

What's so special about the Mascarenes?

By Vikash Tatayah, Conservation Manager, MWF



What's the BIG deal?

James, of James Gate (Yemen)

- Mauritius does not have tigers, elephants, giraffes, rhinos
- And you pretend that you work for wildlife?
- Which wildlife?
- There is no wildlife in Mauritius!



"You gather the idea that Mauritius was made first and then heaven, and that heaven was copied after Mauritius"
- Mark Twain

ISOLATION



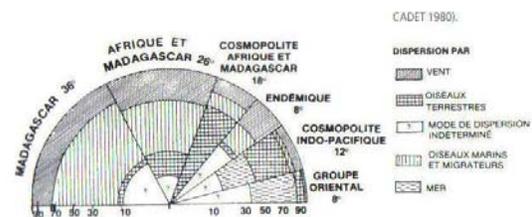
- The Mascarenes archipelago is one of the most isolated in the world:
- Mauritius (2000 km from Africa, the nearest continent),
- Hawaii (2600 km from America),
- St Helena (1950 km from Africa),
- Galapagos (970 km from S America)
- United Kingdom (50 km from continental Europe)

The plants and animals have come from very far



- Dodo & Solitaire– Nicobar Pigeon (4500 kms)
- Nactus spp – Australasia (9500 kms)
- Ficus spp - India (4500 kms)

Hypothetical origin of Mascarenes flowering plant genus and their dispersal mode



FLOWERING PLANT ENDEMISM

- Hawaii - 90%
- Madagascar - >80%
- New Zealand - >80%
- Mascarenes - >60%
- Azores - 10%
- British Isles - 0%



Faunal Endemism to the Mascarenes

- Coleoptera – 65%
- Birds – 88%
- Land snails – 91%
- Reptiles – 96%



Endemism in the Mascarenes

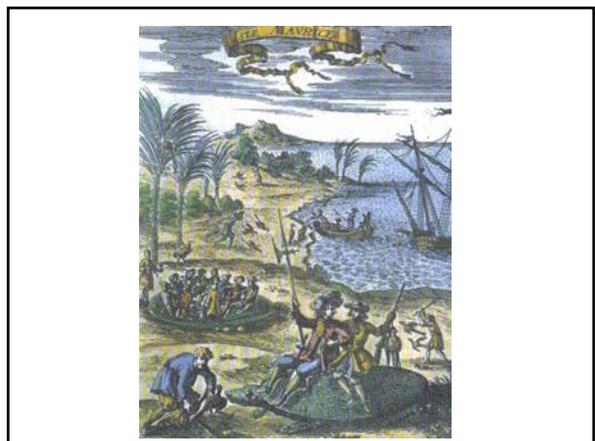
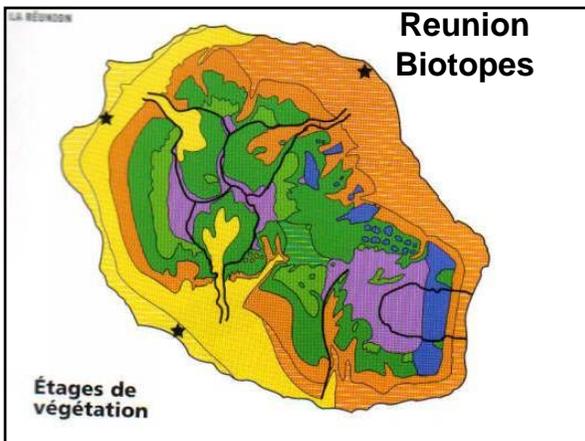


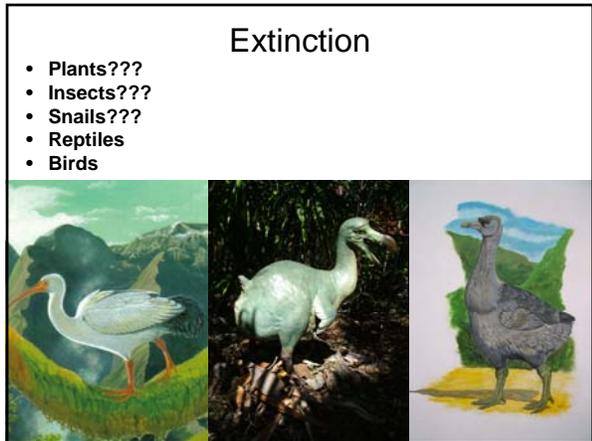
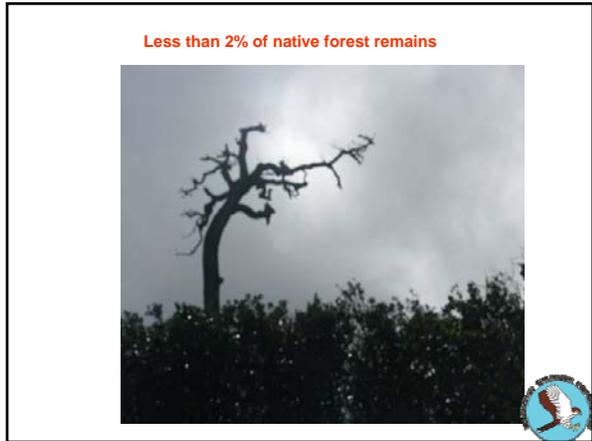
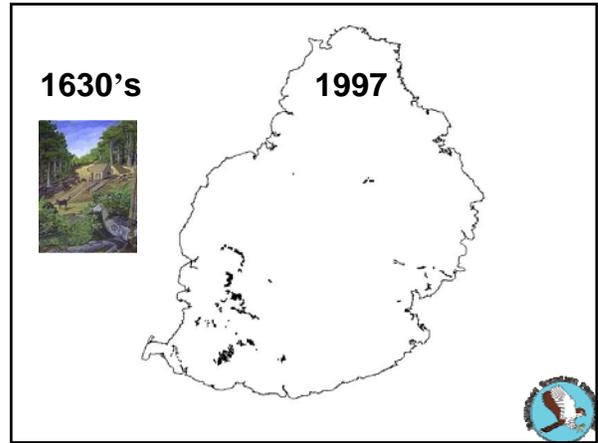
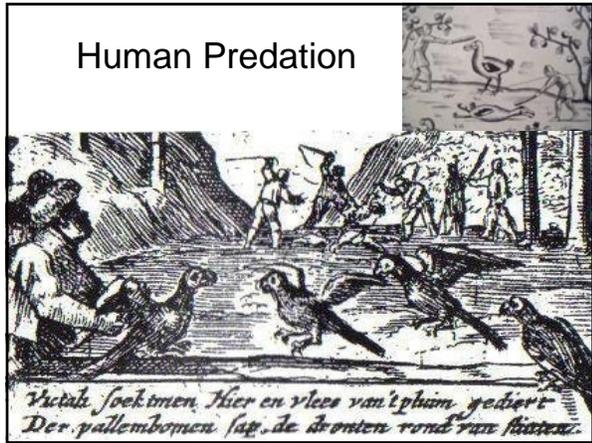
Nombre de taxons et pourcentage d'endémiques chez différents groupes biologiques
(d'après Vinson 1967, 1968, Rakotondrainibe 1995, Cheke 1992, Cadet 1980, données parfois modifiées)

	La Réunion			Maurice			Rodrigues			Mascareignes		
	nb	E	Er	nb	E	Er	nb	E	Er	nb	E	Er
Mollusques terrestres	59			125			26					91 %
Coléoptères ¹	446 *	41 %	57 %	882	48 %	57 %	145	40 %	45 %			~ 65 %
Orthoptéroïdes ²	36 *	36 %	44 %	35	34 %	46 %	11	45 %	64 %			~ 56 %
Reptiles terrestres	6	83 %	83 %	17	94 %	94 %	5	80 %	80 %			96 %
Oiseaux non marins	30	39 %	80 %	29	45 %	80 %	12	90 %	90 %			88 %
Mammifères non marins	5	0 %	40 %	5	0 %	60 %	2	0 %	100 %			50 %
Fougères	250	20 %	9 %	199	19 %	5 %	26	11 %	11 %			22 %
Plantes à fleurs	~ 550	~ 32 %	53 %	~ 685	~ 22 %	?	~ 125	38 %	50 %			~ 60 %

Habitats

- Very diverse
- N (vegetation types) = f (altitudinal range)
- Reunion (8 types, 28 sub-types)
- Mauritius (c. a dozen types and sub-types)
- Rodrigues (c. half a dozen types)

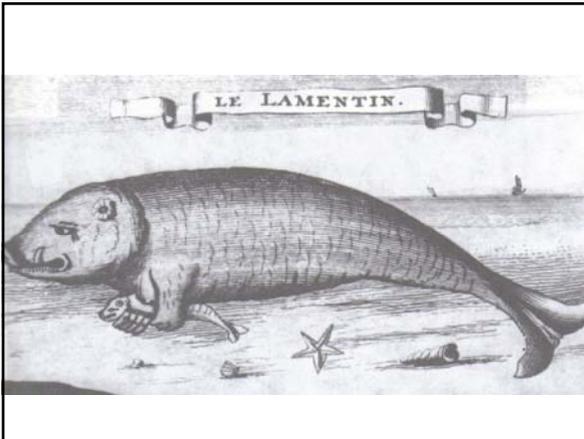




Extinct Reunion Fauna



Rodrigues Extinct Fauna



MADAGASCAR AND THE INDIAN OCEAN ISLANDS HOTSPOT



One of the 34 global hotspots

The hallmark of the flora and fauna of Madagascar and the Indian Ocean islands is not necessarily their diversity (though this is high in some groups of organisms, particularly given the islands' size), but their **remarkable endemism**. The high level of species unique to Madagascar and its surrounding islands resulted from tens of millions of years of isolation from the African mainland and from people, who didn't arrive until 2,000 years ago. **Endemism is marked not only at the species level, but also at higher taxonomic levels:** the islands have an astounding eight plant families, five bird families, and five primate families that live nowhere else on Earth.

Dr Wendy Strahm (1993)

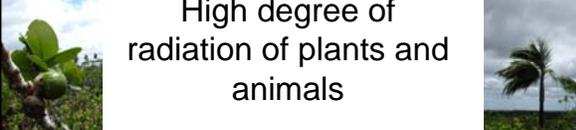
- 'The interest of the flora of the Mascarenes is manifold, not least of all because one can study the **speciation of closely related endemics on islands which have never been united**, but which are found in the **same geographical region**, as well as study problems of **dispersal and phytogeography**'

- Pr Luc Gigord, Univ of Lausanne

'To me there is a major reason why the Mascarenes are so unique worldwide in terms of studying its biodiversity, evolutionary processes, ecological diversification, adaptive radiation etc... Our archipelago has only been **permanently colonised by humans only 350 years ago!** So this is a clear **exceptional** situation.

There are many **original life traits history** that are shared or not with other oceanic archipelago. Heterophily is a striking example but dioecy is another one. **Pollination systems** by lizard/birds can also be cited.'

High degree of radiation of plants and animals



- Plants (*Burseraceae*, *Ebenaceae*, *Palmae*, *Pandanaceae*, *Sapotaceae* etc)
- Reptiles (single species colonisation of *Nactus*, *Gongylomorphus*, *Phelsuma*, *Leiopisma*, *Cylindraspis*)
- Birds (Nicobar pigeon → dodo, solitaire, Alectroenas → Mascarene Blue Pigeons, Madagascar Fody → Mascarene Fodies)
- Insects (*Cratopus spp.*)

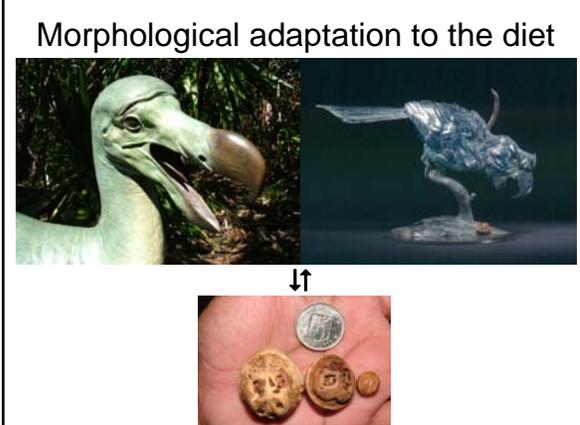
Extreme morphological change



Gigantism



Morphological adaptation to the diet



Loss of anti-predator strategy



Flightlessness, ground nesting, simplified nest, single-egg nest, ecological naivety



Thin shell of tortoises

Niche Separation



Browsers

Saddle-shaped tortoises:

Cylindraspis inepta (Mau.)

C. vosmaeri (Rod.)

C. spp. undet. (Reu.)



Grazers

Dome-shaped tortoises:

C. trisserata (M.)

C. peltates (Rod.)

C. borbonica (Reu.)

Special morphological adaptations



Intra-maxillary joint on upper jaw

Adaptation for feeding on large prey (Telfair's Skink, Guenther's Gecko and seabird chicks) is unique in the Boidae - justifying a distinct Mauritian Family, the Bolyeridae



Diurnal and Nocturnal Vision



Phelsuma guentheri is the only *Phelsuma* with transitional retinal cells that is a transition between diurnal and nocturnal vision. Unlike other *Phelsuma*, which are predominantly diurnal and have a relatively fixed round pupil *P. guentheri* with its transitional cells has its eye fully dilated at night, but can narrow the pupil to a vertical oval to cope with daylight and thus can be active both day and night.

Egg laying in Mauritian *Nactus* spp



The Mauritian *Nactus* produce one egg at a time unlike most other gecko species including the other Australasian *Nactus* that produce two eggs

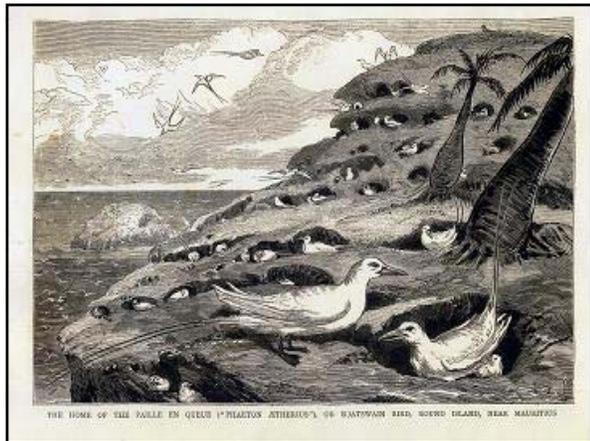
Thought to be a recent adaptation, as they have two oviducts - possibly a response to limited island food resources.

Solitaire – wing musket bone (males)



Leguat 1691:

'Ils ne s'en servent (les ailes) que pour se battre et pour faire le moulinet. ... Les os de l'aileron grossit a l'extrémité et forme sous la plume une petite masse ronde comme une balle de mousquet et qui constitue avec le bec la principale défense de ces oiseaux.'



Coloured Nectar

- Coloured nectar in *Trochetia* spp and *Nesocodon mauritiana*



Coloured nectar in Mauritian plants can function as a honest signal to lizard pollinators, leading to increased pollinator efficiency



Plant adaptations – Heterophily
Grazing by native animals?
Drought resistance?



How many bird extinctions have we prevented?

Stuart Butchart, Alison Stattersfield, and Nigel Collar (Birdlife International)

- 16 bird species would have probably become extinct during 1994–2004, if conservation programmes for them had not been undertaken. 2 are Mauritian birds (Pink Pigeon and Echo Parakeet).
- 31 bird species have been saved from extinction during 1984-2004. 5 are from Mauritius and Rodrigues! (Mauritius Kestrel, Pink Pigeon, Echo Parakeet, Rodrigues Fody, Rodrigues Warbler)

Downlisting species

There are now 41,415 species on the IUCN Red List and 16,306 of them are threatened with extinction.

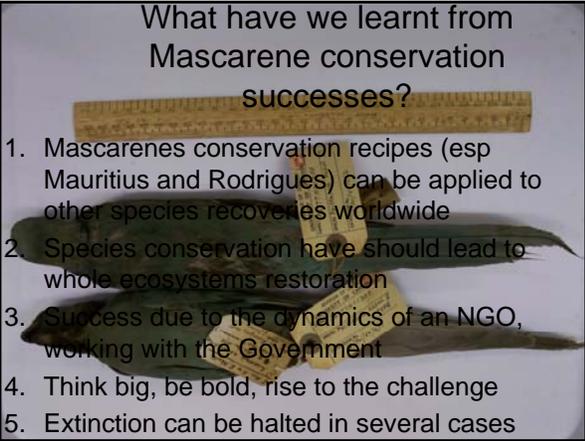
This year, the Echo Parakeet was the only species downlisted (from Critically Endangered to Endangered). The improvement is a result of successful conservation action, including close monitoring of nesting sites and supplementary feeding combined with a captive breeding and release programme' Birdlife International

Bat extinction prevented



Species Management and its impacts

- Impetus to create National Parks and Nature Reserves
- Islands under restoration (Ile aux Aigrettes, Round Island, Ile Cocos, Ile Sables etc)
- Invasive species controlled in National Parks, Reserves and islands
- Mascarenes (Mauritius esp.) a model for conservation



What have we learnt from Mascarene conservation successes?

1. Mascarenes conservation recipes (esp Mauritius and Rodrigues) can be applied to other species recoveries worldwide
2. Species conservation have should lead to whole ecosystems restoration
3. Success due to the dynamics of an NGO, working with the Government
4. Think big, be bold, rise to the challenge
5. Extinction can be halted in several cases