

Impacts of invasive species on islands



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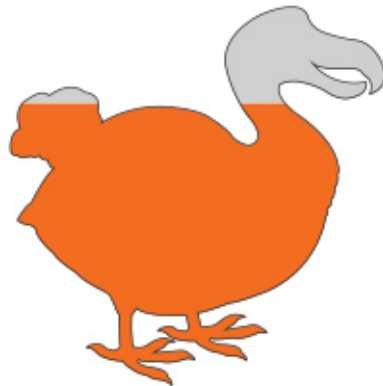


ISLANDS REPRESENT



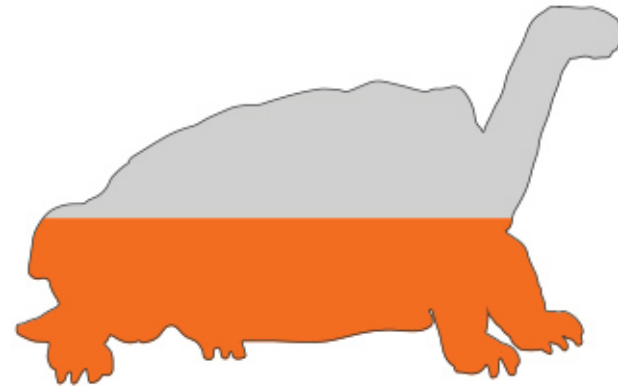
5%

EARTH'S LAND AREA



80%

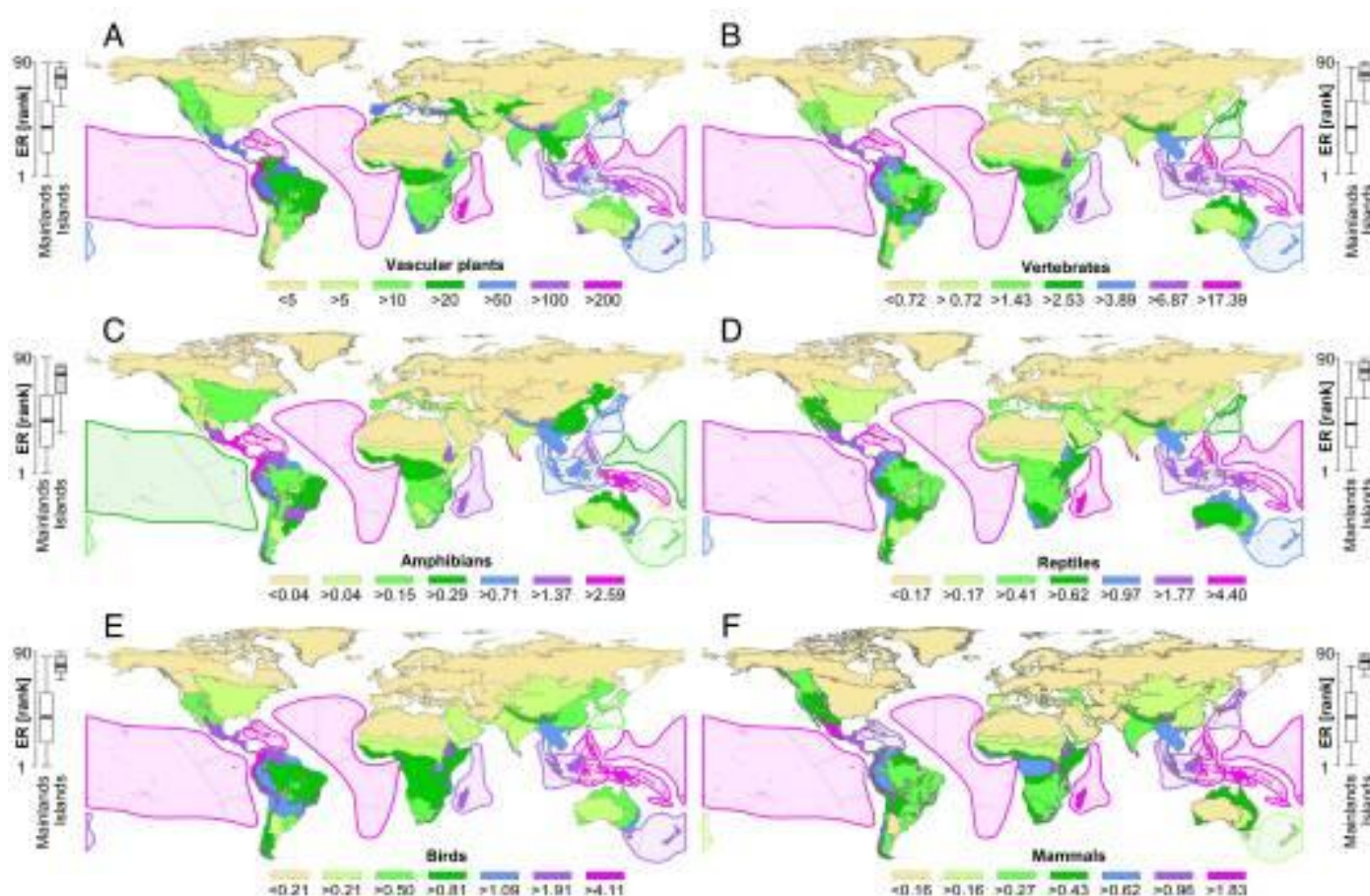
RECORDED EXTINCTIONS



40%

OF ALL ENDANGERED SPECIES

High level of endemism

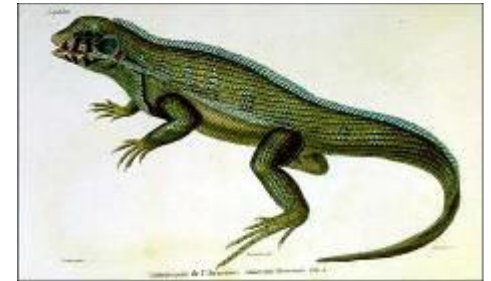


We recorded the highest number of extinctions



80-93% of bird extinctions
from islands

80-90% of reptile & amphibian
extinctions from islands



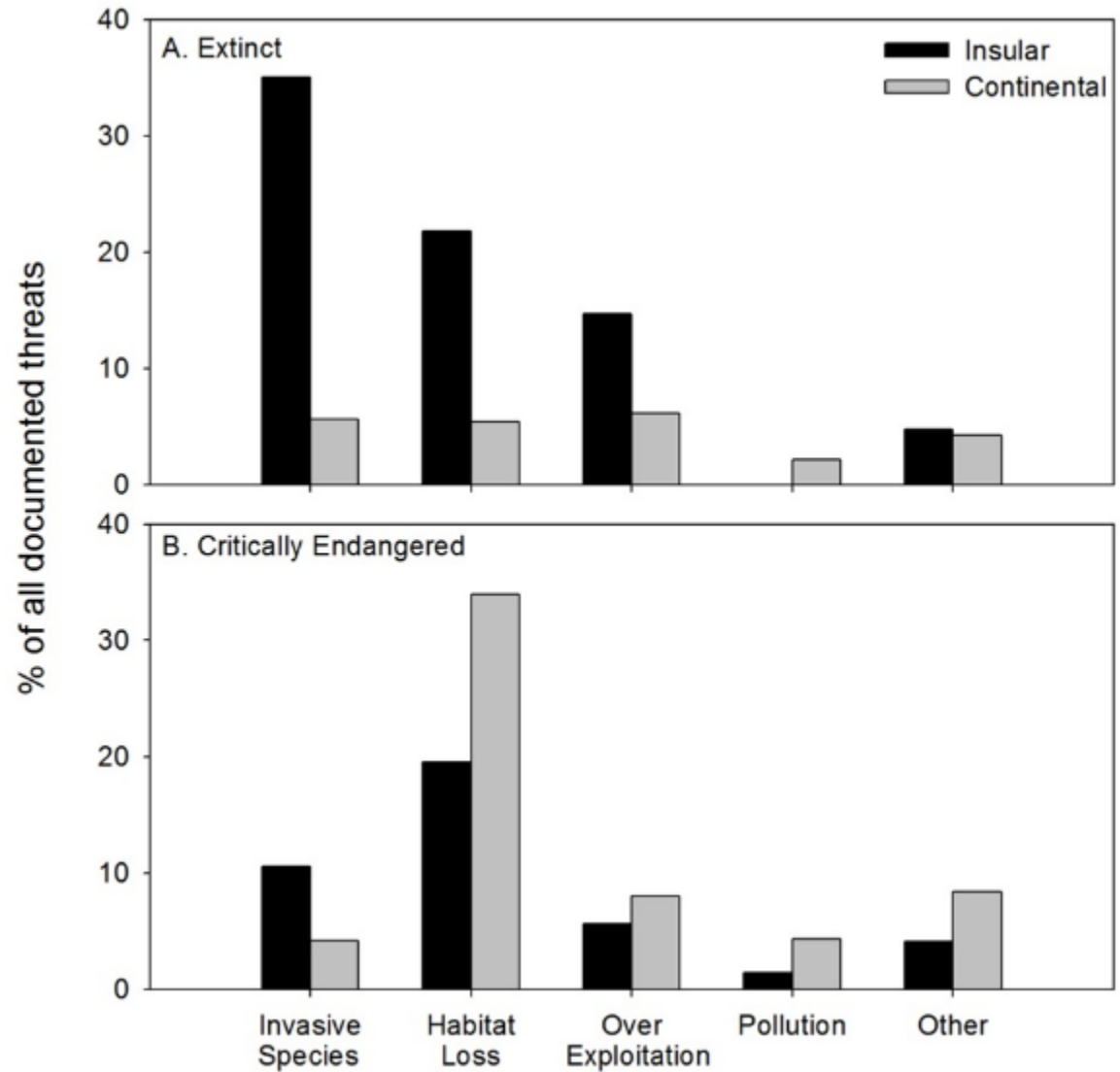
50-81% of mammal extinctions from
islands

>35% of plant extinctions
from islands



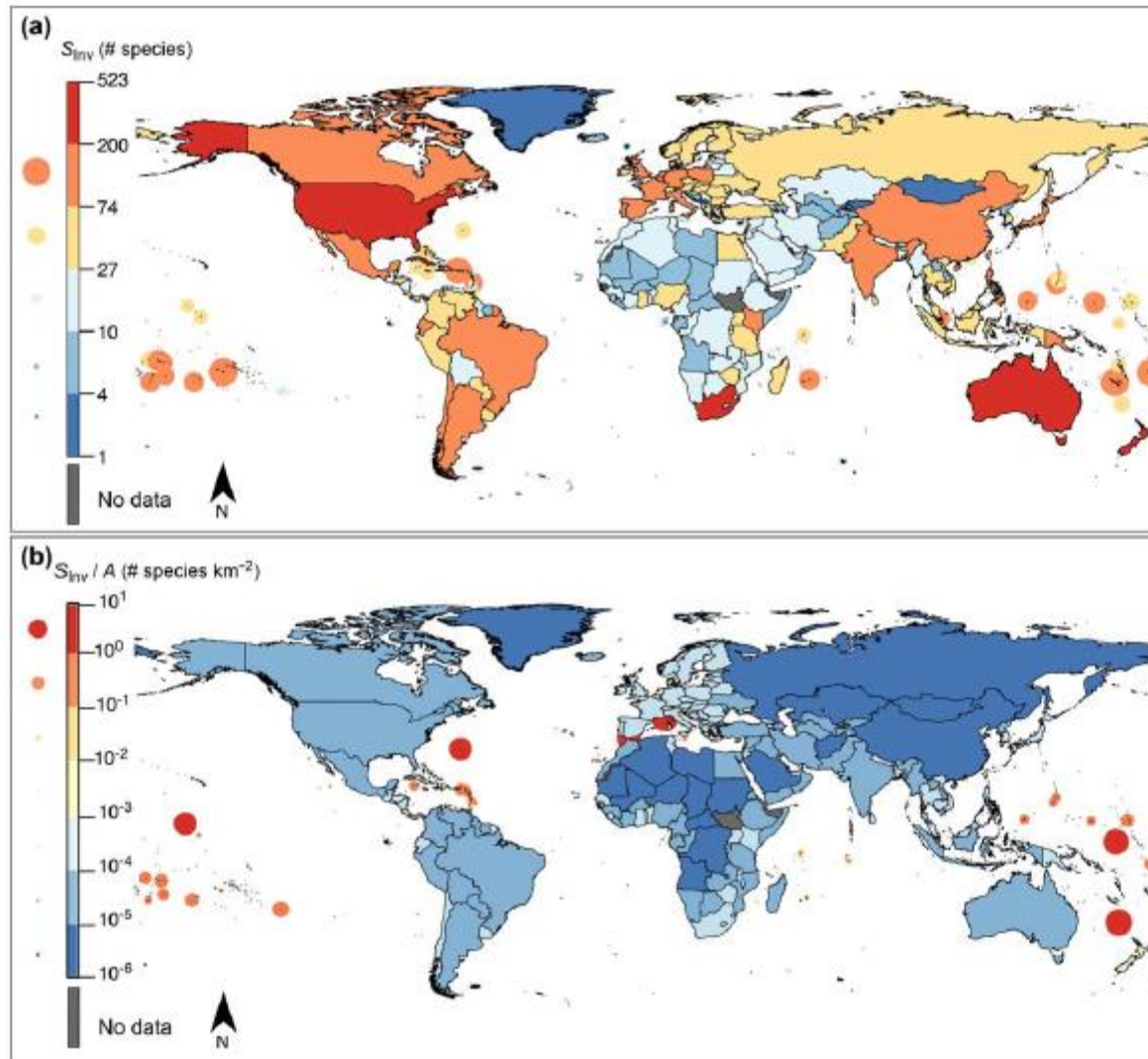
IAS cause island extinctions.

Remain a key threat to plant and animal conservation today.



ISLANDS: They have a higher rate of alien species (50%) compared to the continental areas (20%; Vitousek et al. 1996).

Mapping the global state of invasive alien species

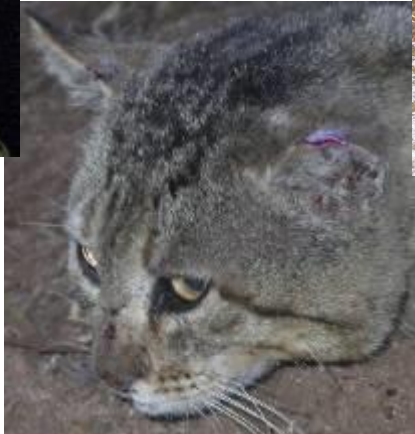


Turbelin et
al. 2017,
Global Ecol
Biogeogr

How do IAS impact island species?

New predators

They cause the extinction of several native species, particularly in islands (Davis 2009).



How do IAS impact island species?

Predation- Galapagos Tortoise (Galapagos Conservancy) and marine birds



Pinzon island – no
natural tortoise
breeding for > 100
years



Heavy predation by black rat *Rattus rattus* is observed on eggs and chicks of native birds, as Yelkouan shearwater *Puffinus yelkouan*, in Mediterranean islands.



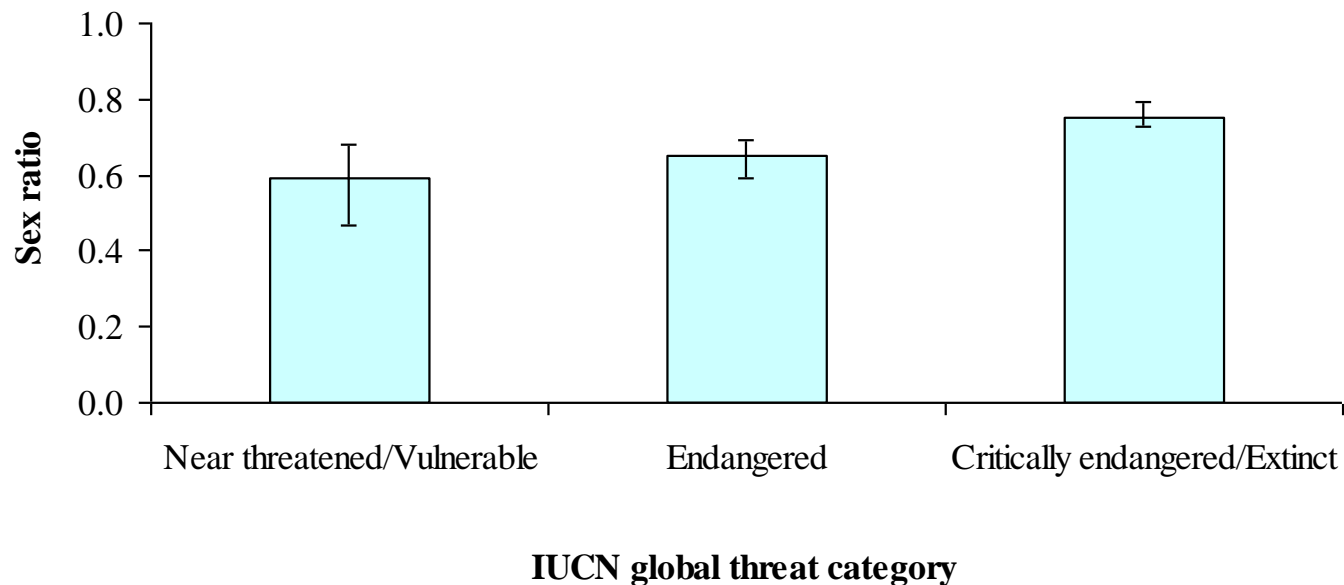
<http://www.lifepuffinustavolara.it/?p=227>



Sposimo 2012



The new predators can alter the sex-ratio of native bird populations.



Disruption of food web

Introduced foxes
for fur



Seabirds



Marine Productivity



Predators
(Land birds, Spiders)



Herbivores
(Slugs)



Terrestrial Plants
(Elymus Grass)



Nutrients from
Guano

Aleutian Islands (Alaska;
Croll et al. 2005)
(courtesy P. McIlleland)



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Introduced foxes



Predators
(Land birds, Spiders)

Herbivores
(Slugs)

Seabirds



Terrestrial Plants
(Empetrum Shrub)

Nutrients from
Guano

Marine Productivity



How do IAS impact island species?

Spread of diseases: infected mainland USA raccoons unintendedly introduced to the Catalina island transmitted canine distemper virus to island fox and cause its decline (Timm et al. 2009, J. Wild Dis).



Urocyon littoralis catalinae

How do IAS impact island species?

Hybridization: the mallards (*Anas platyrhynchos*) have been introduced in many places around the world. Endemic ducks in Hawaii and New Zealand are in danger of extinction because of hybridization with the introduced mallard.



Hawaiian Duck *Anas wyvilliana*

How do IAS impact island species?

New herbivores

They cause the extinction of several native species and destruction/modification of habitats.



Feral goats on Santiago Island.
Foto: Isabela Project.



How do IAS impact island species?

Grazing

Sandy Bay boardwalk & viewing platform



Rabbit grazing impacts

Springer
2015,
Macquarie
Island

How do IAS impact island species?

Burrowing behaviour of rabbits (plus grazing) leads to soil erosion and native taller species are replaced primarily by the introduced grass species, *Poa annua*.



Macquarie Island

How do IAS impact island species?

Rabbits were destroying vegetation and pushing the Endangered Humbolt Penguins out of nesting burrows on Choros Island, Chile. Island Conservation and local Chilean removed invasive rabbits and the island and penguin are on a path to recovery.



How do IAS impact island species?

New plants

They cause the decrease of biodiversity and lead to habitat homogenization.



Table 18.3 Twelve endemic and critically endangered Mediterranean plants from the IUCN ‘Top 50 Mediterranean Island Plant’ list, which are threatened by alien plant invasions (according to de Montmollin and Strahm 2005)

Endemic species	Island//PAMIs	Invasive alien plants
<i>Anchusa crisper</i>	Sardinia (Italy), Corsica (France) (SCIs)	<i>Carpobrotus</i> spp.
<i>Abies nebrodensis</i>	Sicily NP (Italy)	Alien fir
<i>Apium bermejoi</i>	Minorca SCI (Spain)	<i>Carpobrotus edulis</i>
<i>Calendula maritima</i>	Sicily SCI (Italy)	<i>Carpobrotus edulis</i>
<i>Centaurea gymnocarpa</i>	Capraia – Tuscan Archipelago NP (Italy)	<i>Carpobrotus acinaciformis</i> , <i>Senecio angulatus</i>
<i>Centranthus trinervis</i>	Corsica (France)	<i>Centranthus ruber</i> , <i>Cortaderia selloana</i>
<i>Cheirolophus crassifolius</i>	Gozo and Malta	<i>Agave americana</i> , <i>Carpobrotus edulis</i> , <i>Opuntia ficus-indica</i>
<i>Cremnophyton lanfrancoi</i>	Gozo and Malta	<i>Agave americana</i> , <i>Carpobrotus edulis</i> , <i>Opuntia ficus-indica</i>
<i>Helichrysum melitense</i>	Gozo	<i>Agave americana</i> , <i>Carpobrotus edulis</i> , <i>Opuntia ficus-indica</i>
<i>Medicago citrina</i>	Columbretes (Spain)	<i>Cuscuta</i> sp., <i>Opuntia maxima</i>
<i>Silene hicesiae</i>	Aeolian islands (Italy)	<i>Ailanthus altissima</i>
<i>Viola ucriana</i>	Sicily (Italy)	Alien conifers (plantations)

SCI Site of Community Interest according to Directive 92/43/EEC, NP National Park

Where? Sardinia (Italy)? South Africa or Australia?





Ailanthus altissima

Aeonium arboreum

Agave americana

Opuntia ficus indica

Carpobrotus acinaciformis

IAS can impact human on islands!



Tree brown snake *Boiga irregularis*

It caused the extinctions of native birds.

It threatens native reptile/mammals.

It moves along power lines, inducing damages.

It attacks livestock and kids.



Red fire ant *Solenopsis invicta*

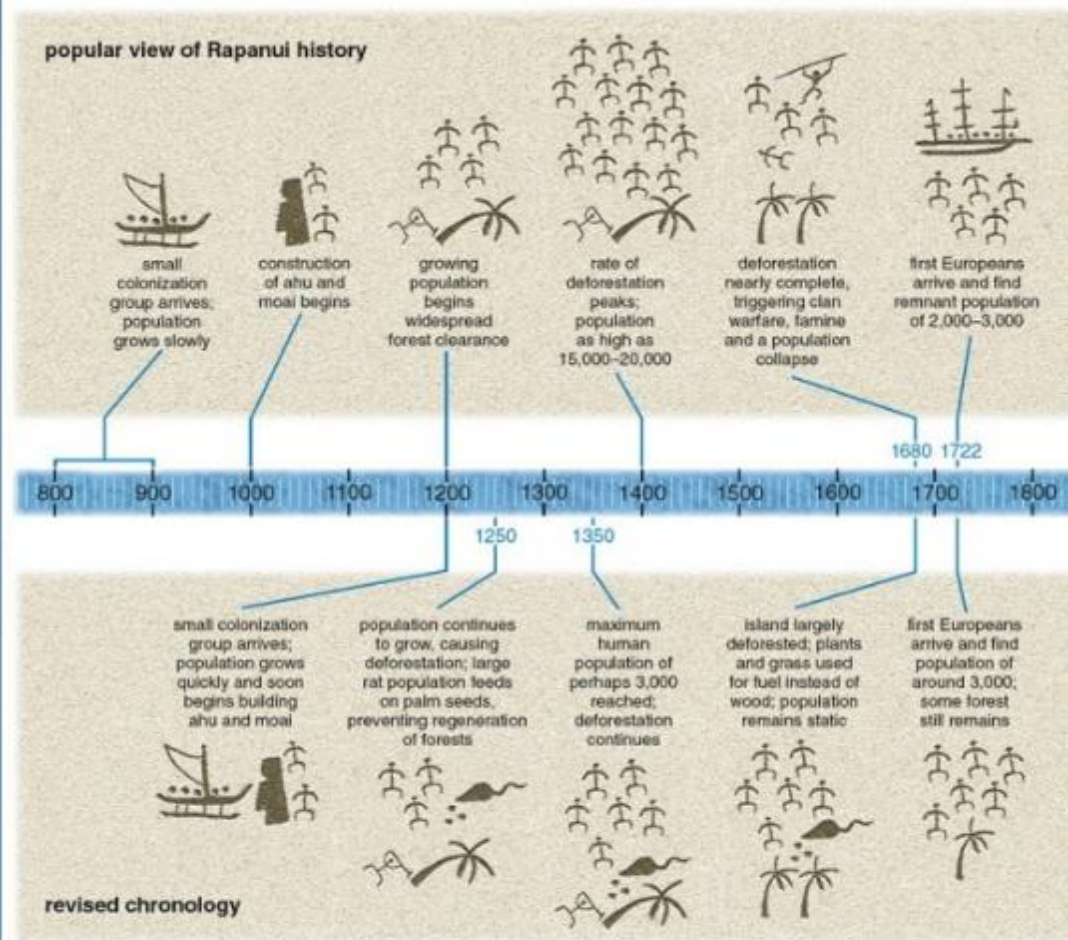
It impacts the biodiversity.

It damages infrastructures and agriculture.

It can sting humans.



Rats, not men, to blame for death of Easter Island!



Hunt 2006,
American
Scientist

Figure B. New evidence casts doubt on the traditional history of Rapa Nui. The popular narrative of environmental collapse hinges on early colonization and a large peak population (top). A revised timeline that takes into account recent radiocarbon dates points to initial settlement around 1200 A.D. (bottom). According to this version of events, the human population never grew much larger than about 3,000, and rats played a dominant role in the deforestation of the island. In this scenario, the Rapanui culture did not decline significantly until after the arrival of Europeans. Within about a century and half of initial contact, however, disease and enslavement reduced the Rapanui population to approximately 100.

Invasive Species on Islands: a global problem



<http://tib.islandconservation.org>

How to mitigate impacts and avoid new introductions?



Eradication

- 86% success (n=911; 819 vs. 93)
- 97.07% on islands (n= 1,129; 1096 vs. 33)
- 94.6% vertebrates (n= 1,119; 1059 vs. 60)

Table 1 Overall summary of the status of reported eradications on European islands.

Eradication status	n. eradications
successful	154
unsuccessful	21
uncompleted	5
being confirmed	16
on going	11
unknown	17
Total	224

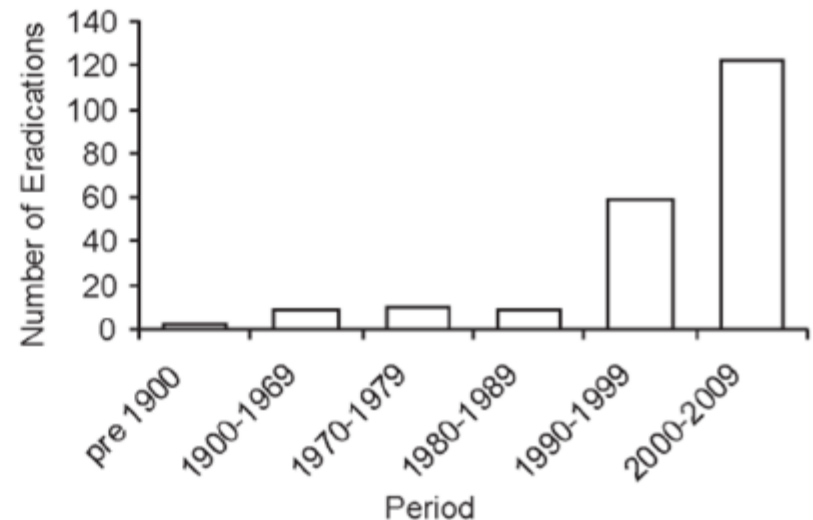


Fig. 1 Frequency of successful eradications; since 1970 reported per decade.

Eradication

- In European islands: 35 target species (19 vertebrates, 3 invertebrates, 12 plants). Rats (*Rattus* spp.) are the most eradicated species (n=127, 57%), followed by goats (*Capra hircus*) (n=21, 11%).



Genovesi & Carnevali 2011





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Type keywords... 

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OUR MISSION is to prevent extinctions
by removing invasive species from islands.



WHY ISLANDS

WHERE WE WORK ▾

ABOUT IC ▾

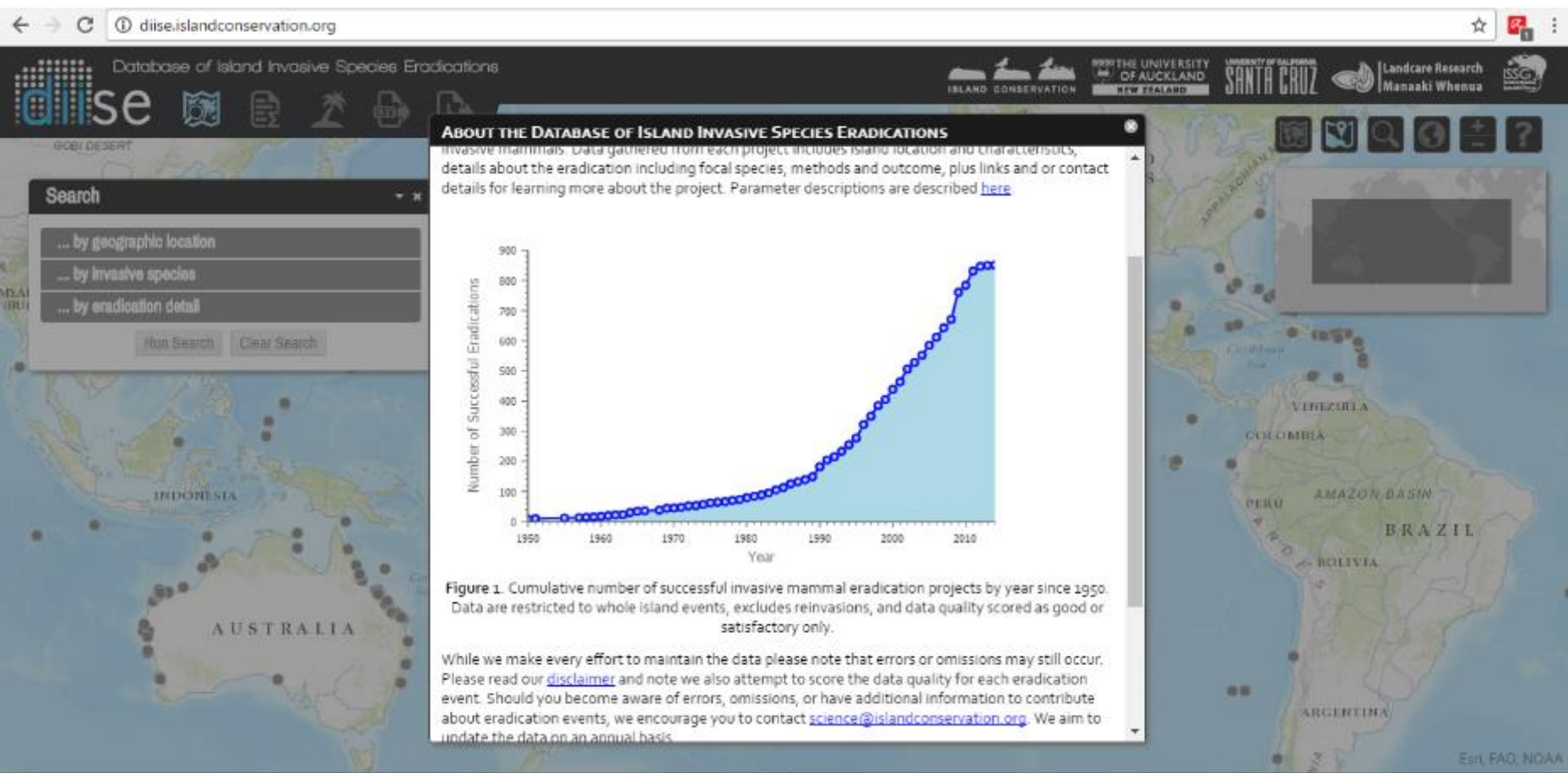
HOW TO HELP ▾

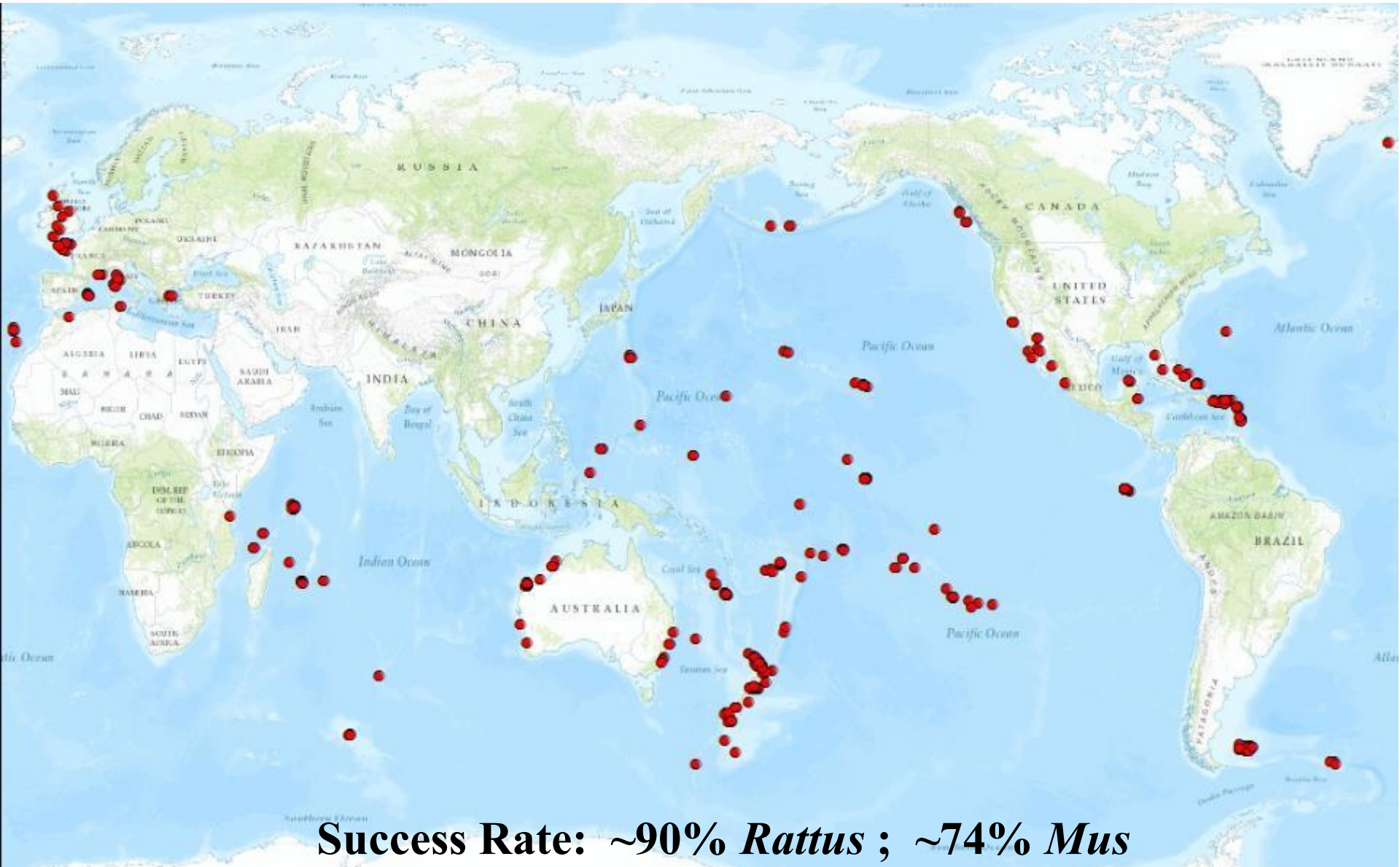
BLOG

CONSERVATION SCIENCE ▾

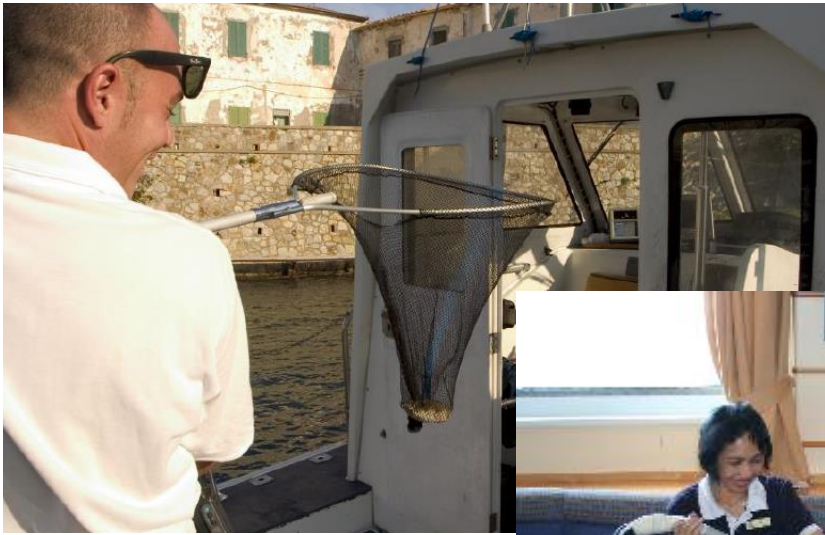
FEATURED PROJECTS







Biosecurity is the priority!



Increase the public awareness in order to have support on IAS management

Eradication of Pacific rats from Vatu-i-Ra Island, Fiji (Important Bird Area): community consultation in 2005 (BirdLife International), followed by approval and support. The island was declared rat-free in 2008.



Nagilogilo clan

Black noddy, *Anous tenuirostris*

Increase the public awareness in order to involve citizens into IAS management



Thank you!



<https://www.youtube.com/watch?v=XgoKIsIflec>