***Original Research Article***

# FLORA AND FAUNA DIVERSITY STATUS ON TRANS SUMATRA RAILWAY PROJECT DEVELOPMENT PLAN THROUGH THE REGION SIGLI – BIREUN - LHOKSEUMAWE - LANGSA – BESITANG, INDONESIA


## ABSTRACT

**Background and Objective**: The plan to construct and operate a trans-urban railway line through the territory of Aceh and northern Sumatra is between Sigli - Bireun - Lhokseumawe - Langsa - Besitang, enabling to have an impact on flora and fauna habitat conditions at the project site. This study has been held to inventarized the biodiversity around the project site. **Methodology**: Collection of species data and number of plants was conducted using the Quadrat Nest Plot Method, placed on the transect track and observation of field inventories, interviews and literature studies. The results are grouped in protected, endangered species and whether they belong to endemic species in Indonesia. **The results**: There are 3 primate species that utilize the habitat around the project site of long-tailed macro monkeys (Macaca fasicularis), Lampung monkeys (Macaca namastrina), and langur (Trachypithecus auratus) and include endemic and endemic spots protected by the Indonesian government and International Union for Conservation Of Nature and Natural Resources. Although these three primates were not found in the project location plan. **Conclusion:** Study of flora and fauna aspects related to prediction and impact evaluation. The activity plan does not affect or disrupt ecological entities


Keywords : Conservation, Endangered Species, Fauna and Flora, Ecological Entities, wildlife protection

## INTRODUCTION

Infrastructure development, especially public transportation and freight transportation, were developed by the Indonesian government in support of National development. The construction of the Trans-Sumatra Railway Line (Sigli - Bireun And Lhokseumawe-Langsa-Besitang) is one of the Trans Sumatra Railway lines being developed by President Jokowi's government through NAWACITA program. The Trans Sumatra Railway is the result of the agreement of the Governors of Sumatra who want a relationship industrial area and trade. The Trans Sumatra Railway is also expected to improve the economy of all provinces in Sumatra as well as catch up from the big city city on the island of Java therefore need to accelerate the implementation of Trans Sumatra Rail Way facilities and infrastructure development (Coordinating Ministry of Economic Affair, 2015).

Construction of Railway Between Sigli - Bireuen and Lhokseumawe - Langsa - Besitang must meet the following requirements: Spatial Plan According to the provisions of the laws and regulations, Fulfilling the Policy in the field of environmental protection and management as well as natural resources regulated in legislative regulations, This activity plan does not intersect with areas that have an interest in defense and security such as state

borders and military areas. Forecasts of the magnitude and nature of the geo physical, socio-economic and socio-cultural impacts and public health impacts of the pre-construction, construction and operation of railway lines between Sigli-Bireuen and Lhokseumawe-Langsa-Besitang referring to Ministerial Regulations Environment No. 16 of 2012 on Guidelines for Compilation of Environmental Documents carefully. Careful forecasts of the magnitude and significance of the physical, chemical, social, cultural and public health impacts of the physical, biological, social, economic, social and cultural aspects of the construction, construction and operation of trans-urban railway line. A holistic evaluation is undertaken on all stages of activities that produce Hypothetical Significant Impacts by considering the linkages between impacts and impact sites, so as to know the balance of Significant Impacts that are positive and of significant negative impacts as the basis for environmental management and monitoring of chemical, social, geophysical aspects Economic, socio-cultural, and public health at the pre-construction, construction and operation stages of the Business and Activity plan, The proponent has the ability to address significant negative impacts through technological, ocial, and institutional approaches. In a technological approach planned to mitigate significant negative impacts, especially on Geophysical-chemical components, the initiator will apply the management technology to surface runoff, vibration, noise, traffic disturbance and the incidence of dust particles (Ministry of Environment and Forestry, 2012). Social and institutional approaches are a top priority in addressing the significant negative impacts associated with social, economic, and cultural issues, namely the impact of homelessness, income change, local accessibility disruption, the impact of disturbances of comfort and public restlessness, and changes in community attitudes, The Business Plan or Activity does not intersect with the customary and cultural issues of the surrounding community, thus not disrupting the social values and views of the community, In this study, a study of biological aspects related to the prediction and evaluation of impacts on ecological entities has been conducted. The activity plan will not affect and / or disturb the ecological entity, In this study, a review of the business and / or activities that has been undertaken around the planned business location and / or activity. The activity plan affects the business and / or activities that already exist around the business location and / or activity plan but can be managed and become more developed. In this study, environmental studies have been conducted covering various aspects (geophysical components-chemical, social, public health) all of which can be linked to environmental carrying capacity and capacity. Overall, it can be concluded that the activity plan should not exceed the carrying capacity and environmental capacity in North Sumatera Province and Aceh Province that does not exceed the applicable quality standards and the criteria for the limits of each environmental parameter (Ministry of Environment and Forestry, 2012).

In the construction of the Trans Sumatra Rail Way, it was needed a comprehensive study to ensure that an ecological balance between development and the environment will be impacted. The environmental impact assessment is a tool for planning, management, monitoring and evaluation of the environment due to an activity so comprehensively between development activities and the environment runs in harmony. One of the factors likely to be affected by the construction of the trans-Sumatra railway is the condition of diversity of flora and fauna, especially protected flora and fauna. Flora and fauna are grouped according to their status, including endangered species, rare plants, endemics and protected by Indonesian wildlife protection laws (Data Red Book). Law of Republic Indonesia No. 5/1990. Chapter V Article 20 paragraph (1) and (2) on protecting plants and animals, and Government Regulation No. 7/1999 on Preservation Of Plant And Animal Species. It also refers to the conservation status of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Sumatera Island has the highest risk level of biodiversity that is threatened with extinction. Sumatra has the mammals most abundant (210 species), composed of sixteen species of mammals endemic to Sumatra, and 17 are endemic to the Mentawai Islands and listed in the Red List of Threatened in Appendix Convention IUCN Species Endangered and International Trade in Endangered Species of Wild Fauna and Flora (CITES). List Sumatra totaling 582 birds and 14 species is endemic, species of reptiles and amphibians, 69 (23%) while the majority of endemic plant species is endemic in the region (Critical Ecosystem Partnership Found, 2001).

Infrastructure development and this development Railways on railway development path between Sigli - Bireuen and Lhokseumawe - Langsa – Besitang certainly give effect to the ecosystem that will be passed. Especially at the construction stage there will be ecological changes of flora and fauna, but it does not occur minimally and does not have an important impact on the ecological balance. The ecological balance of an area is determined by the type of bat fauna. Bats are one of the organisms endemic to be in control of ecological, it is because in addition, as seed dispersers of the edible fruit and pollinators of flowers, boats as well as predators of insects that annoy many plants that live in the forest, as well by Various species of birds can also be used as an indicator of ecosystem. Bird has an important role in the process of succession of ecosystems and species diversity of birds used as ecological indicators in the process of ecological succession early stage successional forest (Oostin, H.J., 1956).

## RESEARCH METHODS

Biological environmental components studied in the development of railway line between Sigli - Bireuen and Lhokseumawe - Langsa - Besitang ie flora: the type of plants that exist in the location of activities and surroundings, fauna: the existence of the type of animal (IUCN, 1994). Vegetation analysis by purposive sampling, placement of paths and plots following the observed vegetation presence. Because the study area is relatively large, Observations of flora and fauna are conducted in areas that represent study areas and plants in residential areas. This study has been held on September – October 2016.

## APPLICATION METHODS IN SAMPLE

The data collection of species and number of plants was done by plotting the example of the Nested Quadrat (Mueller-Dombois, D. and H. Ellenberg, 1974) placed in the transect line 20x20 meters sample plot for Tree species inventory (0> 35 cm), 10 x 10 m, for A-10-35 cm), 5 x 5 m for Piles and Bushes (A = 2-10 cm) and 2 x 2 m for Semai (height <1.5 m) and lower plants. Meanwhile, to find out the types of plants that are located in the vicinity of the construction of the railway line between Sigli - Bireuen and Lhokseumawe - Langsa - Belitung, a sample plot is specified randomly. In addition, secondary data were collected in the form of the library and the results of studies that have been conducted for the area concerned and unstructured interviews with community respondents (IUCN, 1994).

The terrestrial fauna data were collected based on the literature review and the results of the study conducted in the study area, interviews with the community and field observations. Interviews were conducted to obtain information on wildlife species and populations indirectly. The parameters studied in this study were: encounter / population with wildlife and the presence / status of endangered, endemic and protected species (Government Regulation, 1999).

### Materials Research Materials

Materials Research Materials that are used in this study in the form of data, both primary and secondary. The materials used for this study are sampling location maps, literature study. Research tools a lot-tool used in this research is stationary, digital cameras, GPS (Global Positioning System), Personal Computer, Rol meters, Thermometer, Hygrometer and Pitfall Traps. Fauna are not identified during the

sampling, identified laboratory using the Pictorial Keys To Soil Animals Of China. Fauna Identified As Fauna Endemic / Indigenous In The Analysis Based Republik Indonesian Law No. 5 – 1990 on the Conservation of Natural Resources and Ecosystems. The figure 1. shows the location of the survey which based on observations of terrestrial flora and fauna includes observations of monkeys, bats and mangrove ecosystems. The location is because it is feared that there are types of flora and fauna that are covered by the government of Indonesia, while direct observation of flora and fauna in the project location in general is relatively homogeneous

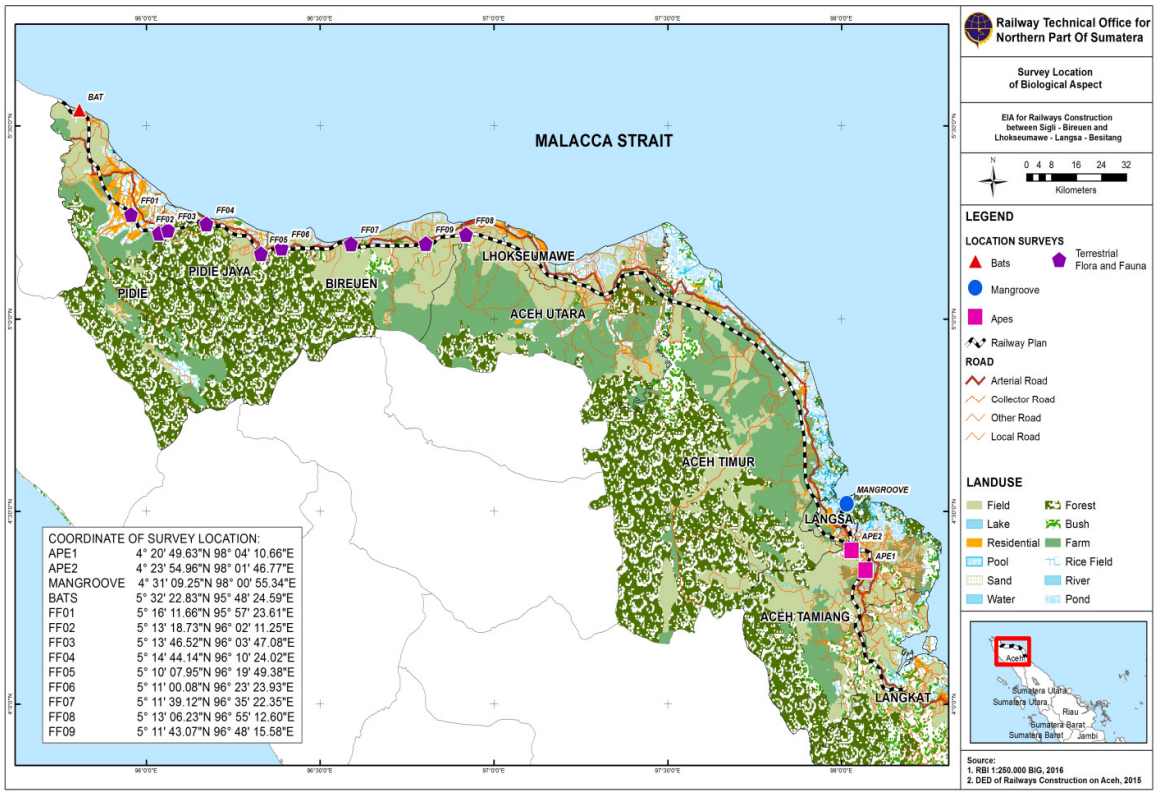


Figure 1. Location of Fauna and Flora Observation on Trans-Sumatera Railway Development Plan (Sigli - Bireun Dan Lhokseumawe -Langsa-Besitang (PT. Mitra Adi Pranata, 2016).

## RESULTS AND DISCUSSION

### A. Flora And Fauna Commonly Found At Project Sites

Based on the initial observation in the field, in general the location of the construction plan of the Sigli-Bireuen and Lhokseumawe-Langsa-Besitang railway lines is formed

by the vegetation structure of the plantation, agriculture and yard communities. The plantation community is made up of mixed garden / talun vegetation and oil palm plantations, whereas the yard is generally made of ornamental plants, protectors and fruits. Meanwhile, the agricultural community is generally a rice field and horticultural farming.

The following data on the types of vegetation found in the plantation community are shown in the following table 1.

Table 1. Types Of Vegetation Found In Mixed Garden Fields Around The Observation Site (PT. Mitra Adi Pranata, 2016)

| No | Name of Indonesia | Scientific Name | Location | | | | | | | | | Protection Status | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | IUCN | CITES | RI | E |
| A. **Trees** | | | | | | | | | | | | | | | |
| 1 | Acacia | *Acacia mangium* | √ | | | | | | | | | - | - | - | - |
| 2 | Angsana | *Pterocarpus indica* | √ | | | | | √ | | | | - | - | - | - |
| 3 | Bambu gombong | *Gigantochloa verticillata* | | √ | √ | | | | √ | | √ | - | - | - | - |
| 4 | Beringin | *Ficus benjamina* | | | | | √ | | √ | | | - | - | - | - |
| 5 | Cempedak | *Artocarpus champeden* | | | | | | √ | √ | | √ | - | - | - | - |
| 6 | Coklat | *Theobroma cacao* | √ | | √ | √ | √ | | √ | √ | √ | - | - | - | - |
| 7 | Durian | *Durio zibethinus* | √ | √ | | √ | | | | | √ | - | - | - | - |
| 8 | Jambu air | *Syzygium aqueum* | | | | | | √ | | | √ | - | - | - | - |
| 9 | Jambu mete | *Anacardium occidentale* | | | | | | √ | | | | - | - | - | - |
| 11 | Jati | *Tectona grandis* | | | √ | | | | √ | | √ | - | - | - | - |
| 12 | Kapuk randu | *Ceiba pentandra* | | | | | | | √ | | √ | - | - | - | - |
| 13 | Kedondong | *Spondias pinnata* | | | | | | | √ | | | - | - | - | - |
| 14 | Kelapa | *Cocos nucifera* | √ | | | √ | √ | √ | √ | √ | √ | - | - | - | - |
| 15 | Ketapang | *Terminalia catappa* | √ | | √ | | | √ | | √ | √ | - | - | - | - |
| 16 | Kiangsret | *Spathodea campanulata* | | | | | | | | | √ | - | - | - | - |
| 17 | Kirinyuh | *Eupathorium inulifolium* | | √ | √ | √ | | | | | √ | - | - | - | - |
| 18 | Mangga | *Mangifera indica* | | | | | √ | | √ | | √ | - | - | - | - |
| 19 | Melinjo | *Gnetum gnemon* | √ | √ | | √ | | | | | | - | - | - | - |
| 20 | Muncang/ kemiri | *Aleurites moluccana* | | | | | | √ | √ | | √ | - | - | - | - |
| 21 | Petai selong | *Leucaena Leucocephala* | | | √ | | | | √ | | | - | - | - | - |
| 22 | Pinang | *Areca catechu* | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | - | - | - |
| 23 | Rambutan | *Nephelium lappaceum* | | √ | | | | √ | √ | √ | | - | - | - | - |
| 24 | Sagu | *Metroxylon sagu* | | | | | √ | | | | | - | - | - | - |
| 25 | Sawit | *Elaeis guineensis* | | | √ | | | | | | √ | - | - | - | - |
| 26 | Sawo | *Manilkara kauki* | | | | | √ | | | | | - | - | - | - |
| 27 | Suren | *Toona sureni* | √ | √ | | √ | √ | √ | √ | √ | | - | - | - | - |
| 28 | Sawit | *Elaeis guenensis* | | | | | | | | | √ | - | - | - | - |
| B. Shrubs | | | | | | | | | | | | | | | |

| No | Name of Indonesia | Scientific Name | Location | | | | | | | | | Protection Status | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | IUCN | CITES | RI | E |
| 1 | Jeruk nipis | *Citrus aurantifolia* | | | | | | | √ | | | - | - | - | - |
| 2 | Kersen | *Muntingia calabura* | √ | | | | | | | | | - | - | - | - |
| 3 | Putri malu | *Mimosa pudica* | √ | | | √ | | | √ | | | - | - | - | - |
| | C. Bushes | | | | | | | | | | | | | | |
| 1 | Cabe | *Piper retrofractum* | √ | | | | | | | | √ | - | - | - | - |
| 2 | Kacang panjang | *Vigna unguiculata* | | | | | | | | | √ | - | - | - | - |
| 3 | Lampuyang | *Panicum repens* | √ | | √ | √ | | √ | | √ | √ | - | - | - | - |
| 4 | Marigold | *Tithonia diversifolia* | | | √ | | | | | | | - | - | - | - |
| 5 | Singkong | *Manihot utilissima* | √ | | | | | √ | | | √ | - | - | - | - |
| 6 | Pecut kuda | *Stacytarpheta indica* | | | √ | √ | | | | | √ | - | - | - | - |
| D. Herbs | | | | | | | | | | | | | | | |
| 1 | Pisang | *Musa paradisiaca* | √ | | √ | | √ | √ | √ | √ | √ | - | - | - | - |
| 2 | Pepaya | *Carica papaya* | | | | | √ | | √ | | √ | - | - | - | - |
| 3 | Harendong | *Melastoma affine* | | | √ | | | √ | | | | - | - | - | - |
| 4 | Kirinyuh | *Eupathorium inulifolium* | | √ | √ | √ | | | | | √ | - | - | - | - |
| 5 | Saliara/ tembelekan | *Lantana camara* | | | √ | | | | | | | - | - | - | - |
| 6 | Talas/keladi | *Collocasia esculenta* | | √ | | | | | √ | | | - | - | - | - |
| 7 | Teklan | *Eupathorium riparium* | √ | √ | | | | | | √ | √ | - | - | - | - |
| E. Grass | | | | | | | | | | | | | | | |
| 1 | Alang-alang | *Imperata cyllindrica* | | | √ | | | √ | | | √ | - | - | - | - |
| 2 | Rumput Carulang | *Eleusine indica* | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | - | - | - |
| 3 | Rumput Kawat | *Cynodon dactylon* | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | - | - | - |
| 4 | Tebu | *Sacharum officinarum* | | | | | | | | √ | | - | - | - | - |
| 5 | Jagung | *Zea mays* | | | | | | | | √ | √ | - | - | - | - |
| F. Plants of ferns | | | | | | | | | | | | | | | |
| 1 | Paku | *Cycas* sp. | | | | | | | √ | | | - | - | - | - |

*Source: Field 0bservation*

*Information:*

1) *Republic Indonesia: Law 5 of 1990 on Conservation of Biological Natural Resources and its Ecosystem and Government Regulation no. 7 of 1999 on the Preservation of Plant and Animal Species*
2) *IUCN (International Union for Conservation of Nature): LC = Least Concern;*
3) *CITES (Convention of International Trade in Endangered Species of Wild Fauna and Flora)*
4) *E : Endemisitas*
5) *Location:*
   *(1) Sub District Sakti Diitrict Pidie; (2) Sub District Glumpang Tiga District Pidie; (3) Sub District Bandar Baru District Pidie Jaya; (4) Sub District Trienggadeng, District Pidie Jaya; (5) Sub District. Bandar Dua P District idie Jaya; (6) Sub District Simpang Mamplam, District Bireuen; (7) Sub District Peudada District Bireuen; (8) Sub District Peusangan Siblah Krueng, District Bireuen; (9) Sub District. Sawang, District. Aceh Utara*

Based on available surveys and literature, no plant species have Conservation Status in the IUCN red list, CITES, or the statute of the law of the Republic of Indonesia is the types of terrestrial fauna observed include fauna of mammals, reptiles, amphibians and insects, based on direct inventory results in the field. The location of the observation was done in Mali village, Sub-district Sakti, District Pidie to Teupin Reusep Village, sub district Sawang, District of North Aceh. As has been explained previously, land use along the project road plan and surrounding areas is generally a residential area, agriculture and plantation owned by surrounding communities. The high activity and the activities of the people around the

location of the activity plan caused limited space for wildlife habitat. So the animals commonly found around this location are domesticated animals and wildlife commonly living around the neighborhoods of settlements, plantations and rice fields. Survey results conducted in nine observation points, wildlife found generally relatively the same. The most commonly found for mammal species, namely coconut bajang *(Callosciurus notatus*) and mice fields (*Rattus exulans*). While for the type of amphibian commonly found in all survey sites, namely frogs (*Hylarana erythraea*) and frog (*Duttaphrynus melanostictus*), and for common types of reptiles are lizards (*Eutropis multifasciata*) and chameleons (*Bronchocela cristatella*). From the results of this survey also found one type of primate, a group of long-tailed monkeys (*Macaca fascicularis*) with the number of individuals as many as 7 tails are looking for food around the district. Siblah Krueng Kab. Bireuen. Meanwhile, the Kalong (*Cynopterus brachyotis*) is often encountered across the project site, among others, Mali village - Sakti-district Pidie sub-district and Trienggadeng-district Pidie Jaya, as:

Table 2. Types of Mammals, Amphibians, Reptiles and Insects Found at Project Sites (PT. Mitra Adi Pranata, 2016)

| No. | Indonesia Name | Scientific name | Location | | | | | | | | | Protection Status | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | IUCN | CITES | RI | E |
| **A. MAMMALS** | | | | | | | | | | | | | | | |
| 1 | Tikus ladang | *Rattus exulans* | √ | √ | √ | √ | √ | √ | √ | √ | √ | LC | - | - | - |
| 2 | Babi hutan | *Sus scrofa* | | | | | | | √ | | | LC | - | - | - |
| 3 | Codot Krawar | *Cynopterus brachyotis* | √ | | | √ | | | | | | LC | - | - | - |
| 4 | Musang | *Paradoxurus hermaphroditus* | | | √ | √ | | | | | | LC | - | - | - |
| 5 | Bajing kelapa | *Callosciurus notatus* | √ | √ | √ | √ | √ | √ | √ | √ | √ | LC | - | - | - |
| 6 | Monyet ekor panjang | *Macaca fascicularis* | | | | | | | | √ | | LC | - | - | - |
| **B. AMFIBIA** | | | | | | | | | | | | | | | |
| 6 | Katak Sawah | *Hylarana erythraea* | √ | √ | √ | √ | √ | √ | √ | √ | √ | LC | - | - | - |
| 7 | Katak rawa | *Fejervarya limnocharis* | | | | √ | | | | | | LC | - | - | - |
| 8 | Kodok budug | *Duttaphrynus melanostictus* | √ | √ | √ | √ | √ | √ | √ | √ | √ | LC | - | - | - |
| **C. REPTILIA** | | | | | | | | | | | | | | | |
| 9 | Biawak | *Varanus salvator* | | √ | | | | | | | | LC | - | - | - |
| 10 | Ular kobra | *Ophiophagus hannah* | | | √ | √ | | | | | | LC | - | - | - |
| 11 | Kadal | *Eutropis multifasciata* | √ | √ | √ | v | √ | √ | √ | √ | √ | LC | - | - | - |
| 12 | Tokek | *Gekko gecko* | | √ | | | | | | | | LC | - | - | - |
| 13 | Bunglon | *Bronchocela cristatella* | √ | √ | √ | √ | √ | √ | √ | √ | √ | LC | - | - | - |
| **D. INSEKTA** | | | | | | | | | | | | | | | |
| 14 | Belalang | *Valanga nigricornis* | √ | √ | √ | √ | √ | √ | √ | √ | √ | - | - | - | - |
| 15 | Kupu-kupu | *Papilio demoleus* | √ | √ | √ | √ | √ | √ | √ | √ | √ | LC | - | - | - |
| 16 | Kupu-kupu Pastur | *Papilio memnon* | √ | √ | √ | √ | √ | √ | √ | √ | √ | LC | - | - | - |
| 17 | Capung | *Crocothermis servilla* | √ | √ | √ | √ | √ | √ | √ | √ | √ | LC | - | - | - |

*Source: Field 0bservation*
*Information:*
1) *Republic Indonesia: Law 5 of 1990 on Conservation of Biological Natural Resources and its Ecosystem and Government Regulation no. 7 of 1999 on the Preservation of Plant and Animal Species*
2) *IUCN (International Union for Conservation of Nature): LC = Least Concern;*
3) *CITES (Convention of International Trade in Endangered Species of Wild Fauna and Flora)*
4) *E : Endemisitas*
5) *Keterangan Lokasi :*
*(1) Sub district Sakti - District. Pidie; (2) Sub district Glumpang Tiga- District. Pidie; (3) Kec. Sub district Bandar Baru -District. Pidie Jaya; (4) Sub district Trienggadeng, - District. Pidie Jaya; (5) Sub district Bandar Dua. - District. Pidie Jaya; (6) Sub district Simpang Mamplam, - District. Bireuen; (7) Sub district Peudada. - District. Bireuen*

Based on Table 2. the fauna species found in the location of the activity and its surroundings are not included in the endemic, protected, or CITES species of fauna. However, based on the IUCN extinction status all wildlife belongs to the IUCN least concern category, except for grasshoppers whose extinction status has not been categorized by IUCN. In addition, based on observations and interviews, no endemic and endangered animal information such as Sumatran elephants and Sumatran tiger were found at the site.

**B. The Existence of Aves Fauna or Birds**

The existence of aves fauna or birds is very dependent on the existence of vegetation as a habitat for nesting, foraging and breeding. Based on observations in all locations of the study area found at least 27 species of birds. Generally, the birds around the site are unprotected except for a few species, such as honey-sriganti (*Nectarinia jugularis)*, barks (*Halcyon smyrnensis*), river checkers (*Todirhampus chloris*), eagles and striped shards *(Rhipidura javanica).* From the observation results, it was found that at 9 locations of the project site plan, it was found that the bird with the highest abundance was the type of bird bondol / pipit *(Lonchura leucogastroides*) with a relative density value (KR) of 16.475%. This is understandable because in general the location of observation is agricultural land or rice fields that are the habitat for species of birds eater such as birds bondol / pipit. In addition, it is also known that other bird species are quite dominant in each survey location, namely the sparrow (*Passer montanus*) with a KR ( Relative Density) of 15.134%. Birds are birds common in residential community types such as those commonly found in sampling sites. Other types are quite dominant, such as cow swallow (*Collocalia esculenta*) with KR 12.261%, merbah cerukcuk (*Pycnonotus goiavier*), cinenen gray (*Orthotomus ruficeps*) with KR ( Relative Density) 6.705% and jen *(Prinia familiaris)* with KR ( Relative Density) 5.364%. Seen from the spread, there are several species of birds that are almost found in all locations of observations. Among other birds merbah cerukcuk (*Pycnonotus goiavier*) and cow swallow (*Collocalia esculenta*) with the value of Relative Frequency (FR) respectively 7.692%. Both bird species are found throughout observation sites. In the meantime, several other bird species were found in each observation site, ie, birds of honey-sriganti (*Nectarinia*

*jugularis*), gray cinenen (*Orthotomus ruficeps*) and Javanese (*Prinia familiaris*) with FR (Relative Frequency) value of 6.838%.. Species of birds in the study area can be seen in Table 3, as follows

Table 3. Diversity of Bird Fauna in Location Plan of Activities (IUCN, 1994)

| No | Indonesian Name | Scientific Name | Sum | KR (%) | FR (%) | Protection Status | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | IUCN | CITES | RI | E |
| 1 | Bondol jawa | *Lonchura leucogastroides* | 86 | 16.475 | 3.419 | LC | - | - | - |
| 2 | Bondol lurik | *Lonchura punctulata* | 24 | 4.598 | 2.564 | LC | - | - | - |
| 3 | Burung cabe jawa | *Dicaeum trochileum* | 17 | 3.257 | 5.983 | LC | - | - | - |
| 4 | Burung gereja | *Passer montanus* | 79 | 15.134 | 5.128 | LC | - | - | - |
| 5 | Burung kacamata | *Zosterops* sp. | 7 | 1.341 | 3.419 | LC | - | - | - |
| 6 | Burung madu sriganti | *Nectarinia jugularis* | 20 | 3.831 | 6.838 | LC | - | - | - |
| 7 | Burung madu | *Anthreptes* sp. | 2 | 0.383 | 1.709 | LC | - | Protected | - |
| 8 | Cekakak belukar | *Halcyon smyrnensis* | 3 | 0.575 | 1.709 | LC | - | Protected | - |
| 9 | Cekakak sungai | *Todirhampus chloris* | 7 | 1.341 | 4.274 | LC | - | Protected | - |
| 10 | Cikrak | *Abroscopus* sp. | 5 | 0.958 | 1.709 | LC | - | - | - |
| 11 | Cinenen kelabu | *Orthotomus ruficeps* | 35 | 6.705 | 6.838 | LC | - | - | - |
| 12 | Cipoh kacat | *Aegithina tiphia* | 7 | 1.341 | 3.419 | LC | - | - | - |
| 13 | Cucak kutilang | *Pycnonotus aurigaster* | 7 | 1.341 | 1.709 | LC | - | - | - |
| 14 | Elang Ular | *Spilornis cheela* | 1 | 0.192 | 0.855 | LC | - | Protected | - |
| 15 | Jingjing | *Hemipus* sp. | 6 | 1.149 | 2.564 | LC | - | - | - |
| 16 | Kapinis | *Apus* sp. | 9 | 1.724 | 2.564 | LC | - | - | - |
| 17 | Kerak kerbau | *Acridotheres javanicus* | 1 | 0.192 | 0.855 | LC | - | - | - |
| 18 | Kipasan belang | *Rhipidura javanica* | 16 | 3.065 | 5.983 | LC | - | - | - |
| 19 | Kirik-kirik laut | *Merops philippinus* | 15 | 2.874 | 2.564 | LC | - | - | - |
| 20 | Kuntul kerbau | *Bubulcus ibis* | 16 | 3.065 | 3.419 | LC | - | - | - |
| 21 | Layang-layang batu | *Hirundo tahitica* | 10 | 1.916 | 2.564 | LC | - | - | - |
| 22 | Merbah cerukcuk | *Pycnonotus goiavier* | 37 | 7.088 | 7.692 | LC | - | - | - |
| 23 | Perenjak jawa | *Prinia familiaris* | 28 | 5.364 | 6.838 | LC | - | - | - |
| 24 | Puyuh | *Coturnix* sp. | 4 | 0.766 | 0.855 | LC | - | - | - |
| 25 | Tekukur | *Streptopelia chinensis* | 11 | 2.107 | 3.419 | LC | - | - | - |
| 26 | Walet sapi | *Collocalia esculenta* | 64 | 12.261 | 7.692 | LC | - | - | - |
| 27 | Wiwik kelabu | *Cacomantis merulinus* | 5 | 0.958 | 3.419 | LC | - | - | - |
| Jumlah | | | 522 | 100.000 | 100.000 | LC | - | - | - |
| *Diversity Index (H')* | | | 3,021 | | | | | | |

*Source: Primary Data*

*Information :*

*1) Law of Republic Indonesia :*
*Constitution No. 5 of 1990 on the Conservation of Natural Resources and Ecosystems*
*Government Regulations No. 7 tahun 1999 tentang Pengawetan Jenis Tumbuhan dan Satwa*
*2) IUCN (International Union for Conservation of Nature):LC = Least Concern;*
*3) CITES (Convention of International Trade in Endangered Species of Wild Fauna and Flora)*
*4) E : Endemisitas*
*5) Relative density-KR*
*6) Frequency Relative -FR*

Based on Table 3.. The type of avifauna present in the location of the activity and its surroundings does not fall within the endemic species of fauna and its trade status is not regulated in the CITES category. However, based on the IUCN extinction status all wildlife belongs to IUCN's least concern category 7 of 1999 on the Preservation of Plant and Animal Species, Honey Bird belongs to family of *Nectarinidae*, Cekakak Belukar, Cekakak River belongs to family of *Alcedinidae*, and *Falconidae* is a protected species (Oosting, 1956)

**C. Flora - Fauna Surveys Are Conducted at Locations That Have Unique Fauna Characteristics And Unique Habitats Located Around The Study Area**

Flora - Fauna surveys are conducted at locations that have unique fauna characteristics and unique habitats surrounding the study area that may be affected by the activity plan are as follows

**1. Chiroptera in Blangraya Village, Muara Tiga Sub-district, Pidie District**

The Muara Tiga District has coastal habitats and hills. One of the uniqueness in Muara Tiga Subdistrict is the sleeping tree found in the mammal colony of Ordo *Chiroptera* with namely *Cynopterus brachyotis*, which by local people commonly called Sematung or Long. *Cynopterus brachyotis* makes Pine tree mercusii as a sleeping tree. Hundreds of *Cynopterus brachyotis* colonies occupy eight Pinus mercusii trees in one area. According to local people, the bat has been occupying a pine tree in Blangraya village shortly after the 2004 tsunami.

Figure 2. *Cynopterus brachyotis* colony that occupies *Pinus mercusii* tree in Blangraya Village, Muara Tiga Sub-district, District Pidie (PT. Mitra Adi Pranata, 2016)

*Cynopterus brachyotis* is a nocturnal animal that actively seeks to eat at night and will rest during the day. At dusk all colonies of *Cynopterus. brachyotis* will fly to the southwest. According to locals *C. brachyotis* are flying towards Seulawah Mountain. Cynopterus brachyotis is a type of frugivora bat that is the main food in the form of aromatic fruits. In addition to fruit, *C. brachyotis* also feed on nectar and pollen.

Figure 3. *Cynopterus brachyotis* form when flying (left); *Cynopterus brachyotis* has been captured (PT. Mitra Adi Pranata, 2016)

*Cynopterus brachyotis* is at coordinates 5º 32 '21,56 "LU; 95º 48 '29.53 "BT or within ± 700 meters of the track plan and ± 50 meters from the beach. *Cynopterus brachyotis* which is a frugivora that in his life more rely on the ability of smell than hearing so that not too sensitive to the noise noise. *Cynopterus brachyotis* only utilizes the pine tree mercusii in Blangraya village as a resting place during the day. *Cynopterus brachyotis* does not seem to be much disturbed by human activity around its sleeping tree. The reaction given at the moment of being disturbed is to fly away from the pine tree into a resting place, but not long after that the bat will return.

Figure 4. *Cynopterus Brachyotis* Will Fly Away From The Tree Of Rest Where It Is Disturbed By Human Activity (PT. Mitra Adi Pranata, 2016)

Figure 5. *Pinus Merkusii* tree has become *Cynopterus brachyotis* rest area (PT. Mitra Adi Pranata, 2016)

In addition to observation of habitat utilization patterns by *Cynopterus brachyotis*, also conducted data collection on plants and animals found around the habitat of his life. Plant data were done by using 10 x 10 meter sample plot while animal registration was done by VES method (Visual Encounter Survey) The data of animal and plant type is presented as shown in table 4 as follows:

Table 4. Types of animals and plants in the vicinity of *Cynopterus brachyotis* habitat

| No | Latin Name | Local Name | Σ IND. | Information |
|---|---|---|---|---|
| **A. Plants** | | | | |
| 1 | *Pinus merkusii* | Pinus merkusii/ pine | 6 | As a Cynopterus bridyotis resting place |
| 2 | *Cocos nucifera* | Kelapa / Coconut | 4 | Found around community settlements |
| 3 | *Elaeis* sp. | Sawit/ Palm | 1 | Found around community settlements |
| **B. Animals** | | | | |
| 4 | *Cynopterus brachyotis* | Semantung/Long | > 500 | Resting on a pine tree |
| 5 | *Haliaetus leucogaster* | Elang Pantai / Coastal Eagle | 1 | Looks flying over the sea |
| 6 | *Tupaia sp.* | Tupai/ Squirrel | 3 | Found around community settlements |
| 7 | *Macaca fascicularis* | Cekre / monyet ekor panjang/ long-tailed monkey | 5 | Found around community settlements |
| 8 | *Viverridae* | Musang/ Weasel | | Found in the form of feces |
| 9 | *Accipitridae* | Elang /Eagle | | Local community information |
| 10 | *Sus scrofa* | Babi Hutan /Pig Forest | | Local community information |

*Source: Survey results, 2016*

**2. Mangrove Habitat in Kuala Langsa, Sub District Langsa Barat - Langsa City.**

The location of the railway development plan (Trans Sumatera - Aceh-Langsa-Besitang) will cross several mangrove plants, especially in Langsa City. Although the location is outside the Mangrove Forest Tourism Area of Langsa City which became the conservation area. After observation at coordinates N 04º30'58.90"; E 098º00'52.99" recorded 7 species of mangrove plants from 38 species estimated to live in Mangrove Forest Area Langsa City. Data analysis of mangrove vegetation on the lane plan is presented as follows

Table 5. Analysis of mangrove vegetation data around the route of trans-sumatra railway line (Sigli - Bireun and Lhokseumawe-Langsa-Besitang).

| NO. | Species | Total | Percentage |
|---|---|---|---|
| 1 | *Rhizophora apiculata* | 24 | 35.82% |
| 2 | *R. mucronata* | 4 | 5.97% |
| 3 | *R. conjugata* | 32 | 47.76% |
| 4 | *Lumnitzera littorea* | 4 | 5.97% |
| 5 | *Bruguiera parviflora* | 3 | 4.48% |
| **Total** | | **67** | **100.00%** |
| **Diversity Index (H')** | | **1,196** | |

*Source: Processing of survey results, 2016.*

The diversity of mangrove species on the land that will become the railway plan is included in the medium category (1 ≤ H '≤ 3) with Rhizophora conjugate being the most recorded species.

Figure 6. Mangrove Forest condition in Langsa (PT. Mitra Adi Pranata, 2016)

In addition to the analysis of mangrove plants, data collection and analysis are also conducted on animals that use mangrove habitat for their lives. Observations were more focused on animals utilizing habitats around the site of the lane plan, as shown in table 6 as follows:

Table 6. Fauna Recorded in Mangrove Habitat in Kuala Langsa

| NO | Species /Latin Name | Local Name | Σ IND. | Information |
|---|---|---|---|---|
| 1. | *Macaca fascicularis* | Cekre/ monyet oker panjang/Long ocher monkeys | 4 | Found in Mangrove Forest Mangrove City |
| 2. | *Ardea alba* | Kuntul besar | 1 | Utilize the muddy expanse at the observation location |
| 3. | *Corvus macrorhynchos* | Gagak | 3 | was found flying by |
| 4. | *Collocalia linchi* | Swallow Linci | 4 | was found flying by |
| 5. | *Thodirhamphus chloris* | River Cekakak | 1 | Encountered often perched on twigs around the location of observation |
| 6. | *Rhipidura javanica* | Kipasan Belang | 1 | Found flying by |
| 7. | *Egretta sarca* | Kuntul Karang | 1 | Utilizing a muddy expanse at the |

| NO | Species /Latin Name | Local Name | Σ IND. | Information |
|---|---|---|---|---|
| | | | | observation location |
| 8. | *Tringa hypoleucos* | Trinil Pantai | 1 | Utilizing a muddy expanse at the observation location |
| 9. | *Butorides striatus* | Sea Kokokan | 1 | Utilizing a muddy expanse at the observation location |
| 10. | *Streptopelia chinensis* | Tekukur Bird | 1 | Found flying by |
| 11. | *Varanus sp.* | Biawak/Lizard | 1 | Found to swim in the river |
| 12. | *Ostreidae* | Scallops / Oysters | Many | There was only a sound at night |

*Source: Processing of survey results, 2016.*

From the results of observation, it can be concluded that not many species of water birds (water bird) that utilize Mangrove area. It is possible because many birds that use food from the pond area of the local population, evidently many species of Ardea alba birds are observed in the pond population.

### 3. Primate Presence in Aceh Tamiang Area

Some of the areas in Aceh Tamiang Regency are planned to be rubber and oil palm plantations. In the habitat of the plantation can still be found several types of wild fauna. According to local people, One of the most commonly encountered is long-tailed monkeys (*Macaca fasicularis*) or commonly called Cekre. There are at least 3 primate species that utilize plantation habitats: long-tailed monkeys / macros (*Macaca fasicularis*), monkeys / Lampung monkeys (*Macaca namastrina*), and langur (*Trachypithecus auratus*).

Long tail monkeys / checkers (*Macaca fasiculari*) can utilize rubber or palm plantations. Live in groups, sometimes in large numbers. Compared with other types of primates, M. fasicularis is able to utilize more habitats because it can live both terrestrially and arboreally. Long tail monkeys / checkers (*Macaca fasiculari*) can utilize young leaves, palm kernels, rubber seeds and gandri fruits as feed. According to community information, *Macaca fasiculari* in Aceh Tamiang is not too afraid of humans. In fact, it is not uncommon to enter the township of the population to steal food that is placed outside the home. *Macaca fasiculari* (Cekre) can distinguish between men and women, and tend to be more courageous towards women.

Figure 7. *Macaca fascicularis* has been found in the Mangrove Forest Area at Langsa (PT. Mitra Adi Pranata, 2016)

Beruk (*Macaca namastrina*) or the local community used to call the term monkey Lampung, has a tail that is similar to the tail of pigs that the community is often said to be "stump tails." These mammals are classified as omnivores whose main foods are fruit and seeds. Often found in rubber plantations although able to live in oil palm plantations.Agrend more time in terrestrial habitat despite having excellent ability to climb trees. Currently known to local monkeys tend to be brave to humans. Even there are stories of people who must run chase monkey Lampung Lampung monkeys have the largest bodies among the three primates found in plantations.

Lutung (*Trachypithecus auratus*) is the most shy of the three primate species found in plantations. Lutung only utilizes rubber plantations as a living habitat. Lutung is arboreal and very rarely descends to the plantation floor. This type of primate is expected to be disturbed if the plantation where he lived in pieces by the railroad. However, after a study of the railway plan position on rubber plantations that became a live habitat of the monkeys, but the plan of fire-lanes only slightly cut the rubber plantations where the primate lives so it is not expected to have significant coverage on the area of live lutung.

## CONCLUSION

The conclusion of this study is the diversity of fauna in the area of The Plan Of Construction Of The Trans-Sumatra Railway Line between Sigli - Bireun and Lhokseumawe -Langsa-Besitang directing that The fauna species found in the location of the activity and its surroundings are not included in the endemic, protected, or CITES species of fauna. However, based on the IUCN extinction status all wildlife belongs to the IUCN least concern category, except for grasshoppers whose extinction status has not been categorized by the IUCN, in addition based on observations and interviews, no endemic and endangered animal.

The analysis of the Mangrove Diversity Index is the diversity of mangrove species on the land that will become the railway plan is included in the medium category (1 ≤ H '≤ 3) with *Rhizophora* conjugate being the most recorded species, This indicated that the mangrove condition of the observation location is in the medium category, although the location of the observation does not include the project location.

The observation observation, there are 3 primate species that utilize the plant habitat: long-tailed monkeys / macros (*Macaca fasicularis),* monkeys / monkeys Lampung (*Macaca namastrina*), and langur (*Trachypithecus auratus)* belonging to animals protected by the Indonesian government and, Endemic and endangered species by IUCN. But these three primates are not termed in the project location plan

**Competing Interests** : The authors have declared that no competing interest exists.

**Data Availability** : All relevant data are within the paper and its supporting information files.

This research will help researchers to uncover the critical areas of the development plan, so that the impacts of railway development can be monitored and managed. The study is expected to be the basis for the management and protection of 3 primate species utilizing habitats around the site of a long-tailed monkey project (Macaca fasicularis), Lampung monkeys (Macaca namastrina), and langur (Trachypithecus auratus) including endemic fauna protected by the Indonesian government and International Agency On Nature Conservation and Natural Resources

**REFERENCES**

Arijit Chaudhuri. 2005. Survey Sampling Theory and Methods. Indian Statistical Institute Calcutta, India Chapman & Hall/CRC is an imprint of Taylor & Francis Group.

Commonwealth Scientific and Industrial Research Organisation (Division of Entomology), 1991. The Insects Of Australia Volume I & II. Cornell University Press. Ithaca, New York.

Convention on the International Trade in Endangered Species (CITES). 2012. Convention on the International Trade in Endangered Species of Wild Flora and Fauna Appendix I, II, and III. Geneva, Switzerland.

Coordinating Minister of Economic Affairs, 2015. Strategic Plan for the acceleration of infrastructure and regional development Year 2015-2019. Coordinating Ministry of Economic Affairs

Critical Ecosystem Partnership Found, 2011. Sumatra Forest Ecosystem In Sundaland Indonesia's Biodiversity Hotspot. Jakarta.

Derek Ford, And Paul Williams, 2007. Karst Hydrogeology and Geomorphology University of Auckland, John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex . England.

International Union for Conservation of Nature (IUCN), 1994. IUCN Red List Categories. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland.

International Union for Conservation of Nature (IUCN), 2008. World Heritage Caves And Karst A Thematic Study A Global Review Of Karst World Heritage Properties: Present Situation, Future Prospects And Management Requirements.

Jonathan E.M et al, 2004. A Global Species Assessment. The IUCN Species Survival Commission. IUCN Red List of Threatened Species.David Brackett. IUCN – The World Conservation Union.

Minister of The Environment, 2012. Minister of The Environment Regulation No 16 Year 2012 Of Drafting Guidelines for The Environmental Documents. Jakarta.

Mueller-Dombois, D. and H. Ellenberg, 1974. Aims and Methods of Vegetation Ecology. New York: John Wiley & Sons.

Oldfield, S., Lusty, C. and MacKinven, A. 1998. *The World List of Threatened Trees*. World Conservation Press, Cambridge.

Oosting, H.J. 1956. The Study of Plant Communitas. W.H. Freman Company. San Fransisco.

President of the Republic of Indonesia, 1990. Laws Of The Republic Indonesia No. 5 Year 1990 Of the Conservation of Natural Resources and Ecosystems. Jakarta.

President of the Republic of Indonesia, 1999. Government Regulation of The Republik Indonesia No 7 Year 1999 of Preservation of Plant and Animal Species. Jakarta.

President of the Republic of Indonesia, 1999. Government Regulation of The Republik Indonesia No 8 Year 1999 of Utilization of Plant and Wild Animal Species. Jakarta.

PT. Mitra Adi Pranata Consultant. 2016. Environmental Impact Analysis The Development Of The Railway Between Train Sigli - Bireuen And Lhokseumawe - Langsa - Besitang. Indonesia. Semarang.

Thomas H. Kunz *et al*. 2011. Ecosystem Services Provided By Bats. The Year In Ecology And Conservation Biology. Annals Of The New York Academy Of Sciences. Center For Ecology And Conservation Biology, Department Of Biology, Boston University, Boston.

Wenying, Yin. 2000. *Pictorial Keys To Soil Animals Of China*. Beijing: Science Press.

Yin wenying *et al*. 1998. Pictorical keys to Soil animals of china. The project supported by National natural science foundation of china Science press Beijing, china.