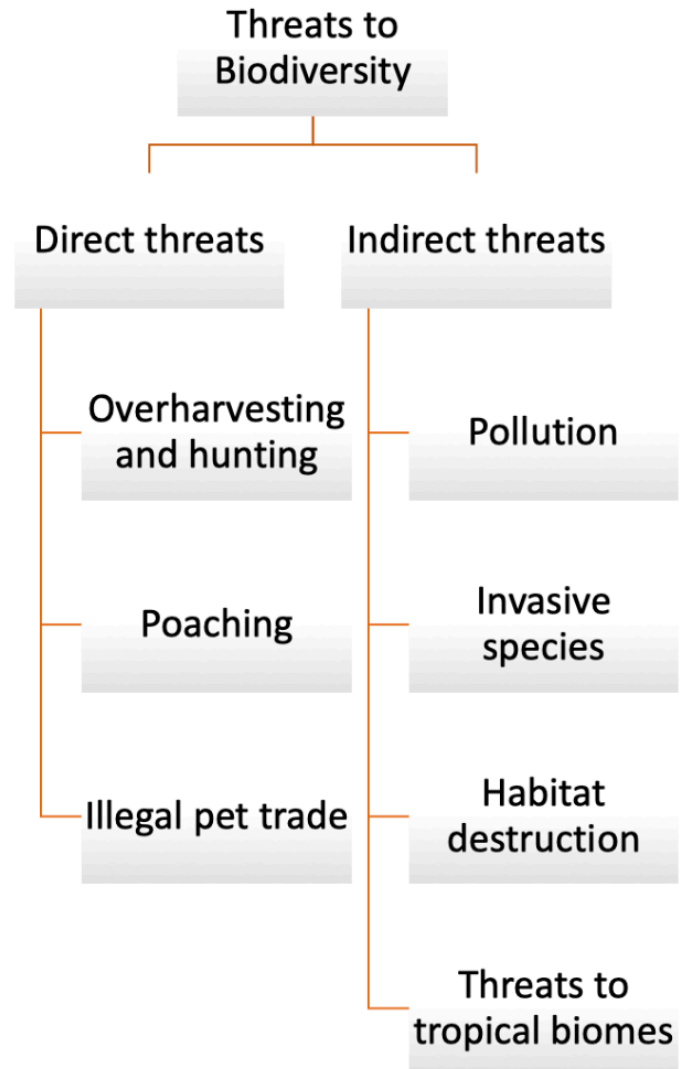


# 3.2 Threats to Biodiversity

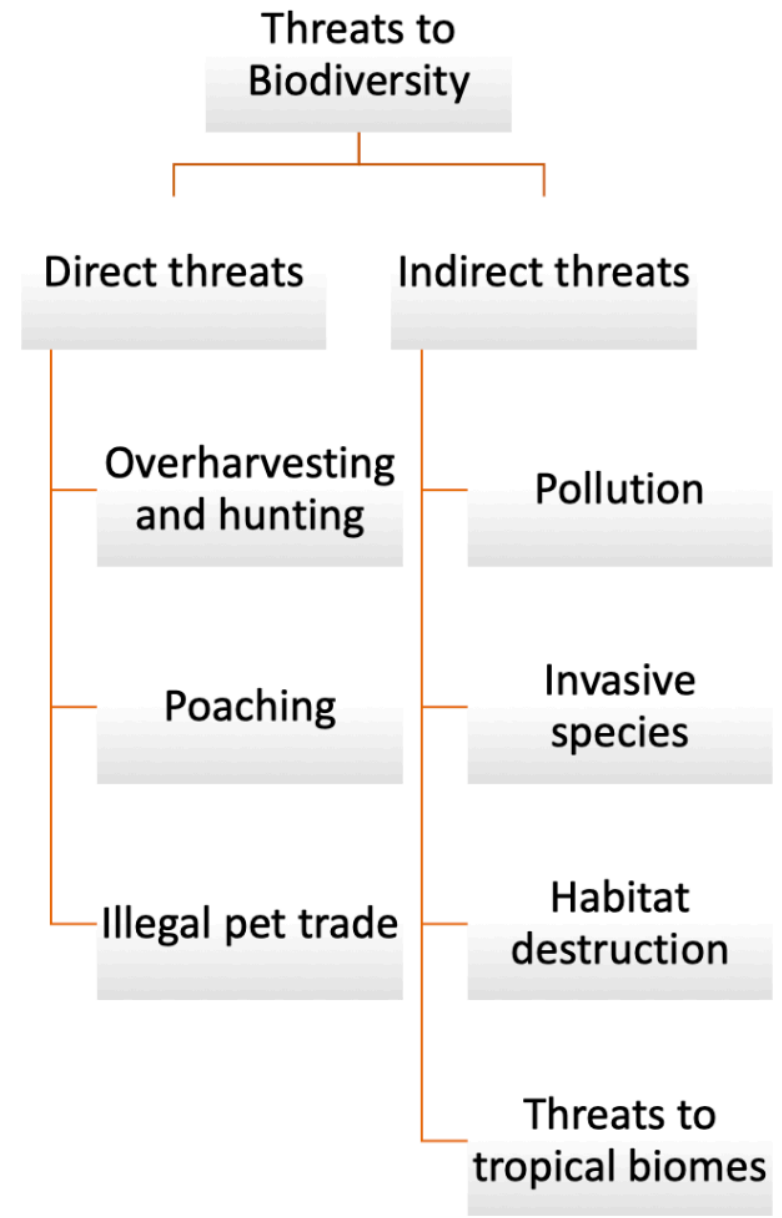
Peter Jamal

# Overview



# Activity 1

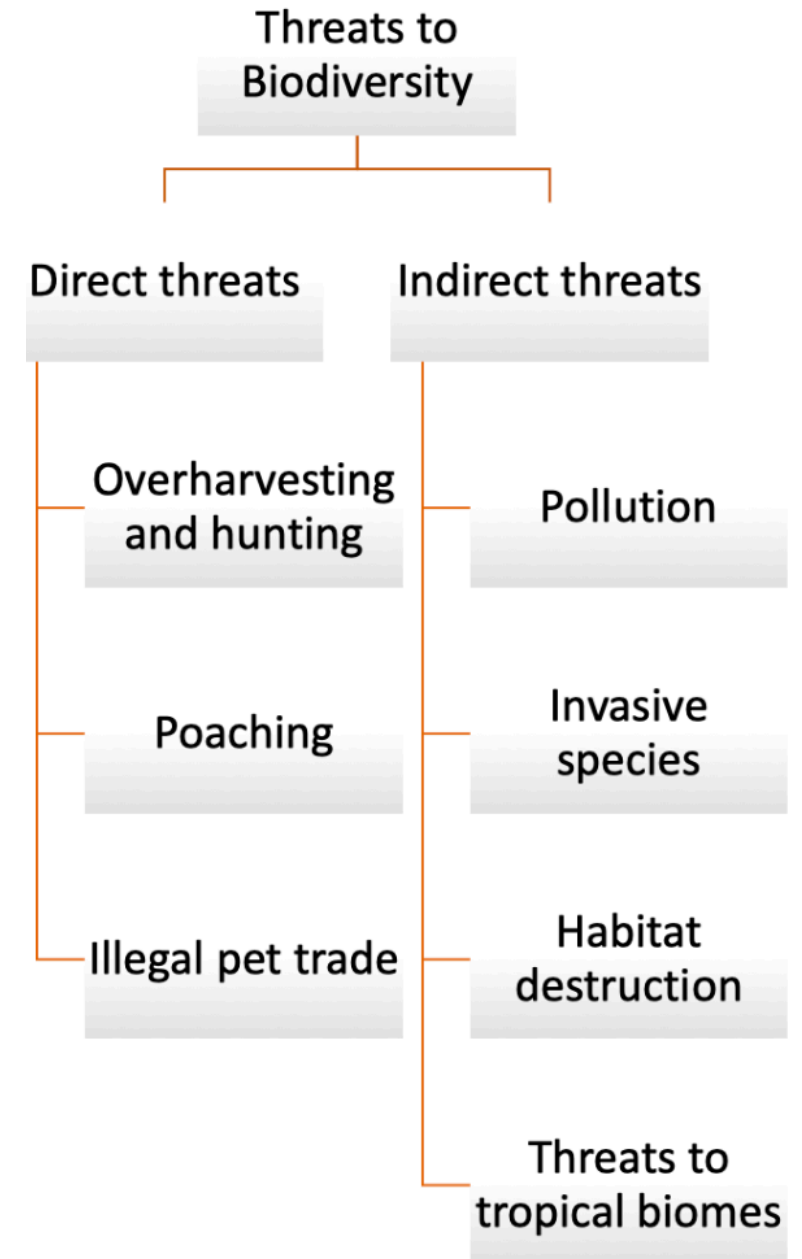
Select one threat and outline how it poses a threat to biodiversity. Give a named example



# Direct Threats

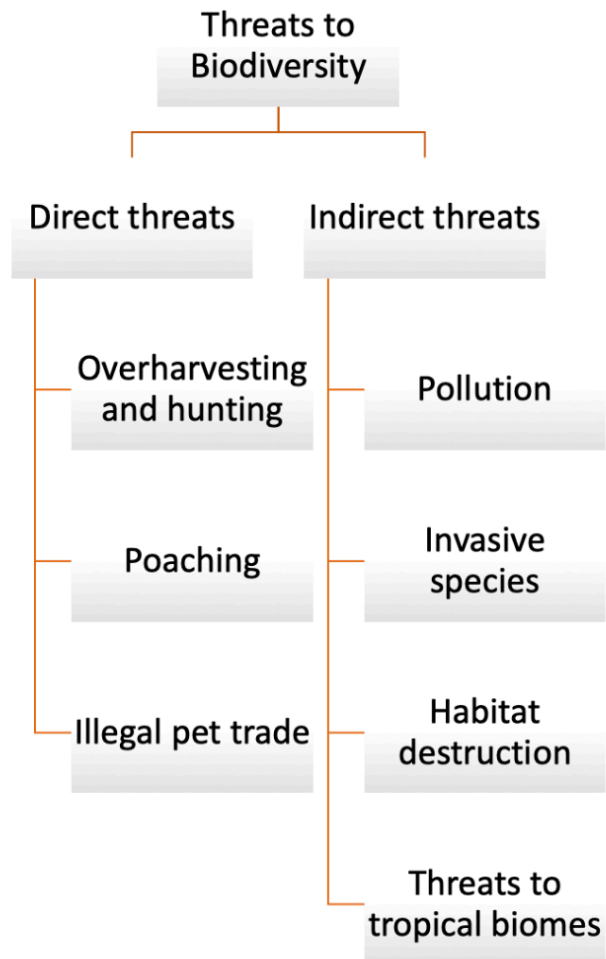
## Direct Threats

- Animals are hunted for
  - food
  - medicines
  - souvenirs
  - fashion
  - to supply the exotic pet trade.
- Hunting up to a certain level is unlikely to be a threat
- **Overharvesting** of populations can significantly deplete numbers.
  - Overharvesting of North Atlantic cod in the 1960s and 1970s, for example, led to a significant reduction in population size.
- **Poaching** is illegal capturing or hunting of wildlife
  - Example: Elephant tusk ivory
- **Illegal pet trade** usually involves baby primates and exotic birds





# Indirect Threats



1. **Pollutions:** Substances that can cause harmful effect when released to the environment. Pollution can directly degrade habitats and/or affect some susceptible species. For example, sulfur dioxide and nitrous oxide are gasses that can cause acid rain. The rain reduce the pH of soil futher. As the result some species won't be able to survive in the new condition
2. Introduction of **invasive species** is an action of releasing a species into a new environment. Due to the lack of competition, the species thrives and becomes a dominant species in terms of population size. The in turn affect the entire habitat.
3. **Habitat destruction** can be caused by natural disaster and human activities. A destruction of habitat is often observed as degradation , fragmentation, and loss. Deforestation is often the major caused of the destruction where land is used for agriculture. In addition, mining and timber consumption is also a driving force of deforestation.
4. Tropical biomes are world's most diverse biomes such as tropical rainforest and coral reefs. Many topical biomes are biodiversity hotspots as they contain a large number of endemic species.

# Invasive Alien Species

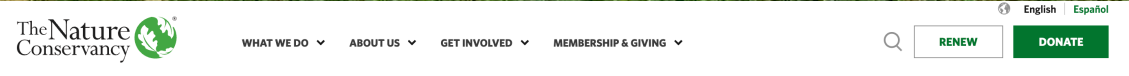
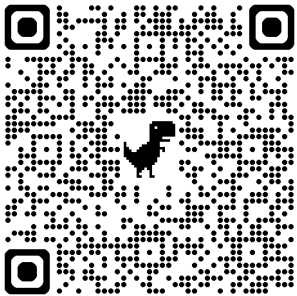
- Invasive alien species are those introduced into areas where they then compete with endemic (native) species.
- This can lead to the extinction of the native species. For example, the grey squirrel was introduced to the UK from North America.
- This species competes with the native UK red squirrel and has led to such a reduction in red squirrel numbers that the red squirrel is now rare.
- The red-clawed signal crayfish and the lionfish are also invasive alien species



## Activity 2 [20 minutes]

- Describe how invasive species affected an ecosystem using a named example
  1. Kudzu
  2. Lionfish in the Caribbean oceans
  3. Red-clawed signal crayfish
- Summarise information about the lionfish
- Describe the effect of its invasion
- Suggest possible solution for this problem
- Create a handwritten poster presentation

# Case Study: Fast growing plant, Kudzu



STORIES IN INDIANA

## Kudzu: The Invasive Vine that Ate the South

Kudzu looks innocent enough yet the invasive plant easily overtakes trees, abandoned homes and telephone poles.

August 09, 2019





# Case Study:

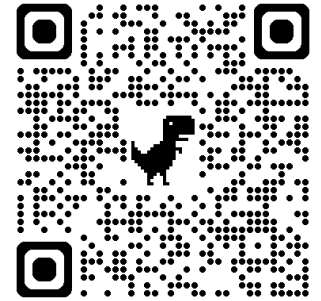
## Red-clawed signal crayfish North America and North Europe

The introduction to the UK of the larger more aggressive American, red-clawed signal crayfish (*Pacifastacus leniusculus*), has wiped out almost 95% of the native UK white-clawed species (*Austropotamobius pallipes*) since its introduction in the late 1970s. The white-clawed signal crayfish (Figure 3.47) is native to the UK but 70% of the population has been wiped out from the south west and it has been given priority status in the UK's Biodiversity Action Plan. The North American, red-clawed signal crayfish (Figure 3.48) was introduced in the 1970s for the fishery industry as a fashionable seafood and to supplement the North European crayfish (*Astacus astacus*) stocks, which were being damaged by crayfish plague. The red-clawed crayfish escaped the fisheries and quickly spread into rivers and streams. This aggressive species has now out-competed the white-clawed crayfish, decimating its population. The crayfish plague is carried by the red-clawed crayfish and can wipe out populations of white-clawed crayfish in a few weeks. The disease can be carried from stream to stream via boots, fishing equipment and recording equipment. In addition, habitat loss and declining water quality have restricted the number of sites in which the white-clawed crayfish can survive.

### The UK Southwest Crayfish Project

The UK Southwest Crayfish Project, working in association with the Bristol Conservation and Science Foundation, is attempting to preserve the white-clawed crayfish in a number of ways:

- increasing awareness about how crayfish plague can be transmitted and the problems facing native crayfish
- introducing a breeding programme and releasing white-clawed crayfish back into the wild
- moving 'at risk' populations to safe areas.



THE Landmark  
PRACTICE

## Invasive Species Series: Signal Crayfish

by Gemma.Admin | July 26th, 2021 | News, Protected Species



# Case Study:

## Lionfish in the Atlantic and Caribbean oceans

Lionfish (*Pterois volitans*) (Figure 3.49) are venomous and aggressive marine fish. They belong to the family Scorpaenidae and genus *Pterois*. This genus is characterized by red, white and black stripes (indicating toxicity and disguising body form), and by elaborate pectoral and dorsal fins. All members of the Scorpaenidae have venom glands in their dorsal, anal and pelvic spines. The main function of these spines is to defend against competitors and predators.

Lionfish are a benthic species – feeding at the bottom layers of the reef rather than in the water columns above (where pelagic fish feed). They suck small fish, crabs and other food off the surface of the reef and can use their pectoral (side) fins to trap food. The largest lionfish can grow to about 15 inches (0.4 metres) in length, but the average is closer to 1 foot (0.3 metres).

Lionfish are native to the Indo-Pacific ocean but have become increasingly abundant in the Atlantic and Caribbean oceans where they were not historically found. Lionfish overpopulate reef areas and force native species to move to areas where conditions may be less favourable for them. Lionfish therefore pose a major potential threat to reef ecological systems on the east coast of the USA and the Caribbean. Current distributions include the Atlantic coast of the USA, the Caribbean coasts of Central and South America, the Gulf of Mexico, the Greater Antilles and the Leeward Islands. Scientists believe that the fish escaped from aquaria in Florida into United States coastal waters where their numbers have expanded due to a lack of competition and predation, along with abundant food supplies.

### Effects of the invasive species

Lionfish have become the second most abundant species of fish from the Bahamas to North Carolina. In the Bahamas they feed on more than 41 species of fish, including commercially valuable species like grouper and snapper as well as fish that keep the reefs clean of algae. *Pterois* could have a significant negative impact on prey populations by decreasing numbers, thereby directly affecting complex food web relationships and having knock-on effects for many food chains. Reef deterioration and the collapse of food chains could therefore be direct results of the lionfish invasion.

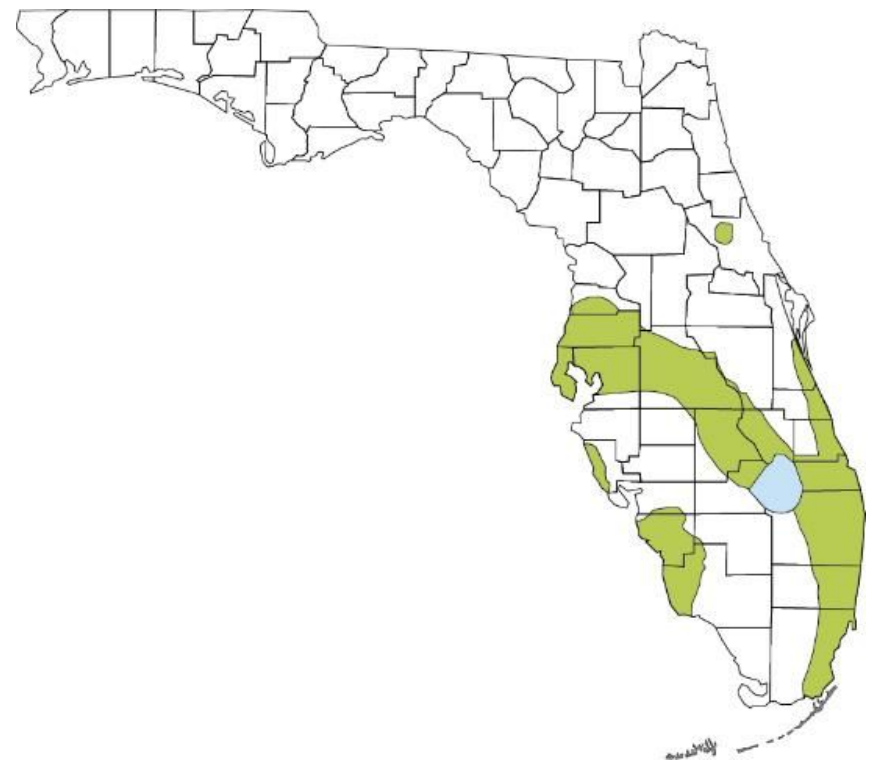
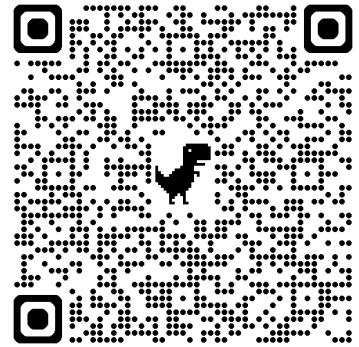
### Possible solutions

Thorough and repeated removal of lionfish from invaded waters will be necessary to control their numbers, which are currently growing exponentially. Conservation groups are organizing hunting expeditions for *Pterois*, and other scientists are training reef sharks to hunt and eliminate the lionfish.


Lionfish are used extensively in cooking – they are tasty and succulent with a similar texture to grouper. Many recipes for lionfish exist, including fried lionfish, lionfish ceviche, lionfish jerky and grilled lionfish. Human consumption of lionfish may prove to be one of the best ways to reduce population numbers and aim for total eradication from the invaded waters.




# Case Study: Cane Toad in USA



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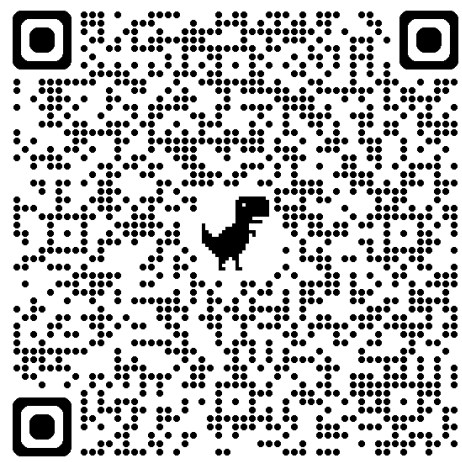
**Florida Fish and Wildlife Conservation Commission**



**Cane Toad**  
*Rhinella marina*

# Case Study: Brown Tree Snake in Guam





# Case Study: Water Hyacinth in South Africa



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## Sustainably controlling the water hyacinth invasions in South Africa

Biology  
September 27, 2023

Download this Article

- Invasive aquatic plants, like the water hyacinth, cause significant economic and environmental impacts.
- Traditional control strategies, such as manual removal and **herbicide** application, are ineffective in the long term.
- Biological control through the release of natural enemies to these plants offers a sustainable long-term solution.
- In South Africa, Professor Martin Hill of Rhodes University and

**Further reading**

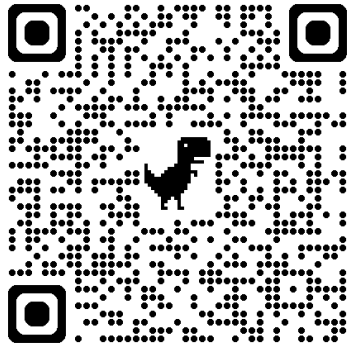
Coetzee, JA, et al, (2022)  
[It's a numbers game: inundative biological control of water hyacinth \(Pontederia crassipes\), using Megamelus scutellaris \(Hemiptera: Delphacidae\) yields success at a high elevation, hypertrophic reservoir in South Africa, Biocontrol Science and Technology, 32\(11\), 1302–1311.](#)

Coetzee, JA, et al, (2021)  
[A review of the biocontrol programmes against aquatic weeds in South Africa, African Entomology, 29\(3\), 935–964.](#)

Hill, MP, et al, (2020)  
[Invasive Alien Aquatic Plants in South African Freshwater Ecosystems,](#)



# Case Study: Feral Pig in USA



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## Boisterous, destructive and divisive: North America's wild boar population is on the rise

21 March 2024

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**India Bourke**  
Features correspondent

