BASE LINE STUDY OF BIRD AT COOPER MINING EXPLORATION AREA OF PT BATUTUA KHARISMA PERMAI IN WETAR ISLAND, MALUKU PROVINCE

(Studi Ekologi Dasar Mengenai Burung Pada Areal Eksplorasi Tambang Tembaga PT Batutua Kharisma Permai Di Pulau Wetar, Provinsi Maluku)

JARWADI B. HERNowo1)

1) Laboratory of Wildlife Ecology, Department of Forest Resources Conservation and Ecotourism Faculty of Forestry IPB, PO Box 168 Bogor 16001

ABSTRAK


Keyword : Base line study, bird, diversity, Wetar Island

INTRODUCTION

Background

Wetar island is one of the islands in the Wallacea archipelago, in which the type of birds are influenced by Oriental birds and Australian ones. However it is also well-knowned that Wallacean area presents many endemic species. The forested areas of Wetar Island are the major habitats for the terrestrial birds.

PT. Batutua Kharisma Permai (BKP) is an cooper mining project at Wetar island, South West Maluku, with licensed area statement of exploration of ca. 4 400 ha. In developing the property, BKP concern with minimizing negative impacts on the environmental. Consequently, BKP started with a base line study of the project area, which includes the bird aspects.

To developed positive impact on the exploration, the company, focuses its activities not only on the economically profitable activities, but also on ecological related activities. From the beginning of the planning, BKP complies with all regulations in Indonesia such as the biodiversity convention regarding high biodiversity value of the exploration area.

Objective of the Study

The base line study of bird at the exploration area of BKP cooper mining in Wetar island is designed to:
1. obtain information and data related to bird species diversity
2. obtain the local distribution and abundances of birds
3. obtain the bird composition and status

STUDY AREA

The cooper mining area of PT. Batutua Kharisma Permai (BKP) is located at northern part of the island at (7°26.45” - 7°47.00” S and 126°20’24” - 126°36’00” E). The topography of the project area is mostly hilly and mountainous, with very few flat areas. The valley is very steep, and most of the slopes are > 45 %.

The project area is dissected by numerous small streams, such as Lurang, Kuning, Vanua, Wetuk and Koreng river. Additionally, there are several small streams that only have water during the rain. The drainage pattern of the rivers was dendritic. All of the river at BKP flow to the north and join with Banda Sea.
Wetar island belong to dry climate, where conditions are wet for about 4 months (>200 mm rainfall) and dry (<100 mm rainfall) for about 8 months of the year. According to Smith and Ferguson rainfall type classification at the project area falls into E and D. The annual precipitation is around 1027 mm. The dryer months in the project area are June to September. Annual average temperature is 28.2°C and average humidity is around 79%.

The soil at the project area have a sandy loamy texture with reddish color. The soil is crumb and shallow. The soil at the terrain area is alluvial, brown color and the column is deep. The soil chemistry at project area is classified as a fertile soil.

The current vegetation of the exploration area are mostly forest. Forest type of the project area can divided as beach forest, moist forest, monsoon forest and eucalyptus forest. The vegetation at beach forest includes Hibiscus tilivaeus, Guettarda speciosa and Terminalia catappa. Moist forest in the area is influenced by humidity from rivers surrounding the forest. Several species of vegetation grow in the forest, such Canarium sylvestre, Palaqium sp, Instia bijuga, Mangifera sp and Ficus spp.

MATERIALS AND METHODS

Location and Time

The study was conducted at PT Batutua Kharisma Permai exploration area in Wetar Island, from 16 – 30 June 2005. The observations were focused on the forested area at 4 400 ha wildlife habitat, i.e. low land monsoon forest, beach forest and plantation forest.

Equipment and Materials

Equipment and materials used in this survey: distribution of forest map of BKP area, compass, chronometer, binocular, and field guide to the birds of Wallacea.

Methods

Bird inventory was carried out using transect method combined with IPA count. Five transects (1 – 2.5 km) were established close to the rivers of Lurang, Kuning, Besar, Wetuk and Koreng. The inventory started at 07.00 until 10.00 a.m. The counting of individual numbers was based on direct visual contact or the bird calls. Additionally, interview with local people was done to find information on bird species at the project area.

Bird Census

Five transects of one kilometer each were set up along riparian in the project area, presenting distinct habitat types within the forested areas. At 200 m intervals along each transect, all bird calls or sightings within 100 m from the observer were recorded over 20 minute periods. This provided a quantitative measure of the relative abundance of species. Daily species lists have been prepared as an indication of the comprehensiveness of the inventory: fewer species will be added as the total list becomes more complete. Tape-recordings of bird calls were also used.

Interviews

Semi-structured interviews with local guides/residents provided information on the local use of wildlife.

Data analysis

Data from the bird censuses were used to calculate the following ecological measures:

Species Diversity Index

The Shannon index (Magurran 1988) describes bird species diversity along the different transects:

\[ H = - \sum p_i \ln p_i \]

in which \( p_i \) is the number of individuals of species divided by the total number of individuals. Species diversity is influenced by its components Species Richness (number of species in the sample) and Evenness (also called Equitability). The following formula were used to express the Evenness:

\[ E = H / H_{\text{max}} \]

in which \( H_{\text{max}} = - \log 1/n \) (\( n \) = number of species in the sample).

Similarity indices

The Jaccard similarity index (\( S \)) (in Mueller-Dombois & Ellenberg 1974) shows the change in species composition among different samples (i.e., along the different transects):

\[ S = c / (a+b+c) \]

in which \( a \) and \( b \) are numbers of species unique to samples 1 and 2 respectively, and \( c \) is species common to both.

The dendrogram method was used to analyze bird composition at each sample plot. This technique described how the relationship between samples plots regarding similarity index.
RESULTS AND DISCUSSION

RESULTS
Species Abundance and Local Distribution

The results showed that the project area held a medium level of bird diversity, but there were relatively significant numbers on endemic and protected species. There were a total of 59 species of birds, including 16 protected species and 14 endemic species. The results also showed that the distribution of birds was related to the forest types (Table 1).

Table 1. The bird species recorded at forest type of the project area

<table>
<thead>
<tr>
<th>Bird</th>
<th>Found at Beach Forest (Species)</th>
<th>Found at Moist Forest (Species)</th>
<th>Found at Monsoon Forest (Species)</th>
<th>Found at Eucalyptus Forest (Species)</th>
<th>Found at Regreening Area (Species)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of species</td>
<td>34</td>
<td>38</td>
<td>32</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Endemic species</td>
<td>9</td>
<td>14</td>
<td>9</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Protected species</td>
<td>13</td>
<td>14</td>
<td>11</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

During the two weeks of fieldwork, a total of 54 terrestrial birds species were observed, with many important species to be protected at the project area. Those important birds species were brown booby (Sula leucogaster), bornell’s eagle (Hieraaetus fasciatus), spotted kestrel (Falco moluccensis), Australia hobby (Falco longipennis), common kingfisher (Alcedo athus), collared kingfisher (Halcyon chloris), scared kingfisher (Halcyon sancta), northern fantail (Rhipidura rufiventris), rufous fantail (Rhipidura rufifrons), helmeted friarbird (Philemon buceroides), streak-breasted meliphaga (Meliphaga reticulata), brown honeyeater (Lichmera indistincta), white-tufted honeyeater (Lichmera squamata), Black-chested honeyeater (Lichmera notabilis), crimson hooded myzomela (Myzomela kuehni) and flame breasted sunbird (Nectarinia solaris).

Fourteen endemic birds species were observed at the project area such as wetar ground dove (Gallicolumba hoedtii), timor black pigeon (Turaeoca modesta), timor imperial pigeon (Ducula cinerea), olive headed lorikeet (Trichoglossus euteles), iris lorikeyt (Psitteuteles iris), olive brown oriole (Oriolus melanotis) wetar figbird (Sphecotheres hypoleucus), orange-handed thrush (Zoothera peronii), timor blue-flycatcher (Cyanis hyacinthinus), fawn-breasted whistler (Pachycephala reticulata), streak-breasted meliphaga (Meliphaga reticulata), black-chested honeyeater (Lichmera notabilis), crimson hooded myzomela (Myzomela kuehni) and flame breasted sunbird (Nectarinia solaris).

The local distribution of bird at the property correlated with forest types. Most of the terrestrial birds (70.4%) were distributed in the moist forest, but only (14.8%) in eucalyptus forest. Meanwhile about (31.5 %) of birds species used re-greening area.

Habitat

Beach forest was dominated by vegetation such as Hibiscus tiliaceus, Terminalia catappa, Calophyllum sp and Pongamia pinnata. This forest occurred along the coast with the width between 25 – 100 m. The forest canopy has 2 – 3 layers. Thirty four species of bird used that forest as their habitat. The species frequently found were barred dove (Geopelia maugi), timor black pigeon (Turaeoca modesta), Tamarindus indica, Shleichera oleosa, Sterculia foetida, Ficus spp and Borassus flabelifer were dominant vegetation in the monsoon forest. Two to three layers of vegetation were present in this forest. Around 32 species of birds were found in this habitat.

Moist forest or evergreen forest occurred at the project area was influenced by rivers surrounding them. Species dominated at the forest were Canarium sylvestris, Pterocarpus indicus, Intsia bijuga, Syzygium sp, Mangifera sp and Ficus sp. Besides many species of trees, abundant species of bird can be found in the moist forest. A total of 38 species of birds were observed in the forest. Although, the re-greening area is not large 17 species of bird used the forest as part of their habitat.

Bird Species Diversity

The index of bird species diversity between the sample areas did not show great differences, with Lurang transect had the lowest and Koreng the highest (Table 2). In this
case, the diversity index has a positive correlation with equitability index. If the diversity is high the equitability will also high and vice versa. The important factor that influenced the diversity is habitat. The diversity of habitat was the main factor in supporting the availability of food resources, cover, shelter and nesting area.

Table 2. Bird species diversity at each transect area

<table>
<thead>
<tr>
<th>Transect</th>
<th>Diversity index (H)</th>
<th>Equitability index (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lurang</td>
<td>2.345</td>
<td>0.827</td>
</tr>
<tr>
<td>Kuning</td>
<td>2.876</td>
<td>0.924</td>
</tr>
<tr>
<td>Vanua</td>
<td>2.795</td>
<td>0.893</td>
</tr>
<tr>
<td>Wetuk</td>
<td>2.678</td>
<td>0.879</td>
</tr>
<tr>
<td>Koreng</td>
<td>2.885</td>
<td>0.945</td>
</tr>
</tbody>
</table>

Bird Composition

The similarity index showed that bird composition at the project area was not much different between the transects. Transect 2 and 3 had the highest similarity in bird composition, while both transects were very different from transect 4 (Figure 1). The dominant guilds were insectivores (42.4%), piscivores (13.6%), seed eater (18.7%), frugivores (18.7%) and carnivores (8.6%). The common birds at the area were barred dove (*Geopelia maugii*), ashy belied white-eye (*Zosterops citrinellus*), pied bush-chat (*Saxicola caprata*), fantail bird (*Rhipidura rufiventris* and *Rhipidura ruffrons*), fawn breasted whistler (*Pachycephala orphei*), brawn honeyeater (*Lichmera indistincta*) crimson hooded myzomela (*Myzomela kuehni*) and flame breasted sunbird (*Nectarinia solaris*).

Table 3. The similarity indices (S) of bird between transects

<table>
<thead>
<tr>
<th>Transect</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>0.572</td>
<td></td>
<td>0.581</td>
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<tr>
<td>2</td>
<td>0.657</td>
<td>0.698</td>
<td></td>
<td>0.625</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.699</td>
<td>0.647</td>
<td>0.674</td>
<td></td>
<td>0.689</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.623</td>
</tr>
<tr>
<td>5</td>
<td></td>
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</tr>
</tbody>
</table>

Legend
1. Transect Lurang and its surrounding
2. Transect Kuning and its surrounding
3. Transect Vanua and its surrounding
4. Transect Wetuk and its surrounding
5. Transect Koreng and its surrounding
DISCUSSION

The endemic species and protected bird found at the property were high (25.9% and 29.6%, respectively). This indicates that if the mining project will be developed at the area should be considered to the species and it used as one of criteria success on management of mining environmental.

The bird composition appeared to be closed similar between sample areas (Table3). This might be influenced by the influenced by the supposedly similar habitats found within each transect, i.e. beach forest, monsoon forest, moist forest and eucalyptus forest. The most common species of bird at the project area was barred dove. The bird was distributed in every sample site with high abundance. It is suggested that the habitats are suitable for this species.

The factors have influenced to bird species diversity in the forest which were high variation of vegetation species, number of forest layer and availability of least disturbed areas. The highest bird diversity was found in the moist forest suggesting that moist forest supported the availability of food resources, cover and shelter also nesting area necessary for birds.

CONCLUSIONS & RECOMMENDATIONS

1. The terrestrial bird found at the project area were 54 species which related to forested area. The diversity of bird was categorized medium, but significant at endemic bird species.

2. Among the birds found at the project area 16 species were identified as protected birds and 14 endemic birds.

3. If the mining project will be developing at the area should be considered to the protected species and endemic species.

ACKNOWLEDGEMENT

This study was a part of the baseline study project in the Copper Mining Exploration Area of PT Batutua Kharisma Permai. The author thank the Management of PT Batutua Kharisma Permai for giving the chance to do research in their area in Wetar Island, providing the logistic, and for giving permission to publish this report. The author also thank Y. A. Mulyani for comments on the manuscript.
**REFERENCE**


### Table 1: The list of birds species found at The PT Batutua Kharisma Permai Project area, Wetar Island, Maluku Province

<table>
<thead>
<tr>
<th>No</th>
<th>Family/Species</th>
<th>Common Name</th>
<th>Found at Sampling Area</th>
<th>Status</th>
<th>Document</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Puffinus pacificus</td>
<td>Wedge-tailed Shearwater</td>
<td>- - - - - -</td>
<td>NP</td>
<td>Banda see closed to project area, Fv</td>
</tr>
<tr>
<td>2</td>
<td>Fregata minor</td>
<td>Great Frigate</td>
<td>- - - - - -</td>
<td>NP</td>
<td>Cross over Lurang, Fv</td>
</tr>
<tr>
<td>3</td>
<td>Sula leucogaster</td>
<td>Brown Booby</td>
<td>- - - - - -</td>
<td>P</td>
<td>Banda see closed to project area, Fv</td>
</tr>
<tr>
<td>4</td>
<td>Hieraaetus fasciatus</td>
<td>Bonelli’s Eagle</td>
<td>√ √ √ ? √</td>
<td>P</td>
<td>MF, EF, C</td>
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<tr>
<td>5</td>
<td>Falco moluccensis</td>
<td>Spotted kestrel</td>
<td>√ - - - -</td>
<td>P</td>
<td>MF, C</td>
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<tr>
<td>7</td>
<td>Streptopelia chinensis</td>
<td>Spotted-Dove</td>
<td>√ √ ? √ ? √ √</td>
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<tr>
<td>8</td>
<td>Geopelia maugei</td>
<td>Barred Dove</td>
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<td>10</td>
<td>Gallicolumba hoedtii</td>
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<td>- - - - - √ √</td>
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<tr>
<td>12</td>
<td>Ducula cinerea</td>
<td>Timor Imperial Pigeon</td>
<td>√ ? ? ? √ √</td>
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<td>MSF, BF, MF, Fr</td>
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### ANEXES
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<th>Order</th>
<th>Genus</th>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Voice</th>
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<th>Food</th>
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<td>Ninox scutulata</td>
<td>Brown Boobook</td>
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<tr>
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<td>Caprimulgus macrurus</td>
<td>Large tailed Nightjar</td>
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<tr>
<td>APIDAE</td>
<td>Collocalia esculenta</td>
<td>Glossy Swiftlet</td>
<td></td>
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<td>ALCEDINIDAE</td>
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<td>Dicrurus densus</td>
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<td>Lichmera notabilis</td>
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<td>6</td>
<td>Myzomela kuehni</td>
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<td>Bs, SF</td>
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<td>?</td>
<td>NP</td>
<td>Bs, SF</td>
</tr>
<tr>
<td>3</td>
<td>Lonchura pallida</td>
<td>Pale-headed Munia</td>
<td>√</td>
<td>√</td>
<td>NP</td>
<td>BF, MF, MsF, SF</td>
</tr>
</tbody>
</table>

Legend:
1. Transect Lurang and its surrounding
2. Transect Kuning and its surrounding
3. Transect Vanua and its surrounding
4. Transect Wetuk and its surrounding
5. Transect Koreng and its surrounding
6. Base camp and its surrounding

- MF = Monsoon Forest
- SF = Seed Feeder
- BF = Beach Forest
- RG = Re greening Forest
- MsF = Moist Forest
- Mo = Mollusk
- EF = Eucalyptus Forest
- Fr = Frugivorous
- Fv = Fishivorous
- E = Endemic
- C = Carnivorous
- Bs = Bush and shrub
- I = Insectivorous
- RF = Riparian Forest
- P = protected species
- O = Omnivorous
- HS = Honey sucker
- NP = not protected species

? = may be present but not recorded during observation
= Beach
Mg = Mangrove

Appendix 2. Selected Species List

In the following account species are listed have a globally threatened status: vulnerable and near-threatened (BirdLife International 2001).

Bonell’s Eagle *Hieraaetus fasciatus*

White bellied - See Eagle *Haliaeetus leucogaster*
Global status – Vulnerable (BirdLife International 2001). Field notes – young and adult birds flew in and above the beach forest at Vanua.

Australian Hobby *Falco longipennis*

Spotted Kestrel *Falco moluccensis*

Dusky Cuckoo-Dove *Macropygia magna*
Global status – Endemic at small island at Sulawesi, 4 subspecies (*magna*) for Wetar. Field notes – On 20 June 2005 a single bird crossing the Kuning river.

Timor Black Pigeon *Turacoena modesta*
Global status – Endemic to Wetar. Field notes – common at low land forest. Widespread in beach forest, monsoon forest and moist forest.

Barred Dove *Geopelia modesta*
Global status – Commonest bird species. Field notes – Widespread over all forest type in concession project area.

Wetar Ground-dove *Gallicolumba hoedtii*

Timor Imperial Pigeon *Ducula cineracea*
Global status – Endemic to Wetar. Field notes – uncommon, but widespread, flying over the beach forest, monsoon forest and moist forest.

Olive-Headed Lorikeet *Trichoglossus euteles*
Global status – Endemic to Wetar. Field notes – Locally common, widespread, flying over the eucalyptus forest, monsoon forest and moist forest.

Iris Lorikeet *Trichoglossus iris*
Global status – Endemic to Wetar. Field notes – uncommon, a small group birds (3 birds) flying over the moist forest at Koreng river hill on 23 June 2005.

Timor Oriole *Oriolus melanotis*

Wetar Figbird *Sphecotheres hypoleucos*
Global status – Endemic to Wetar. Field notes – uncommon, a single bird seen feed on Ficus tree at moist forest.
Orange Banded Thrush  *Zoothera peronii*
Global status – Endemic to NTT. Field notes – locally common, Widespread a solitary bird at beach forest, moist forest and monsoon forest.

Timor Blue Flycatcher  *Cyornis hyacinthinus*
Global status – Endemic to NTT. Field notes – uncommon, Widespread a solitary bird at beach forest, moist forest and monsoon forest.

Northern Fantail  *Rhypidura rufiventris*
Global status – Near-threatened (BirdLife International 2001). Field notes - Widespread and not uncommon in the lower parts of the project area.

Rufous Fantail  *Rhypidura rufifrons*

Fawn-breasted Whistler  *Pachycephala orpheus*
Global status - Endemic to NTT. Field notes – common, Widespread at beach forest, moist forest and monsoon forest.

Helmeted Friarbird  *Philemon buceroides*
Global status – Near-threatened (BirdLife International 2001) Field notes – common, Widespread over all forest, include regreening area.

Streak-breasted Meliphaga  *Meliphaga reticulata*
Global status – Endemic to Wetar. Near-threatened (BirdLife International 2001); Field notes, common, widespread in small numbers.

Black-chested Honeyeater  *Lichmera notabilis*
Global status – Endemic to Wetar. Near-threatened (BirdLife International 2001); Field notes – common, Widespread in the area.

Crimson-hooded Myzomela  *Myzomela kuehni*
Global status – Endemic to Wetar, Restricted range species. Field notes – Rather common in the project area.

Flame-breasted Sunbird  *Nectarinia solaris*
Endemic to Wetar Near-threatened (BirdLife International 2001). Field notes – not uncommon, Widespread in the area.