

Lecture 9

Extinction of Island Species

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- 1 South pacific episode
- 2 Extinction on Islands

South pacific episode: Strange islands

Episode deals mainly with evolution on south pacific islands.

Pay attention to:

- 1 How disharmony – absence of mammals or other groups – have directed the evolution of immigrants to islands?
- 2 Examples of niche shifts on islands.
- 3 The relative ease by which island species go extinct. Why?

Outline

- 1 South pacific episode
- 2 Extinction on Islands

Extinction statistics

Known animal extinctions 1600-1997:

Taxon	On islands	On continents
Birds	97	17-20
Molluscs	151	40
Mammals	34	24
Reptiles	22	1



Extinction statistics

In past 2000 years (Polynesian, and later European, colonization):

- 62 bird species on Hawaii – including many of the honeycreepers and **all** (but a single) species of terrestrial birds.
- 44 land bird species on New Zealand – including all 11 species of giant moas. (Estimated 50% of original bird species on New Zealand are extinct).

Even older extinctions, in prehistory:

- Madagascar – all species of giant land birds (including the elephant bird – the largest bird that ever existed), giant tortoises, a pygmy hippo, 14 species of lemurs.
- All dwarf elephants and hippos of Mediterranean islands.

And many more . . .

Extinction statistics

What do we learn from these numbers?

- 1 Island species show much higher extinction rates in comparison to species on continents.
- 2 The theory of island biogeography teaches us that natural extinction rates should be higher on islands – However, humans usually increase extinction rates by a 100 times (or more).
⇒ So the natural rates of extinction cannot explain the magnitude of species extinction, observed on islands.
- 3 Extinctions are strongly associated with arrival and impact of humans on island environments.

Why island species are more vulnerable?

- 1 High endemism – if an endemic island species is lost **locally** (on the island), it is also lost **globally** – Many island species are endemic.
- 2 Islands are small, and therefore support smaller populations of each species – compared to continents.
- 3 Islands are small and isolated \Rightarrow Human population densities tend to be higher, causing overexploitation of resources – e.g., hunting species to extinction, deforestation.
- 4 Endemic island species often evolved in the absence of strong competitors and predators \Rightarrow are “unfamiliar” with the many non-native species that humans bring with them.

Humans and island extinctions

Threefold impact:

- 1 **Direct (over)exploitation** – Hunting species to extinction (e.g., the Dodo bird; Pygmy elephants in Mediterranean); Massive (or complete) deforestation (e.g., Easter island, New Zealand, Iceland and many more).

(The idea of the “noble savage”, living “in harmony” with nature, is nothing but a romantic myth) .

In more more modern time – industrial destruction of islands. E.g., guano mining destroying entire pacific islands.

Humans and island extinctions

Threefold impact:

1 **Direct (over)exploitation .**

2 **Introduced species –**

- Predators – e.g., Brown tree snake in Guam (exterminating the bird fauna); Rats, cats and dogs gone wild (feral populations).
- Competitors – e.g., Goats on Galapagos, overeating the vegetation that the giant tortoises depend upon (a happy end, after the Ecuadorian government systematically hunted them all down). Ants introduced to Hawaii and Galapagos (of which they are naturally missing) – competing with endemic insect species.
- Pathogens – e.g., Avian malaria introduced into Hawaii, decimating bird populations.

Humans and island extinctions

Threefold impact:

- 1 **Direct (over)exploitation** .
- 2 **Introduced species**.
- 3 **Habitat degradation** and destruction, because of human-related development – deforestation, agriculture, industry, development of residential areas.

Humans and island extinctions

Threefold impact:

- 1 **Direct (over)exploitation .**
- 2 **Introduced species.**
- 3 **Habitat degradation .**

Many island species could cope and survive even with one or few of these negative influences.

But the simultaneous operation of all of them proves to be too much for many island species.