Bats as environmental service providers in Bungo, Jambi, Indonesia

World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

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Bats

Two sub orders (Corbet and Hill, 1992)

Sub order Megachiroptera
Use eyes to recognize or detect (except: *Rousettus* use echolocation)

Sub order Microchiroptera
Use echolocation system to guide


Cynopterus brachyotis


Figure 1. Echolocation mechanism (J. A. Summer, Maria Torres in Harun Yahya, 2005)

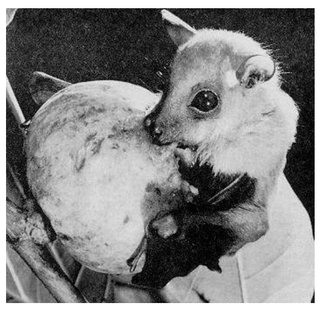
Echolocation Mechanism

Bats ➔ Sound from mouth or nose with high wave frequency ➔ *ultrasonic* (± 50 Khz) beyond human hearing (3-18 Khz)

Sound waves reflecting back from an object (e.g. prey) enable bats to estimate distance and direction of object.

Ecological Functions

- Seed dispersal of many tropical plants, e.g: Dipterocarpaceae, Psidium.
- Pollination of economical plants, e.g: Durio, banana
- Insect bats ➔ pest control


Micropteropus pusillus
(Merlin D. Tuttle, 1983)

Methodology

Research period: April – June 2005 and December 2007.

Sampling area: mixed garden, young rubber, old rubber, disturbed forest and primary forest of Kerinci Seblat National Park.

Method ➔ descriptive
Combination of exploration and mist-neting

Materials: 4 mist-nets with 2.75 meter height and 6, 9, 12 and 18 meters width, and (30-33) mm mesh

- Set up mist-net every evening (at 17.00)
- Check trapped bats every night - every 2 hours until 23.00 and morning at 6 am
- Mist-net set up 3-15 m above ground
- Mist-net set up for 3-4 days at a time

Tabel. 1 Environment abiotic factor

Abiotic Factor	Value
Temperature (°C)	25-28
Humidity(%)	79-83
Rain fool (ml)	0-200
Altitude (dpl)	100-600


Figure 2. Mist-net trapping

Result and Conclusion

Findings

18 species of bats from 5 families were found in different land use systems (mixed garden, young rubber, old rubber, disturbed forest and primary forest)

Family Pteropodidae (13 species):
- *Balionycteris maculata* (Thomas, 1893)
- *Chironax melanochepalos* (Temminck, 1825)
- *Cynopterus brachyotis* (Mueller, 1838)
- *Cynopterus horsfieldi* (Gray, 1843)
- *Cynopterus minutus* (Miller, 1906)
- *Cynopterus sphinx* (Vahl, 1797)
- *Dyacopterus spadiceus* (Thomas.1890)
- *Eonycteris spelaea* (Dobson, 1871)
- *Macroglossus sobrinus* (Andersen, 1911)
- *Megaerops ecaudatus* (Temminck, 1837)
- *Megaerops wetmorei* (Taylor, 1934)
- *Penthetor lucasi* (Dobson, 1880)
- *Pteropus vampyrus* (Linnaeus, 1758).

Family Emballonuridae:*Emballonura monticola* (Temminck, 1838)

Family Rhinolophidae: *Rhinolophus trifoliatus* (Temminck, 1834)

Family Vespertilonidae: *Myotis muricola* (Gray, 1846)

Family Hipposideridae 2 species:
- *Hipposideros cineraceus* (Blyth, 1853)
- *Hipposideros cervinus* (Gould, 1863)

Bat diversity index

The land use change has influenced bat diversity index. This changes also indirectly influenced the diversity index in primary forest.

High diversity in old rubber (H'=1.079 dan A=0.083)

Low diversity in young rubber and primary forest (H'=0.602 dan A=0.25)

However, bat species in primary forests were different from bats in other land use systems. Several species, such as *Chironax melanochepalos*, found in primary forests were not encountered elsewhere.

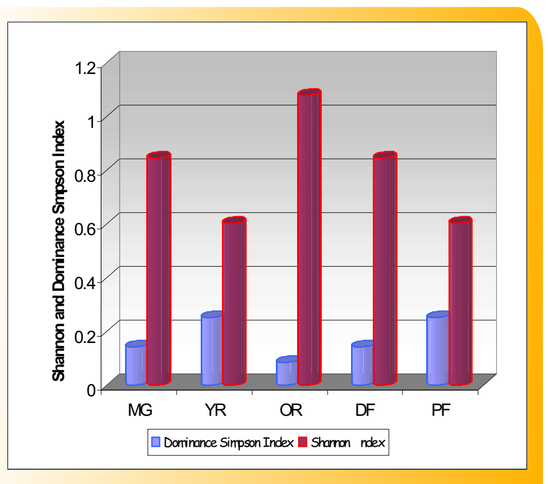


Figure 3. Diversity Shannon and Index Dominancy Simpson Comparison

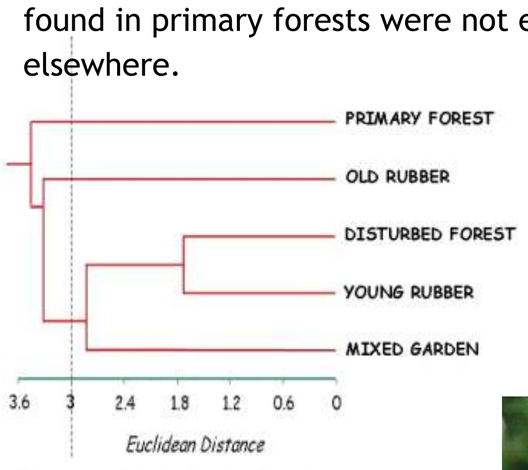


Figure 4. Dissimilarity Dendogram variable land use system according species of bats with furthest neighbour and Euclidean distance

Dissimilarity Test for Land Use System

Using dendogram for dissimilarity co-efficient 3.00

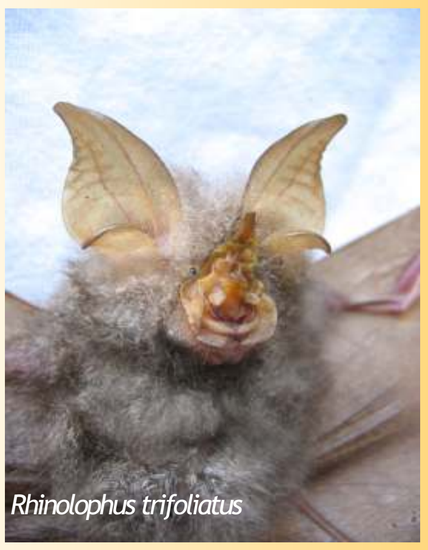
Old rubber has structure similar to Primary forest.

Old rubber agroforests can become alternative habitat for bats, especially where forests are disappearing.


Cynopterus brachyotis

Common species (count in many land use system = Highly adaptive)
- *Cynopterus brachyotis* (Mueller, 1838), except in forest
- *Balionycteris maculata* (Thomas, 1893), except in mix garden

Microchiroptera


Rhinolophus trifoliatus


Hipposideros cervinus

Megachiroptera


Penthetor lucasi


Megaerops wetmorei

Figure 5. Several species of bats normally found in PRIMARY FORESTs are now found in OLD RUBBER AGROFORESTS

Primary Forest ➔ Young Rubber | Old Rubber

Conversion of Primary forest to young rubber can decrease the diversity index and increase dominance of one or few species.

If you like Durian, then Save the Bats, Save Old rubber, Save Forests, Save BIODIVERSITY

Note color:
Red: seed dispersal agent; Green: pollinator agent; Blue: biological controller of insect pests

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