Vegetation on ex-tin mining in Mempayak village, Manggar district, Belitung regency and its utilization

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Abstract. The former tin mining land in Mempayak Village in Belitung Regency created a basin that becomes water catchment area when it rains and becomes a source of clean air during the dry season. The heavy rain occurred in 2017 brought vast amounts of soil material depending on the ex-mining basins in this village. This study aims to inventory of vegetation that grows and discusses its use by the communities around the Mempayak Village. Vegetation that succeeded in changing 34 species grouped into 20 families and 31 genera. Vegetation in this former tin mining land has benefits as a raw material for making a single drug without mixture (34 species), food (2 species), roofing material (1 species), cutting tools (1 species), chicken feed (1 species), and straws (1 species). Vegetation body parts that are useful for the above purposes include: roots (2 species), petioli (1 species), shoots (1 species), leaf blades (2 species), young stems (2 species), old stems (2 species), and all parts of the plant body (14 species), and unknown parts of the plant body used by the surrounding community (9 species). The success of vegetation on ex-mining land has been taking place by spending a variety of types and diverse uses by the people of Mempayak Village, Manggar District, Belitung Regency. Efforts to manage the area and manage vegetation are needed to protect the preservation of vegetation on ex-tin mining land and work carried out at high speed.

Keywords: contribution: feed; food; medicine; straw.

1. Introduction
Mempayak is one of the villages in East Belitung Regency which has ex-tin mining land with a length of up to 1.3 km [1]. This former tin mining area forms a deep hole approximately 40 m [2] with a kaolin soil structure. Rainwater will accommodate here so resembles a lake and local people named kulong. Even during the dry season, the water does not dry up. Local residents use it as a clean water source [3]. This lake has remained filled with water since mining activities have been stopped by the TBK Timah company until 2017. This ex tin area is known as kulong Mempayak.

Belitung was flooded with heavy rains that occurred on 15-16 July 2017 [4], causing flooding and erosion. Soil materials carried by rainwater configurated Mempayak Lake resembles a land until this research was carried out. This situation causes vegetation community growing surrounding.

Previous study informed [5] observed the ex tin area based on the age level of the no longer active mining land. The research location categorized Overburden 2 months

Overburden ± 1 year, Subsoil ± 1 year, Tailing ± 3 years, Overburden < 10 years, Overburden > 20 years, and Tailing > 20 years. There are 35 species vegetation that grow on ex-mining land, which are dominated by grass. The vegetation former in ex gold mining Monterado Village, Bengkayang Regency
have also been carried out by [6]. The study differentiated the tailings area based on the age of < 1 year, 2-3 years, 5-7 years, and > 10 years. There were 18 species vegetation that lived in this location, which varied in habit such as seedlings, saplings, poles, and trees. This current research conducted without separate the age of the ex-tin mining land to observed the vegetation diversity around Mempayak Village, East Belitung Regency.

Mempayak lake was changed originally full of water to become land which is gradually growth wild vegetation. The research aims to inventory and to analyze the local community utilization.

2. Study Site and Methods
The unknown species vegetation grows in plot 20x20 m will be collected to make a herbarium which refers to [7] and identified using A Practical Field Guide to Weeds of Rice in Asia [8]. Information on the utilization of each species vegetation was obtained by interviewing 9 people around Mempayak Village and various libraries [9-15].

3. Results and Discussion
3.1 Species diversity on ex-tin Mempayak
Around Mempayak lake consists of 35 species grouped into Eudicots, Monocots, and Pteridophyta (Table 1). Eudicot consists of 13 families, three families of Monocots, and four families of Pteridophyta. Five species of Asteraceae is the highest members of Eudicot while the other families consist of 1-4 species. Cyperaceae and Poaceae are a member of Monocots with 3 species, while Arecaceae consists of one species. Lycopodiaceae as a member Pteridophyta consists of 2 species.

Species diversity around Mempayak lake is more than (35 species) previous study [5] on 3 years old tin tailings in Bangka island (25 species). Several species were found growing at the two research sites, i.e. Ageratum conyzoides, Eupatorium odoratum, Vernonia cinerea, Dillenia suffruticosa, Mimosa pudica, Melastoma polyanthum, Melaleuca cajuputi, Schima walichii, Stachytarpheta jamaicensis, Paspalum conjugatum, and Lycopodium cernuum. Due to the great flood occurred in East Belitung Regency in 2017, the Mempayak Lake soil brought seeds of Asteraceae, Lamiaceae, Cyperaceae, Poaceae and other families from other areas. Asteraceae, Cyperaceae, and Poaceae seeds can grow around Mempayak lakes because they are spread by wind and birds [16] or ruminant animal waste [14,16]. Pteridophyta spores are dispersed from their pockets are also dispersed by wind and will grow in the Mempayak lake soil which has a lot of nutrients for plants growth.

Asteraceae members in this study were also found to grow on reclaimed ex-coal mining in South Kalimantan [20], e.g. Ageratum conyzoides, Eupatorium odoratum, and Vernonia cinerea. It caused the geological history between the Sumatra and Kalimantan islands which were once united in the Paleozoic era [21].

| Table 1. Species diversity in Mempayak ex-tin mining. |
|---|---|---|
| Families | Species | Local name |
| Eudicot | Amaranthaceae | Achyrantes aspera | Jarong |
| | Asteraceae | Ageratum conyzoides | Bandotan |
| | | Eupatorium odoratum | Bandotan |
| | | E. haustianum | - |
| | | Eclipta alba | Keremak janten |
| | | Vernonia cinerea | Sawi-langit |
| Cannabaceae | Trema micrantha | Mengkirai laki |
| Dilleniaceae | Dillenia suffruticosa | Simpor |
### Table 1. Species diversity in Mempayak ex tin mining (continued).

| Families         | Species                     | Local name            |
|------------------|-----------------------------|-----------------------|
| **Eudicot**      |                             |                       |
| Euphorbiaceae    | Euphorbia hirta             | Daun biji kacang      |
| Fabaceae         | Mimosa pudica               | Putri malu            |
| Lamiaceae        | Hyptis capitata             | -                     |
|                  | Hyptis sp.                  | -                     |
|                  | Leucas lavandulifolia       | -                     |
|                  | Coleus amboinicus           | Daun ketumaran        |
| Melastomataceae  | Melastoma polyanthum        | Keletaan              |
| Muntingiaceae    | Muntingia carabula          | Kersen                |
| Myrtaceae        | Melaleuca cajuputi          | Gelam                 |
| Rubiaceae        | Gaertnera vaginans          | Sawar bubu            |
|                  | Uncaria gambir              | Ramkam lam            |
|                  | Hedyotis corymbosa          | Rumput mutiara        |
| Theaceae         | Schima walichii             | Seru                  |
| Verbenaceae      | Stachytarpheta jamaicensis  | Pecut kuda            |
| **Monocot**      |                             |                       |
| Arecaceae        | Elaeis guineensis           | Sawit                 |
| Cyperaceae       | Schoenus calostachybas      | Mensayat              |
|                  | Scleria laevis              | Penjela               |
|                  | Kyllinga brevifolia         | Teki                  |
| Poaceae          | Leptironia articulata       | Purun                 |
|                  | Paspalum conjugatum         | -                     |
|                  | Pennisetum polystachion     | Rumput ekor tupai     |
| **Pteridophyta** |                             |                       |
| Blechnaceae      | Stenochlaena palustris      | Paku iding-iding      |
| Gleicheiniaceae  | Sticherus truncatus         | Brutak                |
| Lycopodiaceae    | Lycopodium cernuum          | Paku kawat            |
|                  | L. clavatum                 | Sengkelut             |
| Pteridaceae      | Pteris sp1.                 | Paku                  |
|                  | Pteris sp2.                 | Paku                  |

### 3.2 Vegetation structure on ex tin Mempayak

The vegetation structure on the ex-tin mining land in Mempayak Village is generally herbaceous (Figure 1). There are fewer species of herbaceous vegetation in the study area than [14] found 42 species. This can be caused by environmental chemical factors where the herbaceous species grow in both places and their availability [5].
Herbaceous species usually grows in contaminated soil because it has the ability to synthesize phytochelatins, metallothioneins, stress proteins and phenolic compounds to tolerate cadmium and other metals [2] and adaptable with temperature changes [16]. In addition, in herbacious there are endophytic microorganisms also involve in the plant tolerant mechanism [15].

3.3 Vegetation utilize by Mempayak communities
Local Mempayak people use vegetation around the ex-tin mining area as medicine, cutting tools, straws, roofs, and chicken feed (Figure 2). Local people generally use vegetation as medicinal plants such as Achyranthes aspera, Ageratum conyzoides, Eupatorium odoratum, and Stenochlaena palustris. Their medicinal plants knowledge obtained from their ancestors. Lepironia articulata or purun used by people in East Belitung Regency as straw. This creativity is carried out by the community, supported by the Regional Government of East Belitung Regency to reduce the use of plastic straws which when disposed of directly into nature do not easily decompose in a short time. The mature Gaertnera vagina or Sawar bubu can be used for the roof house. Achoemus calostachyas has sharp leaves and can cut a piece of cloth. This leaves can be used as cutting tools if we can't find a knife or scissor. Local people use Dillenia suffruticosa’s leaf for food wrapping.

3.4 Various uses of plant organs
The Mempayak people generally use all plant organs (14 species) as medicinal plants (Figure 3) because the organs contain tannin, flying oil, methanol, and metal acetate [9; 10; 11; 12; 13]. Several species are
still unknown utility. The young leaves are used by the people of Mempayak to treat itching, the thinned old stems are used as roof, and petiole are used as straw.

![Graph showing the number of species for each plant part.](image)

**Figure 3.** Vegetation organs used by the Mempayak Village community.

### 4. Conclusion
Vegetation diversity around the Mempayak lake has identify as many as 35 species which are divided into Eudicot, Monocot, and Pteridophyta. Herbaceous are plants that commonly grow around the Mempayak lake. Vegetation has many benefits for the surrounding community. The Mempayak village should be able to use the vegetation wisely and maintain its sustainability.

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