning tools. It will be more effective in studying science, especially the diversity of various living creatures, if learning resources from the natural environment are used [5].

For the past five years, Bengkulu University has been actively managing the conservation area (Fig. 1). Sumatran semi-aquatic and terrestrial turtles are the subject of current conservation efforts. These protection zones are expected to provide an ecosystem that is similar to that of turtles such as *Cyclemys oldhamii, Cuora amboinensis, Notochelys platynota, Siebenrockiella crassicolis,* and *Heosemys spinosa* in their natural habitat [6]. However, the biotic environmental conditions in conservation do not only affect turtles; there are still interactions between other living things in the ecosystem about which little is known. Other creatures' existence is intimately linked to the state of the conservation area, which is concerned about its viability and good interactions. PBL activities with students will be used to collect data by looking for animals that exist in conservation areas. The obtained diversity data can be reviewed and used as a learning resource in the subject of living things diversity, as well as an excellent source because it is bundled into a single learning module. This is supposed to be a teaching resource that will improve students' knowledge of topics and learning activities for scientific education students at Bengkulu University's Faculty of Teacher Training and Education.

## 2    Method

PBL was conducted by 12 students who voluntarily participated in the investigation. at Bengkulu University starting from August 29 to October 11, 2020 at the Turtle Conservation Area. After guided observation with lecturers for 2 days, students carry out weekly surveys regularly and independently for up to 6 weeks. This project includes five phases: (1) Research planning and pre-survey preparation, (2) Guided observation (3) Survey and data collection, (4) Assessment, and (5) Follow-up efforts.

1) Research planning and preparation
   One week prior to the survey, the study design and pre-survey preparation were completed. At this point, the 12 students that took part were divided into two teams,
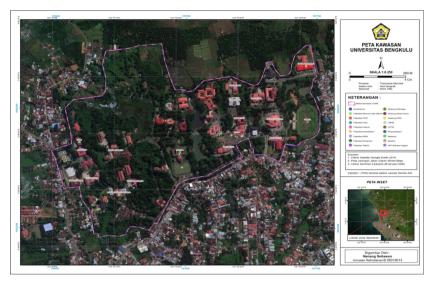
**Fig. 1.** Bengkulu University Area

each with six members. Each group is given the task of designing research relevant to animal diversity in the conservation area, which will be carried out by the team. Each crew did their own survey, which was dispersed around the area. Students are given many tasks to complete in order to perform an effective survey, such as taking images, capturing (optional), recording data, and calculating. Students were instructed to prepare all necessary tools and equipment according to a checklist created by the students at the conclusion of the [7]; Table 1.

2) Guided observation

At the start of the survey, guided observations were made. Students learn how to identify and photograph animals in the wild, capture them (if needed), count them, and record their findings in data sheets in this activity. They are then taught how to operate and record abiotic data measuring instruments in the field. Once the speaker had given an example, the pupils replicated what he had done. Then compare and contrast the outcomes of student trials with those of lecturers. If the field technique is found to be adequate, the students will survey and collect data on their own.

3) Surveys and data collection

Twelve students had already prepared their field needs and were provided with data retrieval abilities prior to the survey and data collecting. All participants must apply themselves to following out the guidelines outlined in the checklist data. Participants in pairs dispersed according to the supervisor's location selection. All participants collected all of the images for identification after obtaining data in the form of animal photos and abiotic data. Books used are Herpetofauna [8], Butterfly [9], Avifauna [10], Odonata [11] and some reserch posters are used to carry out the identification.

4) Evaluation

Every week during the six weeks of observation, students provide a data summary in the form of a species table, as well as images that have been identified or have not

**Table 1.** Checklist table check tools and rules before survey

| Tools | Y | N | Rules | Y | N |
|---|---|---|---|---|---|
| Hygrometer | ✓ | | Trousers and field shoes (without shorts or sandals) | ✓ | |
| Soiltester | ✓ | | Breakfast first | ✓ | |
| Thermometer | ✓ | | Use skin protection | ✓ | |
| pH meter | ✓ | | Clean/wash your hands after contact with animals | ✓ | |
| Lux meter | ✓ | | Killing animals | | ✓ |
| Digital camera | ✓ | | Photographing (capture if needed) | ✓ | |
| Datasheets and pencils | ✓ | | Open the mask | | ✓ |
| Identification guidebook | ✓ | | Change the position of any object on the ground | | ✓ |
| Cell phones and tongsis | ✓ | | Noise or screaming | | ✓ |
| Bottle of drinking water | ✓ | | Eating and drinking in the location | | ✓ |
| Antiseptic (cleanser during activity) | ✓ | | Create a fire in location | | ✓ |
| Mask | ✓ | | Leaving something in the location (garbage, trap or tool) | | ✓ |
| Spare battery | ✓ | | | | |
| Sample plastic (optional) | ✓ | | | | |
| Reminders/Clocks | ✓ | | | | |

been identified. Participants present study objectives, field survey results, and share experiences and views with fellow participants about field data collection procedures and limits during educational events. Each participant is given the opportunity to rectify the results of other teams' identification data, and the rectified data becomes input for each group. At each stage of their development, their progress in terms of knowledge, skills, and attitude can be examined.

5) Follow-up efforts

The students' efforts can then be used as group work, and the data on animal diversity can be combined into field guides/handbooks, posters, and leaflets that can be used as learning resources, as well as draft articles extracted from reports to be published. Paper or poster presentations, as well as popular periodicals and scientific publications.

## 3 Result and Discussion

Table 2 displays the species information gathered by all participants in the study. There are 93 animal species classified into nine groups, 26 orders, 46 families, and 79 genera. The existence of these creatures is critical for gathering data to assist their long-term

**Table 2.** Animal Diversity in the Turtle Conservation Area

| Nb | Spesies | England name | Genus | Family | Ordo | Kelas | Conservation status |
|---|---|---|---|---|---|---|---|
| 1 | Oreochromis niloticus (Linnaeus, 1758) | Nile Tilapia | Oreochromis | Cichlidae | Perciformes | Teleostei | LC |
| 2 | Aplocheilus panchax (Hamilton, 1822) | blue panchax | Aplocheilus | Aplocheilidae | Cyprinodontiformes | Teleostei | Unknown |
| 3 | Monopterus albus (Zuiew, 1793) | rice eel | Monopterus | Synbranchidae | Synbranchiformes | Teleostei | Unknown |
| 4 | Trichopodus trichopterus (Pallas, 1770) | Blue gourami | Trichopodus | Osphronemidae | Perciformes | Teleostei | Unknown |
| 5 | Fejervarya cancrivora (Gravenhorst, 1829) | Unknown | Fejervarya | Dicroglossidae | Anura | Amphibi | LC |
| 6 | Fejervarya limnocharis (Gravenhorst, 1829) | Unknown | Fejervarya | Dicroglossidae | Anura | Amphibi | LC |
| 7 | Chalcorana chalconota (Schlegel, 1837) | Unknown | Chalcorana | Ranidae | Anura | Amphibi | LC |
| 8 | Indosylvirana nicobariensis (Stoliczka, 1870) | Unknown | Indosylvirana | Ranidae | Anura | Amphibi | LC |
| 9 | Ingerophrynus biporcatus (Gravenhorst, 1829) | Unknown | Ingerophrynus | Bufonidae | Anura | Amphibi | LC |
| 10 | Ingerophrynus parvus (Boulenger, 1887) | Unknown | Ingerophrynus | Bufonidae | Anura | Amphibi | LC |
| 11 | Ingerophrynus claviger (Peters, 1863) | Unknown | Ingerophrynus | Bufonidae | Anura | Amphibi | LC |

(continued)

**Table 2.** (continued)

| Nb | Spesies | England name | Genus | Family | Ordo | Kelas | Conservation status |
|---|---|---|---|---|---|---|---|
| 12 | *Ingerophrynus quadriporcatus (Boulenger, 1887)* | Unknown | *Ingerophrynus* | *Bufonidae* | *Anura* | *Amphibi* | LC |
| 13 | *Limnonectes macrodon (Duméril and Bibron, 1841)* | Unknown | *Limnonectes* | *Dicroglossidae* | *Anura* | *Amphibi* | VU |
| 14 | *Polypedates leucomystax (Gravenhorst, 1829)* | Unknown | *Polypedates* | *Rhacophoridae* | *Anura* | *Amphibi* | LC |
| 15 | *Duttaphrynus melanostictus (Schneider, 1799)* | Unknown | *Duttaphrynus* | *Bufonidae* | *Anura* | *Amphibi* | NE |
| 16 | *Hylarana erythraea (Schlegel, 1837)* | Unknown | *Hylarana* | *Ranidae* | *Anura* | *Amphibi* | NE |
| 17 | *Microhyla heymonsi (Vogt, 1911)* | dark-sided chorus frog | *Microhyla* | *Microhylidae* | *Anura* | *Amphibi* | LC |
| 18 | *Zoropsis spinimana (Dufour, 1820)* | Garage spider | *Zoropsis* | *Zoropsidae* | *Araneae* | *Arachnida* | NE |
| 19 | *Eudynamys scolopaceus* | Unknown | *Eudynamys* | *Cuculidae* | *Cuculiformes* | *Aves* | NE |
| 20 | *Harpaphe haydeniana* | yellow-spotted millipede | *Harpaphe* | *Xystodesmidae* | *Polydesmida* | *Diplopoda* | NE |
| 21 | *Trigoniulus corallinus (Eydoux & Souleyet, 1842)* | red garden milipede | *Trigoniulus* | *Trigoniulidae* | *Spirobolida* | *Diplopoda* | Unknown |
| 22 | *Filicaulis bleekeri* | Unknown | *Filicaulis* | *Veronicellidae* | *Systellommatophora* | *Gastropoda* | Unknown |
| 23 | *Pila ampullacea (Linnaeus, 1758)* | Unknown | *Pila* | *Ampullariidae* | *Architaenioglossa* | *Gastropoda* | Unknown |

(continued)

**Table 2.** (*continued*)

| Nb | Spesies | England name | Genus | Family | Ordo | Kelas | Conservation status |
|----|---------|--------------|-------|--------|------|-------|---------------------|
| 24 | *Pomacea canaliculata (Lamarck, 1822)* | *golden apple snail or the channeled apple snail,* | *Pomacea* | *Ampullariidae* | *Architaenioglossa* | *Gastropoda* | *LC* |
| 25 | *Achatina fulica* | *Giant African land snail* | *Achatina* | *Achatinidae* | *Stylommatophora* | *Gastropoda* | *Unknown* |
| 26 | *Acyrthosiphon pisum (Harris, 1776)* | *pea aphid* | *Acyrthosiphon* | *Aphididae* | *Hemiptera* | *Insecta* | *Unknown* |
| 27 | *Anasa tristis De Geer, 1773* | *squash bug* | *Anasa* | *Coreidae* | *Hemiptera* | *Insecta* | *NE* |
| 28 | *Ancistroides nigrita* | *Chocolate Demon* | *Ancistroides* | *Hesperiidae* | *Lepidoptera* | *Insecta* | *Unknown* |
| 29 | *Apis mellifera Linnaeu, 1758* | *honey bee* | *Apis Fabricius* | *Apidae* | *Hymenoptera* | *Insecta* | *NE* |
| 30 | *Aquarius remigis* | *water striders* | *Aquarius* | *Gerridae* | *Hemiptera* | *Insecta* | *Unknown* |
| 31 | *Asota caricae* | *Unknown* | *Asota* | *Noctuidae* | *Lepidoptera* | *Insecta* | *DD* |
| 32 | *Atractomorpha crenulata (Fabricius, 1793)* | *tobacco grasshopper* | *Atractomorpha* | *Pyrgomorphidae* | *Orthoptera* | *Insecta* | *NE* |
| 33 | *Lymnoganus sp* | *Unknown* | *Lymnogonus* | *Berytidae* | *Hemiptera* | *Insecta* | *Unknown* |
| 34 | *Borbo cinnara Wallace, 1866* | *rice swift or Formosan swift* | *Borbo* | *Hesperiidae* | *Lepidoptera* | *Insecta* | *NE* |
| 35 | *Bothrogonia addita (F.Walker, 1851)* | *Unknown* | *Bothrogonia* | *Cicadellidae* | *Hemiptera* | *Insecta* | *NE* |

**Table 2.** (*continued*)

| Nb | Spesies | England name | Genus | Family | Ordo | Kelas | Conservation status |
|---|---|---|---|---|---|---|---|
| 36 | *Calliphora vomitoria (Linnaeus, 1758)* | *blue bottle fly* | *Calliphorini* | *Calliphoridae* | *Diptera* | *Insecta* | *Unknown* |
| 37 | *Catopsilia pomona Fabricius, 1775* | *Common Emigrant* | *Catopsilia* | *Pieridae* | *Lepidoptera* | *Insecta* | *NE* |
| 38 | *Condylostylus sipho* | *Unknown* | *Condylostylus* | *Dolichopodidae* | *Holometabola* | *Insecta* | *Unknown* |
| 39 | *Coptosoma acuticeps Montandon, 1894* | *Unknown* | *Coptosoma* | *Plataspidae* | *Hemiptera* | *Insecta* | *Unknown* |
| 40 | *Coptosoma Laporte, 1833* | *Daughter taxa* | *Coptosoma* | *Plataspidae* | *Hemiptera* | *Insecta* | *Unknown* |
| 41 | *Epignopholeon sophiae Makarkin, 2017* | *Unknown* | *Epignopholeon* | *Myrmeleontidae* | *Neuroptera* | *Insecta* | *Unknown* |
| 42 | *Epilachna varivestis Mulsant, 1850* | *Unknown* | *Epilachna Chevrolat, 1836* | *Coccinellidae* | *Coleoptera* | *Insecta* | *NE* |
| 43 | *Eurema sari sodalis (Horsfield, 1829)* | *Unknown* | *Eurema* | *Pieridae* | *Lepidoptera* | *Insecta* | *NE* |
| 44 | *Euthalia monina Fabricius, 1787* | *Unknown* | *Euthalia* | *Nymphalidae* | *Lepidoptera* | *Insecta* | *NE* |
| 45 | *Gryllus bimaculatus* | *two-spotted cricket* | *Gryllus* | *Veronicellidae* | *Orthoptera* | *Insecta* | *Unknown* |
| 46 | *Halymorpha halys Stål, 1855* | *Unknown* | *Halyomorpha* | *Pentatomidae* | *Hemiptera* | *Insecta* | *NE* |
| 47 | *Hypolimnas bolina Linnaeus, 1758* | *Great Eggfly* | *Hypolimnas* | *Nymphalidae* | *Lepidoptera* | *Insecta* | *NE* |

(*continued*)

**Table 2.** (*continued*)

| Nb | Spesies | England name | Genus | Family | Ordo | Kelas | Conservation status |
|----|---------|--------------|-------|--------|------|-------|---------------------|
| 48 | *Junonia almana Linnaeus, 1758* | Peacock Pansy | *Junonia* | *Nymphalidae* | *Lepidoptera* | *Insecta* | *LC* |
| 49 | *Junonia atlites Linnaeus, 1763* | Grey Pansy | *Junonia* | *Nymphalidae* | *Lepidoptera* | *Insecta* | *Unknown* |
| 50 | *Junonia genoveva (Cramer, 1780* | Tropical Buckeye | *Junonia* | *Nymphalidae* | *Lepidoptera* | *Insecta* | *NE* |
| 51 | *Junonia orithya Linnaeus, 1764* | Blue pansy | *Junonia* | *NymphalidaeNE* | *Lepidoptera* | *Insecta* | *NE* |
| 52 | *Leptosia nina (Fabricius, 1793)* | Psyche | *Leptosia* | *Pieridae* | *Lepidoptera* | *Insecta* | *NE* |
| 53 | *Limenitis camilla Linnaeus, 1764* | White Admiral | *Limenitis* | *Nymphalidae* | *Lepidoptera* | *Insecta* | *Unknown* |
| 54 | *Lucilia sericata (Meigen, 1826)* | numerous green bottle fly species | *Lucilia* | *Calliphoridae* | *Diptera* | *Insecta* | *NE* |
| 55 | *Malacosoma disstria Hübner, 1822* | forest tent caterpillar | *Malacosoma* | *Lasiocampidae* | *Lepidoptera* | *Insecta* | *NE* |
| 56 | *Mantis religiosa* | European mantis | *Mantis* | *Mantidae* | *Mantodea* | *Insecta* | *LC* |
| 57 | *Neurothemis fluctuans Fabricius, 1793* | Grasshawk dragonfly | *Neurothemis* | *Libellulidae* | *Odonata* | *Insecta* | *LC* |
| 58 | *Nyctemera secundiana T.P.Lucas, 1891* | Magpie moth | *Nyctemera* | *Arctiidae* | *Lepidoptera* | *Insecta* | *NE* |

**Table 2.** (continued)

| Nb | Spesies | England name | Genus | Family | Ordo | Kelas | Conservation status |
|---|---|---|---|---|---|---|---|
| 59 | *Orthetrum pruinosum Burmeister, 1839* | *Crimson-tailed Marsh Hawk* | *Orthetrum* | *Libellulidae* | *Odonata* | *Insecta* | *LC* |
| 60 | *Orthetrum sabina Drury, 1773* | *Green Marsh Hawk* | *Orthetrum* | *Libellulidae* | *Odonata* | *Insecta* | *LC* |
| 61 | *Orthoptera* | *Grasshoppers* | *Abisares* | *Acrididae* | *Orthoptera* | *Insecta* | *NE* |
| 62 | *Periplaneta australasiae* | *Australian cockroach* | *Periplaneta* | *Blattidea* | *Blattodea* | *Insecta* | *NE* |
| 63 | *Periplaneta fuliginosa Serville 1838* | *smokybrown cockroach* | *Periplaneta* | *Blattidae* | *Blattodea* | *Insecta* | *NE* |
| 64 | *Phaedyma columella* | *Short-banded Sailer* | *Phaedyma* | *Nymphalidae* | *Lepidoptera* | *Insecta* | *Unknown* |
| 65 | *Polyrachis dives* | *Unknown* | *Polyrhachis* | *Formicidae* | *Hymenoptera* | *Insecta* | *Unknown* |
| 66 | *Potanthous omaha* | *darts* | *Potanthus* | *Hesperiidae* | *Lepidoptera* | *Insecta* | *NE* |
| 67 | *Potanthus omaha Edwards, 1863* | *Lesser Dart* | *Polyrhachis* | *Formicidae* | *Hymenoptera* | *Insecta* | *NE* |
| 68 | *Pyrrhosoma nymphula Sulzer, 1776* | *large red damselfly* | *Pyrrhosoma* | *Coenagrionidae* | *Odonata* | *Insecta* | *LC* |
| 69 | *Spathosternum Portevin, 1903* | *Unknown* | *Eucatops* | *Leiodidae* | *Coleoptera* | *Insecta* | *Unknown* |
| 70 | *Tanaecia pelea Fabricius, 1787* | *Malay Viscount* | *Tanaecia* | *Nymphalidae* | *Lepidoptera* | *Insecta* | *LC* |

(continued)

**Table 2.** (*continued*)

| Nb | Spesies | England name | Genus | Family | Ordo | Kelas | Conservation status |
|---|---|---|---|---|---|---|---|
| 71 | *Taygetis virgilia Cramer; 1779* | *Unknown* | *Taygetis* | *Nymphalidae* | *Lepidoptera* | *Insecta* | *NE* |
| 72 | *Telicota colon Fabricius, 1775* | *pale palm dart or common palm dart* | *Telicota* | *Hesperiidae* | *Lepidoptera* | *Insecta* | *NE* |
| 73 | *Tettigoniidae/Abaxinicephora Gorochov & Kang, 2005* | *long-horned grasshoppers* | *Abaxinicephora* | *Tettigoniidae* | *Orthoptera* | *Insecta* | *NE* |
| 74 | *Valanga nigricornis* | *Oxya chinensis* | *Valanga* | *Acrididae* | *Orthoptera* | *Insecta* | *Unknown* |
| 75 | *Xylocopa violacea (Linnaeus, 1758)* | *Unknown* | *Xylocopa* | *Apidae* | *Hymenoptera* | *Insecta* | *NE* |
| 76 | *Ypthima baldus Fabricius, 1775* | *Common Fivering* | *Ypthima* | *Nymphalidae* | *Lepidoptera* | *Insecta* | *NE* |
| 77 | *Macaca fascicularis* | *Long-tailed Macaque* | *Macaca* | *Cercopithecidae* | *Primates* | *Mammalia* | *VU* |
| 78 | *Callosciurus notatus (Boddaert, 1785* | *Plantain Squirrel* | *Callosciurus* | *Sciuridae* | *Rodentia* | *Mammalia* | *Unknown* |
| 79 | *Lumbricina Burmeister; 1837* | *Unknown* | *Lumbrineris* | *Lumbrineridae* | *Eunicida* | *Polychaeta* | *Unknown* |
| 80 | *Indotyphlops braminus* | *brahminy blind snake* | *Indotyphlops* | *Typhlopidae* | *Squamata* | *Reptilia* | *NE* |
| 81 | *Bronchocela cristatella (Kuhl, 1820)* | *Green Crested Lizard* | *Bronchocela* | *Agamidae* | *Squamata* | *Reptilia* | *Unknown* |
| 82 | *Cyrtodactylus marmoratus Gray, 1831* | *Curve-toed Geckos* | *Cyrtodactylus* | *Gekkonidae* | *Squamata* | *Reptilia* | *LC* |

**Table 2.** (*continued*)

| Nb | Spesies | England name | Genus | Family | Ordo | Kelas | Conservation status |
|---|---|---|---|---|---|---|---|
| 83 | *Draco sumatranus (Schlegel, 1844)* | *Common Gliding Lizard* | *Draco* | *Agamidae* | *Squamata* | *Reptilia* | *LC* |
| 84 | *Eutropis multifasciata (Kuhl, 1820)* | *East Indian brown mabuya* | *Eutropis* | *Scincidae* | *Squamata* | *Reptilia* | *LC* |
| 85 | *Gekko smithii Gray, 1842* | *Tropical Asian Geckos,* | *Gecko* | *Gekkonidae* | *Squamata* | *Reptilia* | *LC* |
| 86 | *Gekko gecko (Linnaeus, 1758)* | *Tropical Asian Geckos,* | *Gecko* | *Gekkonidae* | *Squamata* | *Reptilia* | *LC* |
| 87 | *Gekko monarchus (Schlegel, 1836)* | *Tropical Asian Geckos,* | *Gecko* | *Gekkonidae* | *Squamata* | *Reptilia* | *Unknown* |
| 88 | *Hemidactylus frenatus (Duméril & Bibron, 1836)* | *Common House Gecko* | *Hemidactylus* | *Gekkonidae* | *Squamata* | *Reptilia* | *Unknown* |
| 89 | *Varanus salvator (Laurenti, 1768)* | *Common Water Monitor.* | *Varanus* | *Varanidae* | *Squamata* | *Reptilia* | *LC* |
| 90 | *Dendrelaphis pictus (Gmelin, 1789)* | *Common Bronze-back* | *Dendrelaphis* | *Colubridae* | *Squamata* | *Reptilia* | *Unknown* |
| 91 | *Malayopython reticulatus (Schneider, 1801)* | *Reticulated Python* | *Malayophyton* | *Pythonidae* | *Squamata* | *Reptilia* | *LC* |
| 92 | *Naja sumatrana (Müller, 1887)* | *Equatorial Spitting Cobra,* | *Naja* | *Elapidae* | *Squamata* | *Reptilia* | *LC* |
| 93 | *Ahaetulla prasina* | *Asian Vine Snake* | *Ahaetulla* | *Colubridae* | *Squamata* | *Reptilia* | *LC* |

**Table 3.** Environmental Data In Turtle Conservation Areas

| Number | Abiotic Data | Average numbers |
|--------|--------------|-----------------|
| 1 | Air humidity | 77% |
| 2 | Soil pH | 6.5 |
| 3 | Soil humidity | 74% |
| 4 | Intensity of light | 2266.7 |
| 5 | Air temperature | 29.3 |
| 7 | Soil temperature | 27.1 |

conservation. Amphibians, reptiles, insects, diplopods, and gastropods are examples of species that require high humidity and may thrive in their current environment. Mammals are drawn to the region by trees that have blossomed and bear fruit (mango, papaya, coconut, palm, jackfruit).

Table 3 displays abiotic (environmental) data averaged over six measurements over six weeks. The presence of water places (conservation ponds) and land regions with a lot of flora around them promote the existence of rather excellent environmental conditions. Appropriate abiotic conditions for the life of animals in conservation zones foster diversity.

Student learning experiences with PBL is kind of contextual learning were stimulated participants to: a) Learn to seek and find essential scientific questions, organize scientific questions into 1 problem formulation, b) Behave: care about environmental problems in their daily lives and practice being sensitive to environmental problems, practicing original, logical, critical, and detailed thinking, learn to seek and find essential scientific questions, learn to seek and find essential scientific questions, learn to seek and find essential scientific questions, learn to seek [12].

Students will be more motivated to learn in a contextual manner if they are presented with occurrences or facts found in their immediate environment [13]. PBL can always relate or apply the subject to the practical realities it encounters in everyday life surrounding the student's environment. Learners will discover the relationship between abstract ideas and practical objects (applicative) in a real-world situation and internalize concepts through the discovery process [14]. The contextual approach assumes that a person's mind will naturally seek meaning that is relevant to real-world environmental problems and beneficial to the environment. The basics of in-depth knowledge can be obtained by combining the topic matter with the student's daily experiences. Learners will be able to apply what they've learned to tackle new challenges they've never encountered before. Learners' knowledge is meant to be built through contextual shortness, which can be used in everyday life based on their learning experience [15]. Contextual learning by PBL is a method of teaching that connects the subject being studied to a real-life issue, allowing students to apply what they've learned in the classroom to real-life situations [16].

## 4   Conclusion

The implementation of PBL in exploring the diversity of animals in the turtle conservation area of Bengkulu University resulted in sufficient survey data and field activities providing an efficient and practical project-based learning experience but with a lot of cognitive, affective and psychomotor content for students.

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