



New global initiative calls for urgent action against invasive alien species

INVASIVE ALIEN SPECIES CASE STUDIES

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1. Brown Tree Snake (*Boiga irregularis*), Guam



USDA specialist holds a Brown tree snake (*Boiga irregularis*) retrieved from a snake trap on Guam. There are dozens of such traps that surround the airfield to reduce the risk of snakes becoming stowaways on planes to other islands in the Pacific © [US Department of Agriculture](#) Creative Commons by 2.0.

The Brown tree snake was introduced to the Pacific island of Guam, shortly after World War II, most likely via ship cargo from its native range. It has since caused the local extinction of 17 vertebrate species, which is most of the island's native birds and lizards, including a number of endemic species. Through the removal of these native pollinators and seed dispersers, it has reduced native plant species regeneration. . The species also has significant economic and human health impacts as it has caused thousands of power cuts affecting homes, schools, businesses and military facilities, and snake bites lead to the hospitalisation of 170 people per year. The ecosystem fragility of other Pacific islands to which cargo flows from Guam has made the potential spread of the brown tree snake from Guam a major concern. The US Department of Agriculture, and other U.S. federal agencies are implementing many measures to manage the species on Guam, including biosecurity to prevent its spread off the island, and the protection of threatened wildlife and sensitive areas such as power stations.

For more information see:

[IUCN Global Invasive Species Database account for the Brown Tree Snake;](#)

https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/programs/nwrc/research-areas/SA_Brown_Treesnake

https://www.aphis.usda.gov/wildlife_damage/nwrc/publications/10pubs/shwiff101.pdf

<https://pubs.er.usgs.gov/publication/53889>

<https://www.fort.usgs.gov/science->

[tasks/2184https://www.researchgate.net/publication/237061263_Natural_Experiment_Demonstrates_That_Bird_Loss_Leads_to_Cessation_of_Dispersal_of_Native_Seeds_from_Intact_to_Degraded_Forests](https://www.researchgate.net/publication/237061263_Natural_Experiment_Demonstrates_That_Bird_Loss_Leads_to_Cessation_of_Dispersal_of_Native_Seeds_from_Intact_to_Degraded_Forests)

[Leads to Cessation of Dispersal of Native Seeds from Intact to Degraded Forests](#)

2. Asian common toad (*Duttaphrynus melanostictus*), Madagascar



Asian common toad © Peter Nijenhuis Creative Commons by-nc-nd 2.0

The Asian common toad (*Duttaphrynus melanostictus*) was recorded in 2014 near Madagascar's main port in Toamasina, and is likely to have arrived via shipping containers as early as 2010. Madagascar, one of the world's biodiversity hotspots, has a climate highly suitable to the alien species and there are major fears for the country's biodiversity, human health and economic activity. The species can survive in many habitat types and has a broad diet so it is likely to out-compete and prey upon many native species. The Asian common toad is also poisonous, so not only is it a direct human health risk, but it is likely to have significant impacts upon native predator species, leading to an increase in Black rat (*Rattus rattus*) numbers which will have implications for human health (increasing the rat-borne plague) and livelihoods (as food supplies are damaged and lost). In late 2015, the toad had already spread to an area of 98km², and an urgent eradication attempt has been recommended before it is too late.

For more information see:

Asian toad eradication feasibility report:

<http://www.amphibians.org/wp-content/uploads/2016/03/Asian-Toad-Feasibility-Report-26th-Jan-2016.pdf>

Asian common toads in Madagascar: an urgent effort to inform surveys and eradication efforts

<http://onlinelibrary.wiley.com/doi/10.1111/gcb.12693/full>

https://tropicalconservation.mongabay.com/content/v8/tcs_v8i2_439-454_Moore.pdf

3. Mosquito's (*Aedes* spp. and *Culex* spp.), Hawaii



Asian tiger mosquito *Aedes albopictus* feeding © [AFPMB](#)
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There were no mosquitoes on Hawaii until the early 19th Century, when they arrived on whaling ships. With the mosquitoes came mosquito borne diseases which affect both wildlife and humans. *Culex* carried the mosquito-borne pathogens avian malaria (*Plasmodium relictum*) and avian pox virus (Avipoxvirus), which have been implicated in the past extinctions and declines of Hawaiian avifauna and remain significant obstacles to the recovery and restoration of endemic Hawaiian birds. The remaining native bird species are now surviving in small pockets of mostly high elevation areas where temperatures are too cold for the malarian protozoan parasite to develop. However, rising temperatures due to climate change are putting these native and endemic birds species immediate future in doubt. In addition, the spread and establishment of these mosquito species raises the likelihood of the establishment of harmful diseases such as dengue, chikungunya, and zika.

For more information see:

Human health links:

<http://health.hawaii.gov/docd/dib/disease/mosquito-borne-diseases/>

<http://health.hawaii.gov/docd/dengue-outbreak-2015/>

https://www.researchgate.net/publication/29736195_Current_and_potential_impacts_of_mosquitoes_and_the_pathogens_they_vector_in_the_Pacific_Region

Avian Malaria links:

<https://pubs.usgs.gov/fs/2005/3151/report.pdf>

<http://onlinelibrary.wiley.com/doi/10.1890/ES14-00393.1/pdf>

<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0140389>

4. Protecting African farmers' crops from cassava mealybug



Inspecting cassava crops © David Onyango, CABI (please contact Rachel Winks, CABI for a high resolution image r.winks@cabi.org)

Cassava is native to South America, but has become an important staple crop in tropical Africa. It is grown by many low income farmers and provides both food security and income. In the 1970s, the invasive, non-native cassava mealybug (*Phenacoccus manihoti*) erupted in numbers in Africa and spread rapidly, mainly due to it not having any natural enemies. This pest attacked African cassava crops, causing **crop losses of up to 80%**. It quickly threatened **the food security of over 200 million people** in 27 African countries. Through research, it was found that a parasitic wasp (*Anagyrus lopezi*) native to areas such as Bolivia and Brazil fed on the cassava mealybug. In 1981, CABI was part of an international effort to introduce the wasp to control the mealybug and, by 1990, **the population of mealybug had been reduced by 95%**. An economic analysis of this biocontrol project showed that the benefits to all 27 African countries involved - accumulated over 40 years - amounted to US\$9.4 billion, with an annual gain of US\$235 million and a benefit-cost ratio of 149:1.

For more information see:

[Biological control of invasive species: case study:](#)

<http://www.cabi.org/projects/case-studies/biocontrol-of-invasive-species/>

5. Mouse aggression. Scientists Document Non-native Mice Attacking Nesting Albatrosses at Midway Atoll National Wildlife Refuge



Laysan albatross incubating an egg on the Midway Atoll [© Greg Joder USFWS Pacific Region Creative Commons 2.0 ny-bc](#)

Amongst the more than 480,000 nests of the world's largest albatross colony, U.S. Fish and Wildlife Service biologists and volunteers recently discovered house mice attacking adult nesting Laysan and black-footed albatrosses at Midway Atoll National Wildlife Refuge, part of Papahānaumokuākea Marine National Monument. Mice attacks have been documented at other islands, on other seabirds, but never at Midway on the large albatrosses. An albatross stands almost three feet tall with a wingspan of more than six feet and has a deeply ingrained drive to steadfastly incubate its egg through adversity. This evolutionary strategy is successful for withstanding fierce north-Pacific winter weather and aggressive neighbouring birds, but leaves the albatross extremely vulnerable to non-native, predatory rodents. As Midway's albatrosses faithfully incubate, many are now being bitten and preyed upon by non-native mice during the night – causing debilitating injuries and often death.

For more information see:

https://www.fws.gov/refuge/Midway_Atoll/news/mouse.html

6. BirdLife International's Spotlight on invasive alien species



Aerial baiting Monuriki Island Fiji © Steve Cranwell (contact steve.cranwell@birdlife.org for high resolution)

Invasive alien species have been the most important driver of documented bird extinctions—implicated in the disappearance of more than 70 species since 1500. The problem is especially acute on islands, where endemic landbirds and breeding seabirds often lack adequate defences against introduced predators such as rats and cats. Over the last two decades, however, there have been considerable advances in eradication techniques, and a number of recent and current island restoration projects attest to the dramatic success that can be achieved given sufficient resources and political will.

For more information see:

<http://datazone.birdlife.org/sowb/casestudy/birdlife-partners-are-helping-to-restore-island-ecosystems-by-eradicating-invasive-alien-species>

7. Ecosystem transformation by exotic African grasses into Australia's northern tree-dominated savannas



Gamba grass fire on NT. AAP Image/CRC for Weed Management (Please contact Andy Sheppard, CSIRO for a high resolution image Andy.Sheppard@csiro.au)

Invasive plants cause many incipient problems to ecosystem diversity and resilience, transforming native ecosystems. Gamba grass is one of several high impact exotic grasses deliberately introduced into Northern Australia from Africa to provide improved forage. Widely planted from the 1940s, Gamba grass has spread out of managed grazing lands into Australia's ecologically rich tree-dominated savannas, which stretch widely across northern Australia. While it is still undergoing massive spread, in savannas where it has established it has become the dominant species often forming a monoculture grass layer. With a capacity to grow several metres tall and generate biomass per unit area many times more than the native grasses and forbs, Gamba grass is permanently transforming the native savannas. When fire occurs, the high biomass generates much stronger and taller fires licking the flames into fire sensitive canopies, killing trees and slowly converting the rich tree-savannas to exotic African grass type savannas. This is having huge impacts on floral, reptilian, mammal and arthropod diversity. As fire risk increases under climate change, the resultant permanent ecosystem changes will accelerate.

For more information see:

<https://www.environment.gov.au/biodiversity/threatened/threat-abatement-advice/invasive-pasture-grasses-gamba-grass>

<https://theconversation.com/field-of-nightmares-gamba-grass-in-the-top-end-12178>