



1. Menjelaskan konsep dasar **zoogeografi** dan faktor-faktor yang mempengaruhi persebaran mamalia.
2. Menganalisis pola distribusi mamalia di dunia dan Indonesia.
3. Mengidentifikasi zona zoogeografi dan keanekaragaman mamalia khas tiap zona.
4. Mengevaluasi dampak perubahan lingkungan terhadap distribusi mamalia

Agus Subagyo



Zoogeografi Mamalia

Zoogeografi adalah cabang ilmu biogeografi yang mempelajari distribusi hewan di permukaan bumi.

Dalam mamalogi, zoogeografi berperan dalam memahami pola persebaran mamalia, faktor-faktor yang mempengaruhinya, serta implikasi bagi konservasi.



describe the concept and definition of biogeography;

- **Biogeografi** adalah studi tentang distribusi hewan dan tumbuhan di planet bumi, yang terjadi di berbagai wilayah di dunia dalam pola yang berbeda..
- Distribusi beberapa spesies hewan sangat unik sehingga sulit untuk menjelaskan kemunculan mereka di wilayah tertentu..
- Zoogeografi mencoba memahami kompleksitas dan kesederhanaan distribusi hewan berdasarkan pengaruh evolusi dan lingkungan.

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Wallace: Zoogeography

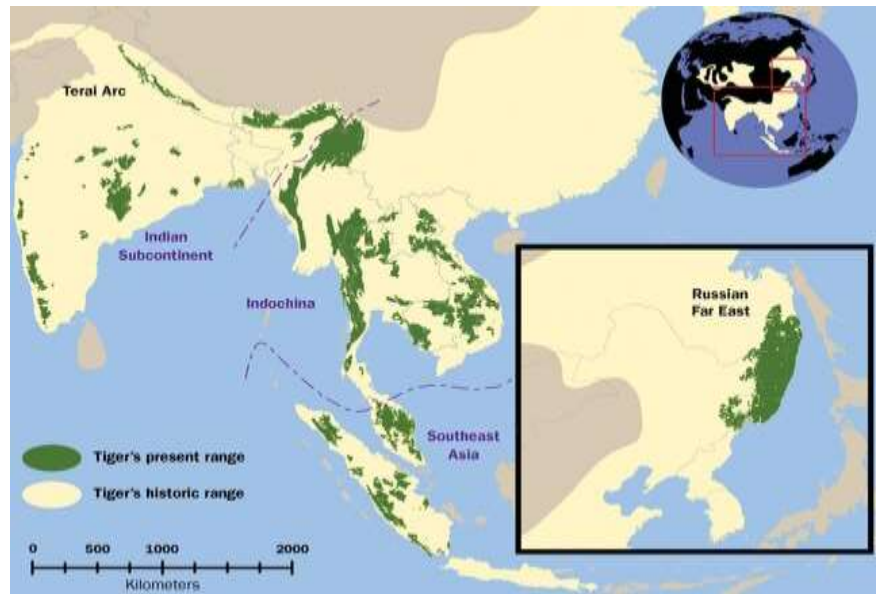
- * Studying animal distributions (animal geography)
- * **Father of animal geography/biogeography.**
- * Co-discoverer of theory of natural selection.

".....every species comes into existence coincident in time and space with a preexisting closely allied species." (1855)





Zoogeography is the branch of the science of biogeography that is concerned with the **geographic distribution** (present and past) of animal species.



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1. Zona Biogeografi Dunia

Berdasarkan **Alfred Russel Wallace** dan beberapa ilmuwan lainnya, dunia dibagi menjadi beberapa **wilayah zoogeografi**:

- **Neartik** (Amerika Utara)
- **Neotropik** (Amerika Selatan)
- **Paleartik** (Eropa, Asia Utara, Afrika Utara)
- **Ethiopian** (Afrika Sub-Sahara)
- **Oriental** (Asia Selatan & Tenggara)
- **Australis** (Australia & Papua)

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Zoogeographical Regions: Modern View

The widely accepted modern classification of land masses into regions is given below which is based on Wallace (1876) and Darlington (1957).

1. Realm MEG(=T)AGEA

1. **PALEARCTIC** (Europe, Russia, Mediterranean).
2. **NEARCTIC** (North America up to the middle of Mexico).
3. **AFRICAN** (=ETHIOPIAN) (Africa south of Sahara).
4. **ORIENTAL** (Tropical Asia south of 30° latitude).

2. Realm NEOGEEA

5. **NEOTROPICAL** (South America, tropical Mexico and Caribbean Islands).

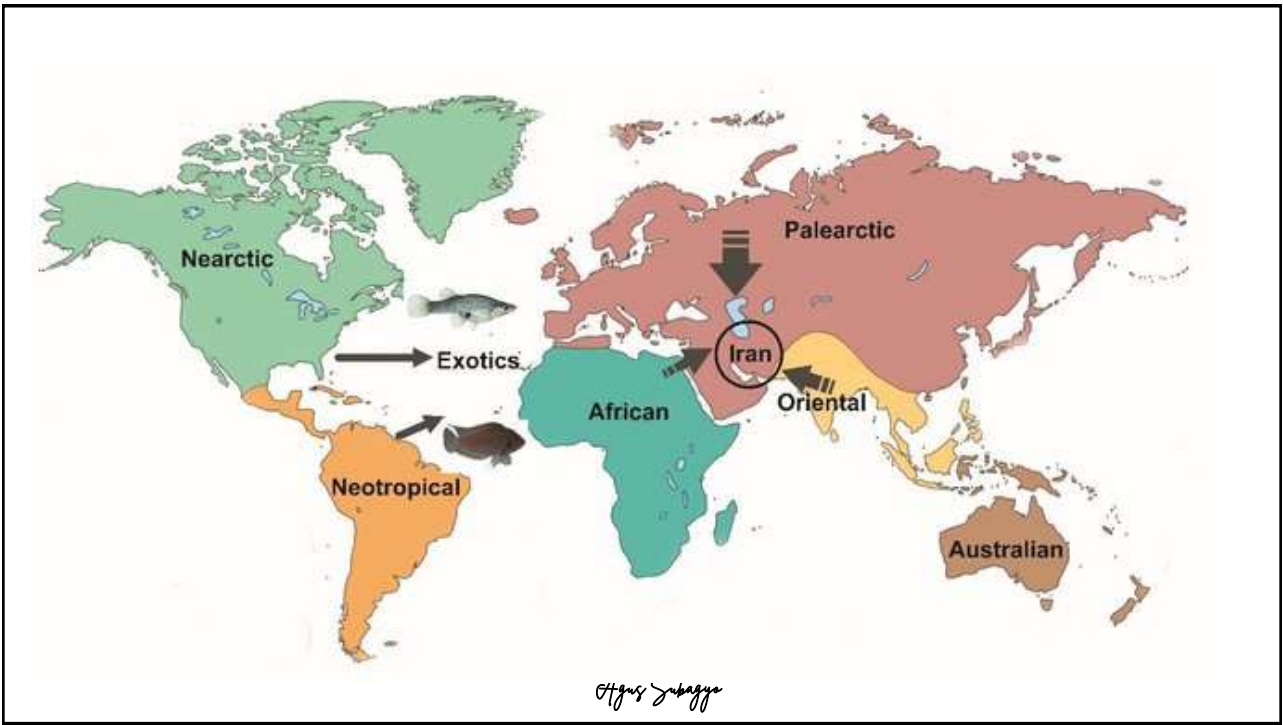
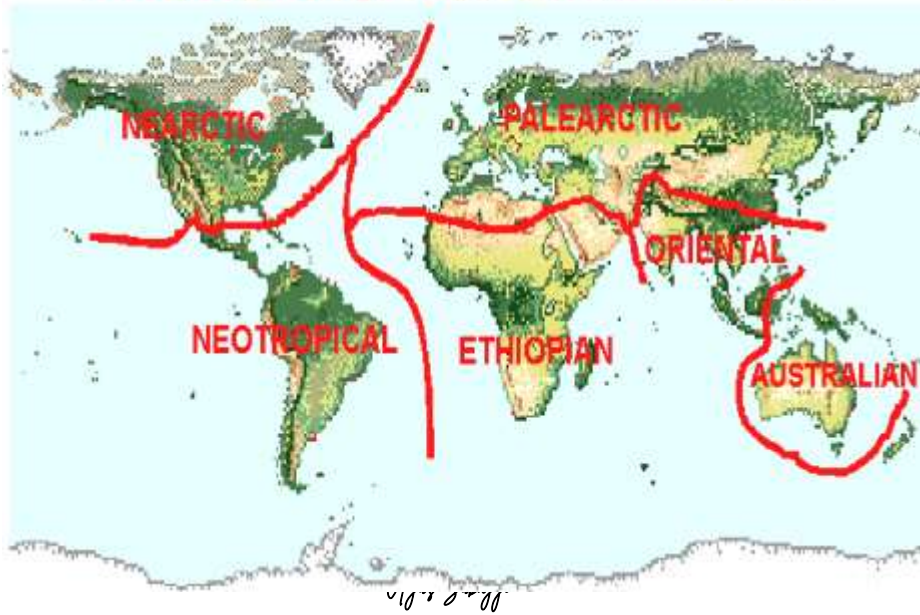
3. Realm NOTOGEEA

6. Region **AUSTRALIAN** (Australia, Tasmania, New Guinea and New Zealand).

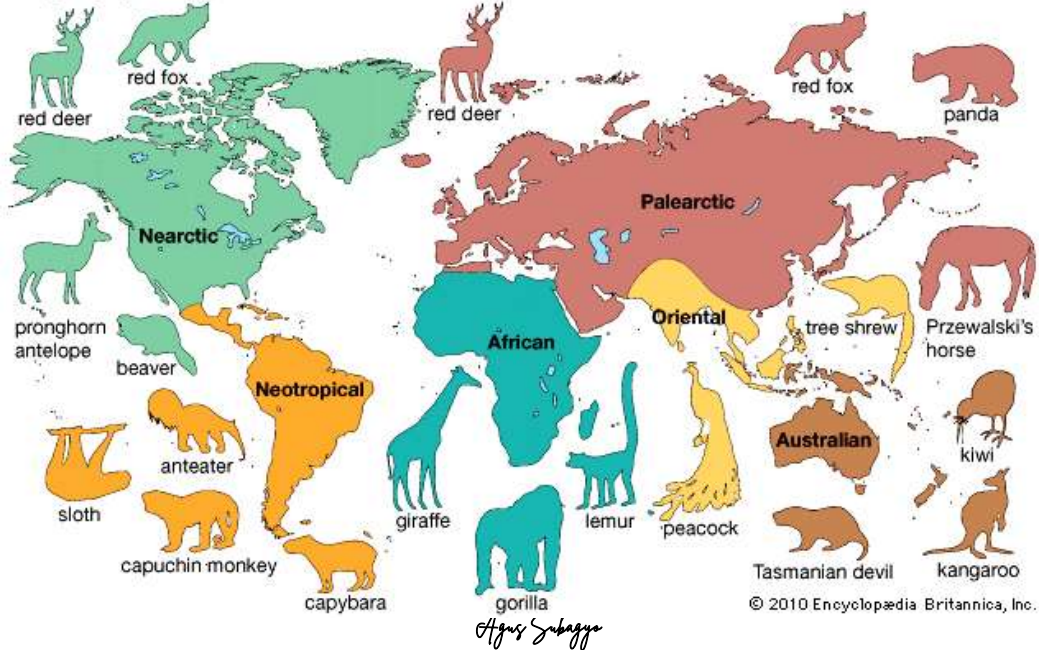
Catatan: Nearktik dan Palearktik membentuk Holarktik. Batas biogeografi antara Palearktik dan Ethiopia serta Nearktik dan Neotropis juga sulit ditemukan. Batasan wilayah biogeografis Oriental dan Australia adalah garis Wallace

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Zoogeography: Six Principal Realms



Zoogeographic regions and some characteristic animals



Zoogeographic Regions

History

Faunal regions proposed by [Alfred Russel Wallace](#), co-discover of the Theory of Evolution by Natural Selection. Comparisons of the Mammals of the Faunal Regions.

1. Palearctic (PA)

- A. Europe, North Africa (to Sahara), Asia (except India, Pakistan and SE Asia) and Middle East.
B. Number of families = 36; endemics = 1

2. Nearctic (NA)

- A. Canada, USA, Mexico to tropics
B. Number of families = 31; endemics = 2.

Note: Holarctic is Palearctic plus Nearctic

3. Neotropical (NT)

- A. tropical Mexico south to South America, plus the Antilles
B. Number of families = 56; endemics = 28.

4. Afrotropic (AF) or Ethiopian (ET)

- A. Madagascar, Africa south of the Sahara, southern Arabian Peninsula
B. Number of families = 58; endemics = 20.

5. Indo-Malayan (IM) or Oriental (OR)

- A. Pakistan, India, Southeast Asia, Philippines, Indonesia west of Wallace's line (Sumatra, Java, Borneo)
B. Number of families = 49; endemics = 8.

6. Australian (AU)

- A. Australia, New Guinea, Tasmania, Indonesian Islands east of Wallace's line (Sulawesi, Timor, etc.)
Note: does not include New Zealand

- B. Number of families = 35; endemics = 21.

7. Oceanic

- A. Oceans of the world and truly oceanic, isolated, small islands

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Richness of Vertebrates (overall), Birds and Mammals in 6 Zoo-geo-Realms

COMPARATIVE RICHNESS OF THE SIX REGIONS.

REGIONS.	VERTEBRATA.		MAMMALIA.			BIRDS.		
	Fami- lies.	Peculiar families.	Genera.	Peculiar genera.	Per centage.	Genera.	Peculiar genera.	Per centage.
Palæarctic...	136	3	100	35	35	174	57	33
Ethiopian ...	174	22	140	90	64	294	179	60
Oriental.....	164	12	118	55	46	340	165	48
Australian...	141	30	72	44	61	298	189	64
Neotropical..	168	44	130	103	79	683	576	86
Nearctic	122	12	74	24	32	169	52	31

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Political Map of the World, June 1997



FAUNAL CHARACTERISTICS OF PALEARCTIC REALM

Fishes : Sucker fish (*Echenis*), Salmon fish, etc.

Amphibians : Salamanders, eg. *Proteus*, etc.

Reptiles : lizard *Trigonophis*, sand boa etc.

Birds : Tern, wren, finches, Gees etc.

Mammal: Wild dog (wolf), wild pig, hedgehog (*Hystrix*), Mole rat, etc.

It is suggested that vertebrate fauna of palaeartic region is not very rich and shows overlapping [nearctic region](#) with New world and old world fauna.

1. PALEARCTIC REALM

Characteristics:

- a) Largest region
- b) Includes Europe, north Africa, much of Middle East, most of Asia (except south-southeastern Asia)
- c) Diverse biomes: polar ice (N) to desert (S)

Sub-Regions:

- a) European Sub-region
- b) Mediterranean Sub region
- c) Siberian sub region
- d) Manchurian Sub region

Climate: This is the largest of the Six regions is covering an area of 14,000,000 square miles. In this region we find Europe, Asia, North of Himalayas and Northern parts of Africa. The lands bordering the Mediterranean Sea in southern Europe, north Africa, and western Asia are home to the Mediterranean Basin eco-regions, which together constitute the world's largest and most diverse Mediterranean climate region of the world, with generally mild, rainy winters and hot, dry summers.

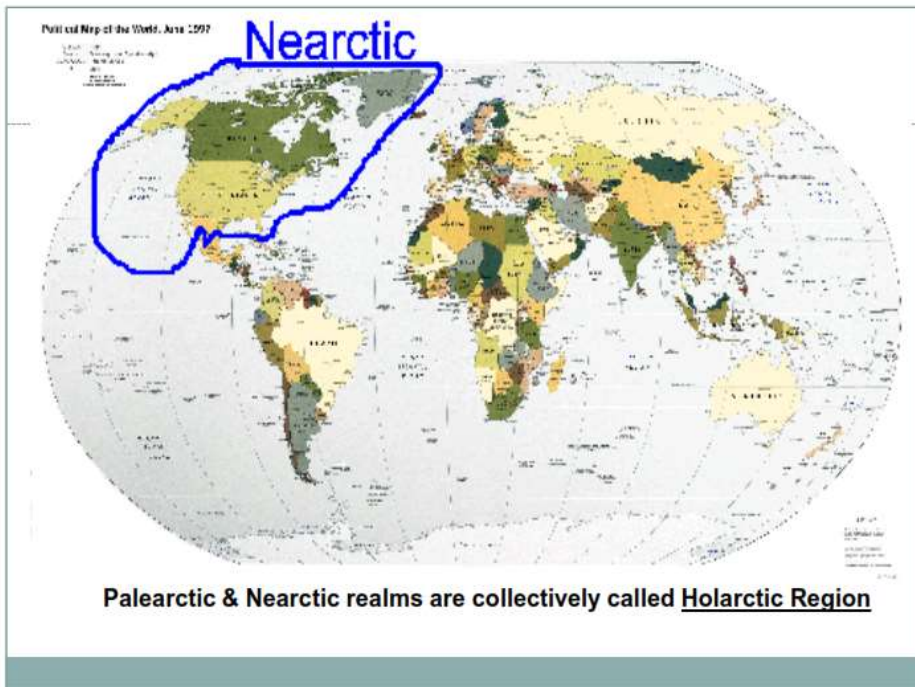
Few Mammals of Palearctic realm



Palearctic Fauna:

Gray wolf, Norway rat, Siberian tiger, giant panda, Polar bear.





2. NEARCTIC REALM

Characteristics:

- Most of North America, Greenland
- Latitudinal biome diversity similar to Palearctic
- Polar ice (N) to desert & subtropical (S)
- This region is known as “**Head quarters of urodels**”

Sub-Regions:

- California Sub-region
- Rocky mountain sub-region
- Alleghasy Sub-region
- Canadian Sub region

Climate: This region includes the north American continent up to the middle of Mexico. Climate is temperate with an arctic edge. There are grasslands in the middle of the continent. Western part is arid with mountains and coniferous forests. Like Palearctic region this has extreme cold and hot climate.

Few Mammals of Nearctic realm



FAUNAL CHARACTERISTICS OF NEARCTIC REALM

Fishes: Garpike, Paddle fish etc.

Amphibians: Salamanders, like *Amphiuma*, *Amblystoma* (Axoltl larva), etc.

Reptiles: Rich number of Reptiles like, Musk turtle, *Trionyx*, Alligators *Ophiosaurus*, and Colubrid vipers, like *Pituophis couophis* and *Chilomeniscus* are present.

Birds: Pelicans, Heron, Humming birds, Woodpeckers, Mocking birds, Larks and Sand- pipers are present.

Mammals: Squirrels, Moles, Rabbits, Beavers, Cats, Bats, Deers, Bears, Weasels, Opposum, Porcupine and Armadillo are present.



Nearctic Region- Mammals

- Holarctic Fam.-(Nearctic and Palearctic)
- Moles
- Pikas
- Zapodidae- Jumping Mice
- Beavers (*Castor canadensis*)



3. **Neotropical Realm:** This region shows tropical conditions. The southern part of South America shows temperate zones, because of these varied environmental conditions luxuriant forests, deserts, plains and rivers are common in Neotropical region

Few Animals of Neotropical Region



Political Map of the World, Area 2007

4. Ethiopian Realm



The old world counterpart of the Neotropical is the Ethiopian, which includes the continent of Africa, south of the Atlas Mountain and Sahara Desert, Southern Arabia, Madagascar and Mauritius. It embraces tropical forests in central Africa and in the mountains of East Africa, Savanna, grasslands and deserts. It includes a varied vertebrate fauna and several endemic families.

4. ETHIOPIAN REALM

Characteristics:

Africa, though northernmost Africa is more similar to Europe (Palearctic realm), is characteristic with antelopes, giraffes, elephants, rhinoceros, gorillas, dogs, and cats. This is sometimes called the African or Afrotropical realm. In this realm Africa, Sahara desert, Southern part of Arabia, Madagascar Island are included. This region shows extensive desert on the North side. It is called "Sahara desert". On its Western side thick forests are present. Rest of Africa shows Greenland.

Sub-Regions:

1. East African sub region
2. West African sub region
3. South African sub region
4. Malagassy sub region

Climate: Ethiopia is in the tropical zone laying between the Equator and the Tropic of Cancer. It has three different climate zones according to elevation. Naturally it has 3 distinct CLIMATE ZONES, such as, **1. Tropical zone (Kolla)** - is below 1830 metres in elevation and has an average annual temperature of about 27 degree Celsius with annual rainfall about 510 mm. The Danakil Depression (Danakil Desert) is about 125 metres below sea level and the hottest region in Ethiopia where the temperature climbs up to 50 degree Celsius. **2. Subtropical zone (Woina dega)** - includes the highlands areas of 1830 - 2440 metres in elevation has an average annual temperature of about 22 degree Celsius with annual rainfall between 510 and 1530 mm. **3. Cool zone or Temperate Zone (Dega)** - is above 2440 metres in elevation with an average annual temperature of about 16 degree Celsius with annual rainfall between 1270 and 1280 mm.

FAUNAL CHARACTERISTICS OF ETHIOPIAN REALM

Fishes: Fish fauna is diverse. African fresh water lung fish, *Protopterus* characteristic; other endemic fishes are Tuna, Cat fishes, Electric eels etc.

Amphibians: Anurans, like *Rhacophorus*, *Hyla*, *Microhyala*, *Xenopus* (Clawed Toad) and many caecilians (Apoda) are abundant.

Reptiles in Ethiopian region : Crocodiles (*Crocodylus niloticus*, etc.) and Chelones (*Testudo*, *Trionyx* etc.) the characteristic of this region Chamaeleon (*Chamaeleo* sp.); various lizards, like, *Monotrophis*, *Cordylus*, *Agama*, etc. Amongst Snakes some characteristic examples are *Leptorhynchus*, *Rhamnophis*, *Dendroaspis polylepis* (Black Mamba), *D. angusticeps* (Green Mamba), the puff adder (*Bitis arietans*), Boomslang (*Dispholidus typus*), Gaboon viper (*Bitis gabonica*), Egyptian cobra (*Naja haje*), Spitting Cobra (*Naja mossambica*, *N. nigricincta*, *N. nigricollis*), Carpet viper (*Echis ocellatus*), African rock python (*Python sebae*), African blind snake (*Typhlops bibronii*), etc.

Birds in Ethiopian region : The most important birds is the two toed Ostrich *Struthio camelus*. Other birds are Horn bills, Herons, Pigeons, Parrot, Cuckoos, Storks, Finches etc.

Mammals in Ethiopian region: Hyaena (*Aye aye*), flying lemur (*Galeopithicus*), two species of gorilla (western gorilla, *Gorilla gorilla*, and eastern gorilla, *Gorilla beringei*) and both species of chimpanzee (common chimpanzee, *Pan troglodytes*, and bonobo, *Pan paniscus*). Humans and their ancestors originated in Africa. Equus equus (Horse), Elephant (*Loxodonta africana*), Tiger (*Panthera tigris*), lion (*Panthera leo*), Leopard (*P. pardus pardus*), Camel (*Camelus*), Pig (*Phacochoerus africanus*), Donkey (*Equus acinus*), etc. Mammals of Ethiopian region have shown resemblances with the mammalian fauna of

Oriental region. It is because they have a land connection previously.

Collage of Endemic Animals found in Ethiopian Realm

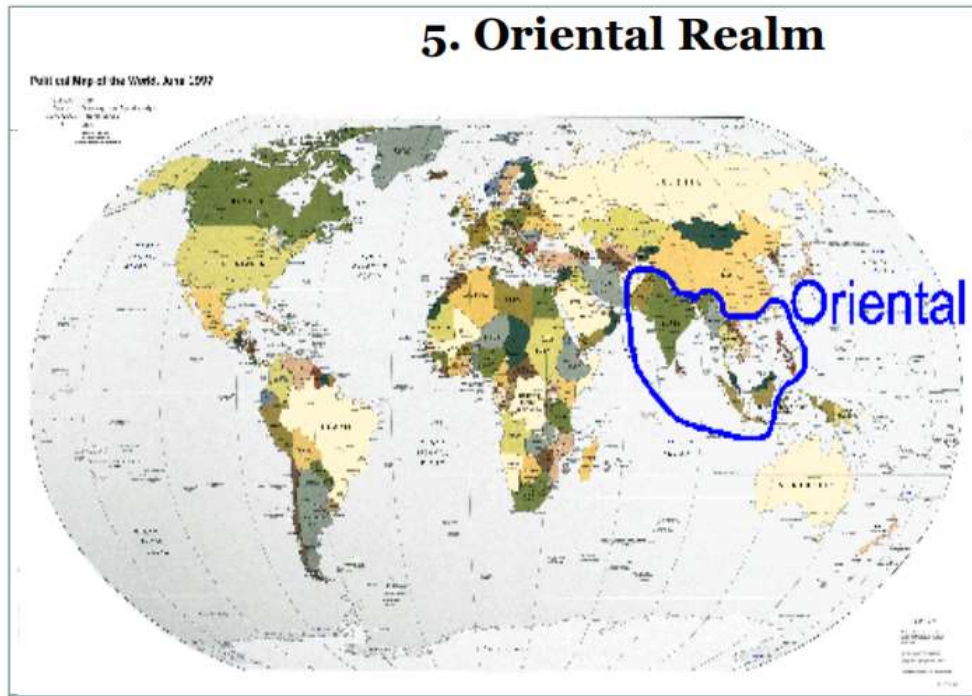


Few Mammals of Africa



Ethiopian Fauna: 52 mammal families, such as, mountain gorilla, African elephant, two-horned rhino, giraffe, aardvark, numerous lemurs and many civets.

5. Oriental Realm



5. ORIENTAL REALM

Characteristics:

This region includes Indian sub-continent including Ceylon, Burma, Philippines, Formosa, Southern China and also the southern region Himalayas. On the West of it Arabian sea is present. In the South east true physical boundary is absent. This region shows tropical and temperate zones. In the North East Asia, tropical rain forest is present, but towards the west there is desert. The remaining part shows plains and rivers hence this region shows different types of atmospheric as well as environmental conditions. Hence the Realm is provided with very rich flora and fauna, showing different biodiversity hot spots.

Sub-Regions:

1. Indian sub-region,
2. Ceylon sub-region.
3. Indo-China sub-region,
4. Indo-Malayan sub-region.

Climate: Oriental Region is known for its varied physical features. The **northern** part of India is temperate, **eastern** part including Burma, Indochina, and North East Asia are rain forest. **Western** Peninsular part is desert and **southern** portion of Indian subcontinent has tropical forests. Similarly Ceylon (Sri Lanka), Indochina and Malaysia contain thick forests. The Himalaya becomes drier and less hospitable westward. The climate of Oriental Region varies. In southern part of the Oriental Region temperature is almost constant all year round and seldom higher than 30 C. in northern part there are great fluctuations varying 10-20 C, raising in spring and summer up to 30 C in the western and eastern western parts. The cool season is accompanied by drought. The hot season is moist. In the southern part the season is dry but with some rain on the mountains. The climate is generally moist, tropical rain deserts extend in the south. The northern countries contain grassy plains with scattered trees or bushes.

FAUNAL CHARACTERISTICS OF ORIENTAL REALM

Fishes in oriental region :- Fish fauna of Oriental region will resemble that of Ethiopian region. Oriental fish fauna is dominated by Carps and Cat fishes.

1. Notopteridae, 2. Anabantidae, 3. Syngnathus, 4. Cypsiluridae,

Amphibians in oriental region:- Tailed Amphibians are very rare, only one genus represented *Tylotriton verrucosus*. Anura and Apoda Amphibians are more.

1. Rana species, 2. Hyla. 3. Rhacophorus, 4. Bufo, 5. Discoblastidae, 6. Icthyophis, 7. Uraeotyphlus,

8. Gegenophis etc.

Reptiles in oriental region:- Many reptiles are seen in this region. This fauna is dominated by lizards, snakes, turtles and Crocodiles.

1. *Gavialis* 2. *Gekko* (Flying Lizard),

3. Chameleon 4. *Varanus* (Indian Monitor Lizard) 5. Python,

6. *Typhlops* 8. *Testudo* 9. Cobra etc., In this region Xenopeltidae, Uropeltidae forms are exclusive.

Birds in oriental region:- In this region 66 families of Birds are included.

1. Honey Guides, 2. Wood Pecker, 3. Horn bill, 4. Pea-cock etc.

Mammals in oriental regions:- This region includes 30 mammalian families.

1. Shrews, 2. Rabbit, 3. Canis,

4. Cat, 5. Aye-aye (Hyaena), 6. Sues, 7. Equas 8. Rhinoceros, 9. Great apes like

Orangutan, Gibbon Gorilla, Chimpanzee Alirus (Himalayan Pander) 10. Camel etc.,

In this region tree Shrews, flying lemurs, Indian Bisons are exclusive.

Various animals of Oriental Realm in COLLAGE



Some of Asiatic Fauna



Oriental Fauna

50 mammal families, such as, Malay tapir, Indian tiger, Water buffalo, Indian elephant, Red panda, King cobra.



Mammals of Oriental region



Indian Bison, Tarsier, Tree Shrews, Sunda (Malayan) flying lemur, Indian giant flying squirrel are exclusive animals.



The Sunda Flying Lemur (*Galeoscoptes variegatus*), also known as the Malayan Flying Lemur or Malayan Colugo, is a species of colugo found throughout South-East Asia.



6. Australian Realm

Australia and New Zealand have flora and fauna that are found nowhere else on Earth. Australia is distinctive because it is an island, a country, and a continent—the smallest of the world's continents. No other land mass can concomitantly make those three claims. Australia consists of a large mainland and the island of **Tasmania** to the south. The main physical area of New Zealand, on the other hand, consists of two main islands separated from Australia's southeastern region by the **Tasman Sea**. Australia is surrounded by various seas. The Indian Ocean surrounds its western and southern coasts. Indonesia and Papua New Guinea lie to the north, separated by the **Timor Sea** and the **Arafura Sea**. The **Gulf of Carpentaria** distinguishes **Cape York**, which extends north along Australia's eastern coast almost to Papua New Guinea. The **Great Barrier Reef** runs for more than 1,600 miles off the continent's northeastern shores. The **Coral Sea** separates the Great Barrier Reef from the South Pacific. The southern side of Australia is the **Great Australian Bight** and the island of Tasmania. Bight is a large and wide bay. To the south of Australia and New Zealand is Antarctica. The two countries have distinct physical geographies.



The fauna of Australia consists of a huge variety of animals; some 83% of mammals, 89% of reptiles, 24% of fish and insects and 93% of amphibians that inhabit the continent are endemic to Australia.

AUSTRALIAN REALM

Characteristics:

This region includes Australia, Tasmania, New Guinea, and a few smaller islands of the Malay Archipelago. But some experts have excluded New Zealand and the Pacific Islands, for these are regarded as oceanic islands separate from the major faunal regions. Partly tropical and partly south temperate, the Australian region is noted for its lack of a land connection with other regions; the poverty of fresh water fish, amphibians and reptiles; the absence of placental mammals and dominance of marsupials.

Sub-Regions:

- Australian subregion.
- Austromalayan Subregion.
- Polynesian Subregion.
- Newzealand Subregion.

Climate: Australia is relatively flat with low elevation highlands and an extensive dry interior, while New Zealand has high mountains and receives adequate rainfall. The tropical regions of **Australia**, in the north of the country, including the equatorial and sub-tropical zones have high **temperatures** and high humidity and distinct wet and dry seasons. In the **Australian** tropics the wet season, called the monsoon season, lasts about six months, between November and March. Both hot and temperate (cold) climates exist in this region. Average annual rain fall is about 75mm. Rain forest, grass land, eucalyptus forest are prominent ecological conditions of Australian Realm.

FAUNAL CHARACTERISTICS OF AUSTRALIAN REALM

Fishes: In this region the most important fish is a lung fish. *Neoceratodus* is seen in this region. It is called “**Australian Lung Fish**”. Osteoglossids & Gadopsids are other important fishes.

Amphibia: Notable amphibians are *Pseudophryne*, *Pachybatrachus*, *Helioporus*, *Pelodyras* and *Leptodactyls*. New Guinea includes only *Xenorhinidae*.

Reptilia: Out of 31 families, 4 are endemic, such as, *Pyzopodiidae*, *Aprasiidae*, *Lialiidae*, and *Dermocheliidae*. N. Zealand possesses *Rhynchocephaliidae* comprising the lone survivor *Sphenodon*. Others are *Varanus* (Monitor Lizard), *Trionyx*, *Testudo elegans*, *Caretta caretta*, *Chamaeleon*, *Calotes versicolor*, *Mabuya* etc.

Aves: In this region flightless birds are common, such as *Apteryx mantelli* (Kiwi, is present only in Newzealand), *Dromaius novaehollandiae* (Emu) in New Guinea, and three spp. of Cassowaries eg. *Casuarius casuarius*, *C.bennetti* & *C. unappendiculatus*. The other birds can be seen in this region are Pigeon, Duck, Crane, Crow, *Passer domesticus* (Sparrow), etc.

Mammalia: Three spp. of prototherians (Monotremata) are Duck-billed Platypus (*Ornithorhynchus anatinus*) & Echidna or Spiny ant eaters (*Zaglossus bruijnii*, *Z. bartoni*, *Z. attenboroughi* & *Tachyglossus aculeatus*). About 234 Marsupials occur in Australia, and these are Kangaroos (*Macropus rufus*) & Wallabies (*Lagostrophus fasciatus*), Wombats (*Vombatus ursinus*), Koalas (*Phascolarctos cinereus*) Tasmanian Devils, (*Sarcophilus harrisi*) Opossums (*Didelphis virginiana*) and Gliders (*Petaurus breviceps*, Sugar glider).

Catatan: Australia memiliki mamalia berplasenta asli dari dua ordo: kelelawar, ordo **Chiroptera**, yang diwakili oleh enam famili, dan tikus, ordo **Rodentia**, famili **Muridae**. Kelelawar dan hewan pengerat merupakan hewan yang relatif baru tiba di Australia. Kelelawar kemungkinan besar tiba dari Asia dan hanya ada dalam catatan fosil sejak 15 juta tahun lalu. Meskipun 7% spesies kelelawar dunia hidup di Australia, hanya dua genus kelelawar yang endemik. Hewan pengerat pertama kali tiba di Australia 5-10 juta tahun lalu dan mengalami radiasi yang luas untuk menghasilkan spesies yang secara kolektif dikenal sebagai hewan pengerat *old endemics*. Old endemics diwakili oleh 14 genus yang masih ada. Sekitar satu juta tahun yang lalu, tikus memasuki Australia dari Nugini dan berevolusi menjadi tujuh spesies *Rattus*, yang secara kolektif disebut sebagai “new endemics”:

Agus Subagya

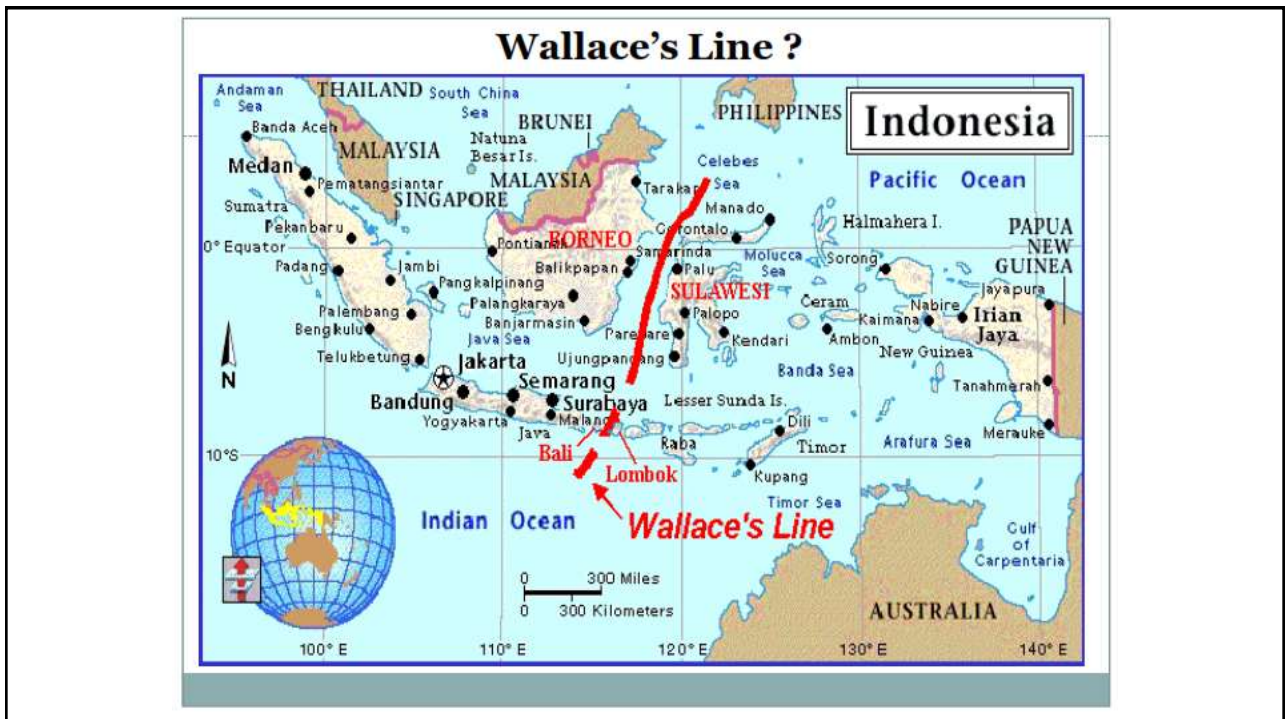
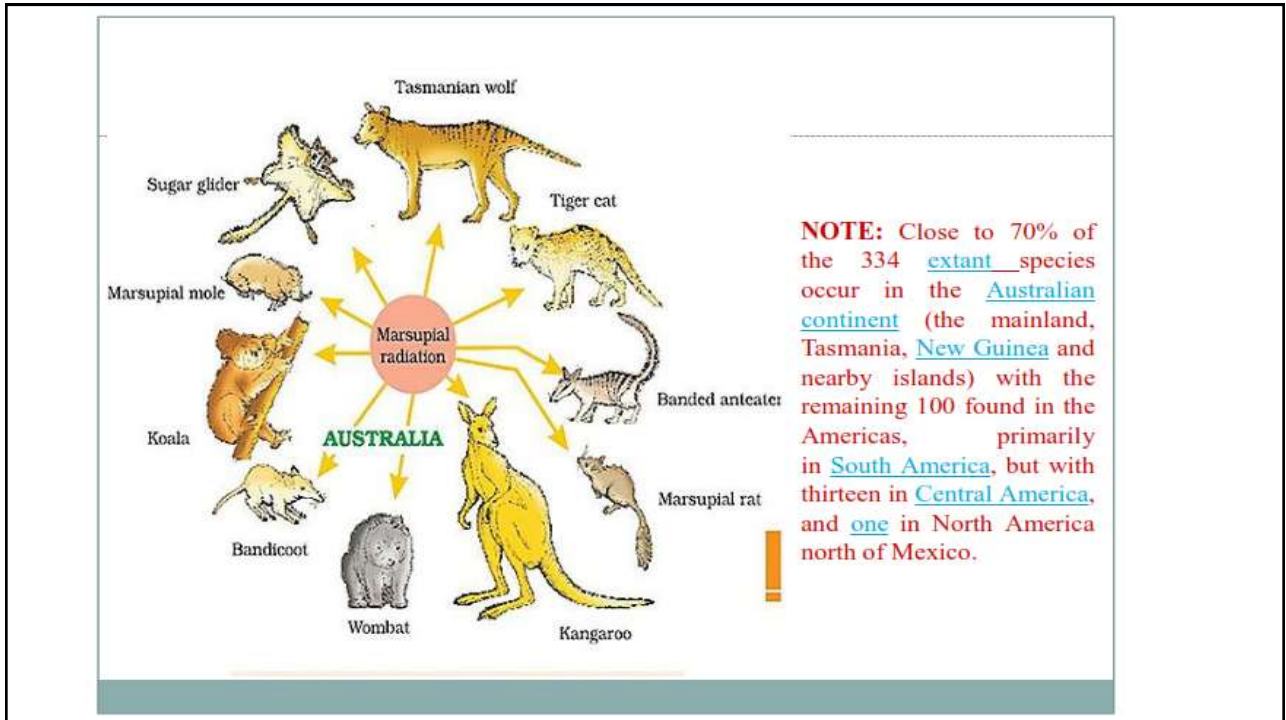
Sejak manusia menetap, banyak mamalia berplasenta yang telah diperkenalkan ke Australia dan kini menjadi liar. Yang pertama adalah **dingo**; bukti fosil menunjukkan bahwa orang-orang dari utara membawa dingo ke Australia sekitar 5000 tahun yang lalu. Ketika orang Eropa menetap di Australia, mereka sengaja melepaskan banyak spesies ke alam liar, termasuk **rubah merah**, **kelinci coklat**, dan **kelinci Eropa**. Spesies domestik lainnya telah lepas dan seiring waktu menghasilkan populasi liar, termasuk **kucing**, **rusa bera**, **rusa rusa**, **chital**, **kuda domestik**, **keledai**, **babi**, **kambing domestik**, **kerbau air**, dan **unta dromedaris**. Hanya tiga spesies mamalia berplasenta non-asli Australia yang sengaja diperkenalkan: tikus rumah, tikus hitam, dan tikus coklat.

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Few Representatives of Australian Realm



Blibby, Duckbill, Quoll, Tasmanian Devil, Tuatara (Sphenodon)



The 7th Realm is Oceanian Realm (New Inclusion by some)



1. SINDHUGHOTAK/ WALRUS: 2 types

Atlantic walrus, *Odobenus rosmarus rosmarus*

Pacific walrus, *Odobenus rosmarus divergens*

2. Maui's dolphin or *popoto* (*Cephalorhynchus hectori maui*) is the world's rarest and smallest known subspecies of [dolphin](#).

3. Seal of New Zealand: [Arctocephalus forsteri](#)

4. Antarctic Krill: *Euphausia superb*

5. Penguins: Of the 17 species under 6 genera: [Aptenodytes](#), [Eudyptes](#), [Eudyptula](#), [Megadyptes](#), [Pygoscelis](#), [Spheniscus](#), only six are found in Antarctica (Adélies, Chinstraps, Emperors, Gentoos, Macaronis, and Rockhoppers)

Mammals of Oceanian Realm



Marine mammals

- Walrus
- Dolphins
- Whales
- Seals
- Krills



Zoogeografi Mamalia di Indonesia

Indonesia memiliki posisi unik di antara dua zona zoogeografi utama

Agus Subagyo



1. Zona Oriental (Sunda)

- Wilayah: Sumatra, Kalimantan, Jawa, dan Bali.
- Contoh Mamalia: Harimau Sumatra (*Panthera tigris sumatrae*), Orangutan (*Pongo pygmaeus*), Gajah Sumatra (*Elephas maximus sumatranus*).

2. Zona Peralihan (Wallacea)

- Wilayah: Sulawesi, Maluku, Nusa Tenggara.
- Contoh Mamalia: Anoa (*Bubalus depressicornis*), Babirusa (*Babyrousa sp.*).

3. Zona Australis (Sahul)

- Wilayah: Papua dan sekitarnya.
- Contoh Mamalia: Kanguru Pohon (*Dendrolagus sp.*), Kuskus (*Phalangeridae*).

Agus Subagyo



Agus Subagyo

Wallace mengelompokkan jenis fauna di Indonesia menjadi tiga, yaitu:

Fauna Asiatis (Tipe Asia), menempati bagian barat Indonesia sampai Selat Makassar dan Selat Lombok. Di daerah ini terdapat berbagai jenis hewan menyusui yang besar

Fauna tipe Australia, menempati bagian timur Indonesia meliputi Papua dan pulau-pulau di sekitarnya. Di daerah ini tidak didapatkan jenis kera, binatang menyusunya kecil-kecil dan jumlahnya tidak banyak. Hewan-hewan di Indonesia bagian timur mirip dengan hewan Australia.

Fauna peralihan, menempati di antara Indonesia timur dan Indonesia barat, misalnya di Sulawesi terdapat kera (fauna Asiatis) dan terdapat kuskus (fauna Australia). Di samping itu terdapat hewan yang tidak didapatkan baik tipe Asiatis maupun tipe Australia.

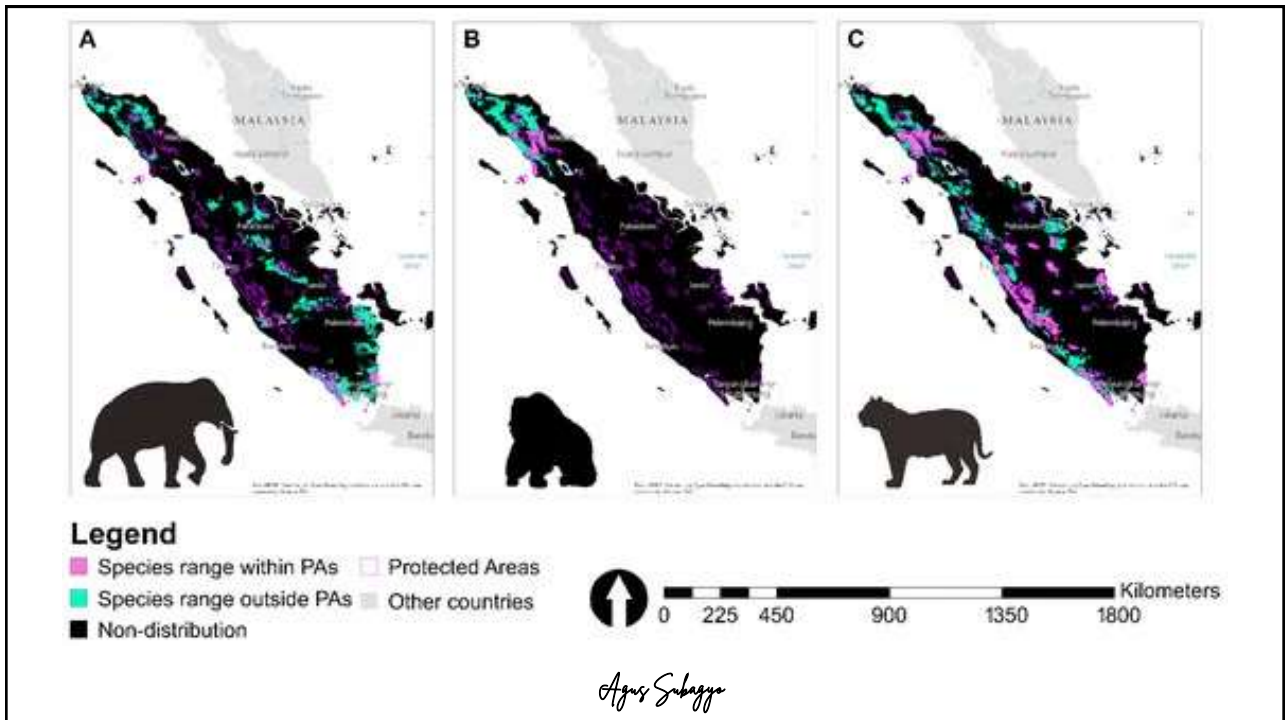
Agus Subagyo

Fauna Asiatis (Tipe Asia),

1. **Tapir** terdapat di Sumatra dan Kalimantan,
2. **Banteng** terdapat di Jawa dan Kalimantan,
3. **Kera gibbon** terdapat di Sumatra dan Kalimantan,
4. **Mawas** (kera hutan), yaitu jenis kera besar dan tidak berekor, hewan ini banyak terdapat di hutan-hutan Sumatra Utara dan Kalimantan,
5. **Beruang** terdapat di Sumatra dan Kalimantan,
6. **Badak** terdapat di Sumatra dan Jawa (bercula dua),
7. **Gajah** terdapat di Sumatra (berpindah-pindah),
8. **Siamang** (kera berwarna hitam dan tak berekor) terdapat di Sumatra,
9. **Kijang** badannya berwarna kemerah-merahan terdapat di Jawa, Sumatra, Bali, dan Lombok,
10. **Harimau** loreng terdapat di Jawa dan Sumatra, sedangkan harimau kumbang dan tutul terdapat di Jawa, Bali, dan Madura,
11. **Kancil** adalah kijang kecil banyak terdapat di Jawa, Sumatra, dan Kalimantan,
12. **Trenggiling** banyak terdapat di Sumatra, Kalimantan, Jawa, dan Bali, dan
13. **Jalak Bali** terdapat di Bali, dan burung merah terdapat di Jawa. Di daerah ini juga ditemui jenis hewan lain, seperti kancil pelanduk (terdapat di Sumatra, Jawa, dan Kalimantan), singa, mukang (terdapat di Sumatra, dan Kalimantan), dan ikan lumba-lumba (terdapat di Kalimantan)

Agus Subagyo





Fauna tipe Australia

1. Burung, terdiri atas cenderawasih, kasuari, nuri dan raja udang.
2. Amfibi, terdiri atas katak pohon, katak terbang, dan katak air.
3. Berbagai jenis serangga.
4. Berbagai jenis ikan.
- 5. Mamalia**, terdiri atas kanguru, walabi, beruang, nokdiak (landak Papua), opossum layang (pemanjat berkantung), kuskus, dan kanguru pohon.
6. Reptilia, terdiri atas buaya, biawak, kadal, dan kura-kura.

Agus Subagyo



Walabi



Nokdiak (landak papua)

Agus Subagyo



Opposum laying



Kangguru pohon

Agus Subagyo

Fauna peralihan

1. **Mamalia**, terdiri atas anoa, babi rusa, kuskus, monyet hitam, sapi, banteng, dan kuda.
2. Reptilia, terdiri atas biawak, komodo, kura-kura, dan buaya.
3. Amfibi, terdiri atas katak pohon, katak terbang, dan katak air.
4. Berbagai macam burung, terdiri atas maleo, kakaktua, nuri, merpati, burung dewata, dan angsa.

Agus Subagyo



Anoa (*Bubalus* sp).



Babi rusa (*Babirusa* sp).



Kuskus mata biru



Agus Subagyo

- **Fauna Asiatis**

hewan menyusui besar dan kecil

- tidak terdapat hewan berkantung
- terdapat berbagai jenis kera
- jenis burung berwarna sedikit
- terdapat berbagai jenis kucing liar dan ajag
- jenis ikan air tawar banyak
-

- **Fauna Australia**

hewan menyusui kecil-kecil

- terdapat hewan berkantung
- tidak terdapat kera
- jenis burung berwarna banyak
- tidak terdapat jenis kucing liar dan ajag
- jenis ikan air tawar sedikit

Agus Subagyo

Dampak Perubahan Lingkungan Terhadap Persebaran Mamalia

1. Deforestasi dan Fragmentasi Habitat

- Pengurangan habitat alami menyebabkan mamalia berpindah atau mengalami penurunan populasi.

2. Perubahan Iklim

- Pergeseran suhu global mengubah distribusi mamalia di berbagai ekosistem.

3. Introduksi Spesies Asing

- Spesies invasif dapat mengganggu keseimbangan ekosistem lokal.

Agus Subagyo

Dampak Perubahan Iklim terhadap Mamalia

- **Migrasi ke Wilayah yang Lebih Dingin** → Mamalia di daerah kutub dan pegunungan berpindah ke lintang atau ketinggian yang lebih tinggi untuk menemukan suhu yang lebih cocok.
 - Contoh: Beruang kutub (*Ursus maritimus*) kehilangan habitat es lautnya, sehingga harus berburu lebih banyak di daratan.
- **Gangguan Pola Makanan dan Reproduksi** → Perubahan musim dan ketersediaan makanan mempengaruhi siklus hidup mamalia.
 - Contoh: Tupai merah (*Sciurus vulgaris*) di Eropa mengalami perubahan dalam pola perkembangbiakan karena musim semi datang lebih awal.
- **Kepunahan Lokal** → Mamalia yang tidak mampu beradaptasi dengan cepat menghadapi risiko kepunahan.
 - Contoh: Pika Amerika (*Ochotona princeps*) mengalami penurunan populasi karena suhu yang lebih tinggi di pegunungan.

Agus Subagya

Deforestasi dan Fragmentasi Habitat

- **Hilangnya Spesies Endemik** → Spesies yang bergantung pada hutan, seperti orangutan (*Pongo spp.*) di Kalimantan dan Sumatra, kehilangan habitatnya akibat pembukaan lahan untuk perkebunan kelapa sawit.
- **Migrasi Mamalia ke Habitat yang Tersisa** → Mamalia yang masih dapat beradaptasi dengan lingkungan yang terganggu, seperti monyet ekor panjang (*Macaca fascicularis*), cenderung berpindah ke wilayah-wilayah yang tersisa, termasuk wilayah perkotaan.
- **Spesies Hutan Terfragmentasi** → Spesies mamalia besar seperti harimau Sumatra (*Panthera tigris sumatrae*) kini hanya ditemukan di kantong-kantong kecil hutan yang terpisah karena deforestasi.

Agus Subagya

Studi Kasus:

Di Amazon, deforestasi skala besar telah mengurangi populasi jaguar (*Panthera onca*), menyebabkan mereka berpindah ke wilayah yang lebih kecil dan meningkatkan konflik dengan manusia.



Agus Subagya

3. Introduksi Spesies Invasif

Manusia sering kali secara sengaja atau tidak sengaja memperkenalkan spesies mamalia ke ekosistem yang bukan habitat aslinya, yang dapat mengganggu keseimbangan alami.

➔ **Dampak terhadap Distribusi Geografis:** Spesies invasif sering kali berkembang biak dengan cepat dan memperluas distribusinya, sementara spesies asli mengalami penurunan atau kepunahan.

Agus Subagya



Dampak Spesies Invasif

- **Kompetisi dengan Spesies Lokal** → Mamalia invasif dapat mendominasi sumber daya dan menyebabkan spesies asli terdesak atau punah.
 - Contoh: Kucing liar dan rubah merah yang diperkenalkan ke Australia menyebabkan kepunahan banyak mamalia kecil asli.
- **Predasi oleh Mamalia Introduksi** → Mamalia karnivora yang diperkenalkan dapat mengancam spesies lokal yang tidak memiliki mekanisme pertahanan terhadap predator baru.
 - Contoh: Musang kecil Asia (*Viverricula indica*) diintroduksi ke berbagai pulau dan berdampak negatif pada burung dan mamalia kecil endemik.

Agus Subagya