

# Biodiversity

Mohd Tajuddin Abdullah (Taj), Madinah Adrus, Mohd Isham  
 Mohd Azhar & Wahap Marni  
 Department of Zoology, Universiti Malaysia Sarawak.

Gunung Mulu World Heritage Area  
 3 February 2012

## Estimated Biodiversity in Malaysia?

Taxa	World	Malaysia	Borneo
Bacteria	5 million	?	?
Fungi	1.5 million	?	?
Mites	1 million	?	?
Insects	950,000 – 30 million	?	?
Marine macrofauna	10 million	?	?
Reptiles	8,240	379	166
Amphibians	5,743	198	100
Fish	29,300	368	394 (149)
Bird	10,234	747	620 (37)
Mammals	5,416	337	222 (44)
Higher plants	258,650	15,500	15,000



## Why so many endemic species?

- 288 species of terrestrial mammals; 100 species bats & 61 species of rodents (Abdullah *et al.*, 2006; Abdullah & Hall, 2009)
- High structural diversity tropical rainforest – high faunal diversity & endemism
- Pleistocene; lack favorable habitat & small founder populations – species become extinct, speciation & radiated into endemic species (Ruedi and Fumagalli, 1996)

	World	Asia	Malaysia	Borneo
Mammals	5,416	702	337	288

3

## Socio-cultural Diversity

Human interactions at all levels including;

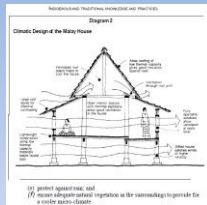
1. **Historical & genealogical background**
2. **Ethno-linguistic groups**
  - 40 in Borneo
3. **Culture**
  - Religion & spiritual belief
  - Adat, custom, rituals, habits
4. **Local Ecological Knowledge**
  - Livelihood, food, drink, craft, sport
  - Ethno-medicine ethno-botany, ethno-zoology
  - Oral history, myths & legend related to biological and physical characteristics
  - Place names



## Socio-cultural & BioD Relationships

### Traditional Malay Kampong

- Sarong, batik & baju kurong
- House of timber with attap roofing near water source, river mouth.
- Plenty fruit trees, chilly, kunyit, selaseh, serai, lengkuas, pandan; rubber, wet padi
- Chicken, cow, goat, cat, caged song birds
- Pengulu & bomoh – spiritual, ritual, adat; LEK – herbs for medicinal, culinary, aromatic & cosmetic
- Nearby forest – monkey, gibbons, squirrels, pigs, birds, snakes, lizard



## Socio-cultural & BioD Relationships

### Traditional Indian Community

- Sarong & saree
- Suburban, plantation, near kampong – depauperate of wild plants or animals
- Mango tree; banana, curry leaf & neem (*Azadirachta indica*), bunga melor; betel-vine (*Piper betle*) & pinang (*Areca catechu*)
- Speaks Tamil, Malayalam, Telegu
- Goat, cow, chicken - fresh milk or meat
- Priest – astrologer, religious practices & similar to bomoh.



**Socio-cultural & BioD Relationships**

**Traditional Kadazan**

- House; pillars are of timber, the walls and floors of bamboo and the roof of thatch.
- Keamatan traditional ceremonies performed by *bobohizan*, honoring the spirit of the rice.
- Speaks Kadazandusun

**Traditional Melanau**

- Villages near river mouth
- wetland with sago (*Metroxylon sagu*) & rice traditional diet
- Speaks Melanau, Bahasa Sarawak



Department of Zoology  
FACULTY OF RESOURCE SCIENCE AND TECHNOLOGY

**Biodiversity Erosion & Cultural Collapse**

**Threatened**

- **Ecosystems**
  - Highlands
  - Wetlands
  - Lowland habitats
- **Species**
- **Gene pool**



**Near extinction**

- **Socio-cultural**
  - Cultural diversity
  - Ethnic diversity
  - Linguistic diversity
  - Musical diversity
  - Craft & sport
  - Custom, ritual
- **Local Ecological Knowledge**
  - Ethnobotany
  - Ethnzoology

8

**Bats of Mulu**

- *Rousettus amplexicaudatus*
- *Murina suilla*

**Ticks & mites**

- **What are they?**
  - Class Arachnida/ subclass Acari.
  - known as ectoparasites on mammals, birds, reptiles, etc.
  - largest & most biological diverse groups or Arachnida.
- **Why are they important?**
  - indicator for medical science/purpose.
  - vector of diseases




Fig 1: Rodent (rat)




Fig 2: Tick (medical importance)




Fig 3: Mites (medical importance)

**Insects**

- Most diverse group in this world
- Found from water till top of mountain
- Known to be source for; Economics such as food, tourism attractions, cosmetics, Medical & sciences important - vectors for diseases, conservation, forensic
- Agriculture & forestry – pollinators
- Environmental indicators
- – pollution,
- How to define an insect?
- 6 legs, 3 segments (head, thorax & abdomen)- 1 pair of eyes, antenna, up to 2 pairs of wings.
- 28 – 30 orders worldwide
- Examples – Coleoptera-beetle, Lepidoptera-Butterflies & moths, Hymenoptera-wasp, bees etc.

Understanding Biodiversity

Environment, Social & Cultural Diversity Integration

Governance Ecological Ethics, Responsibility, Accountability & Knowledge Discovery Obligations

Department of Zoology  
FACULTY OF RESOURCE SCIENCE AND TECHNOLOGY

### UNIMAS Mammal Study Team

 Besar Ketei BSc 2005	 Faisal Ali Anwarali MSc 2009 Phylogenetics	 Wan Nurainie BSc 2008 & Nur Aida MSc on rodents
 Dr. Les Hall Univ. Queensland 2000 External examiner	 Imelda Vivian Paul MSc 2004 Molecular Ecology and Evolution	 Mohd Hanif MSc Pylogenetics; Madinah Adrus MSc ectoparasite.
 Wahap Marni BSc 2005	 Left is Andy Kho MSc 2008 Right is Fong Pooi Har MSc Molecular Ecology	 Madinah Adrus MSc ectoparasite.
 Jayaraj Vijaya Kumaran MSc 2009	 Eileen Lit MSc on Phylogeny of Tupaiia	 Huzal Irwan Husin
 Sigit Wiantoro & Anang MSc 2010 <i>Myotis muricola</i> & <i>Macanmys</i>	 Noor Haliza Hasan 2009, MSc Molecular Ecology	 Ridwan MSc 2010, <i>Penthetor lucasi</i>