

WHAT ARE INVASIVE SPECIES?

Invasive species are introduced organisms that can cause harm to the environment, the economy, or human health. They are mostly spread through human activity and include insects, weeds, fungi, bacteria, viruses, fish, mammals, snails and other species. Many of these harmful organisms are already present in Pacific Island Countries and Territories (PICTs) where they are having detrimental impacts on several sectors including food production, tourism and trade as well as ecosystems and biodiversity. More invasive species are in countries neighbouring PICTs.

HOW DO INVASIVE SPECIES AFFECT FOOD SECURITY IN PICTs?

Food security is negatively affected by invasive species in two main ways:

1. **Decreased production in both subsistence and economic sectors:** People in PICTs rely almost exclusively on agriculture, horticulture, forestry, fishing and wild harvests for their food production and consumption. Damage from invasive plants, animals and diseases can seriously reduce food production within a country.
2. **Reduced native biodiversity and ecosystem resilience:** Native plants and animals in PICTs have evolved in isolated environments and lack defenses against new, more competitive, plants or predatory animals and disease-causing organisms. Invasive species cause loss of native biodiversity resulting in the degradation of local ecosystem services which can affect production and harvests in communities.

For more information about specific invasive species causing damage in, or threatening, PICTs please see the other side of this document.

WHAT CAN BE DONE ABOUT INVASIVE SPECIES?

There are three possible options to manage invasive species (adapted from the *Guidelines for Invasive Species Management in the Pacific*, 2009). These are listed in the ideal order of preference:

Prevention	<p>Prevention (i.e. <i>biosecurity</i>) is the most cost-effective way of managing the threat posed by the spread of invasive species <i>between</i> and <i>within</i> countries.</p> <p>Prevention measures that can be applied include:</p> <ol style="list-style-type: none"> 1. Pre-export: Reduce the risks from countries known to have priority invasive species by implementing appropriate inspection, treatment, packaging and transportation procedures prior to export. 2. Pre-border: Reduce the risks of both deliberate and accidental introduction of invasive species between and within counties by implementing a rigorous process of risk analysis of new organisms. 3. At the border: Establish and maintain effective border control, quarantine and transport systems at national borders and between islands within countries. 4. Post-border: Establish and maintain effective systems to reliably detect incursions of invasive species and mount rapid responses to them.
Eradication	<p>Eradication is the next preferred management option because management costs are reduced after eradication is achieved. This option is used if prevention measures are not successful and invasive species do get past biosecurity checks. Continued surveillance is required to ensure that re-invasion does not occur.</p>
Control	<p>Control is the most expensive management method. This is the least preferred option and is used if prevention fails and eradication is not successful or possible. Several available control options include:</p> <ol style="list-style-type: none"> 1. Biological control requires significant initial investment but can be a successful long-term control. 2. Containment of invasive species within a limited area requires long-term investment. 3. Permanent control by chemical and physical methods should be used as a last resort, if other options are not successful. This type of control requires permanent long-term investment.

HOW DO INVASIVE SPECIES AFFECT FOOD SECURITY?

Plant and Animal Diseases: Bacteria, viruses and fungi, like taro leaf blight (see right), cause diseases in crops, reducing food resources and farmer incomes. The costs of controlling diseases can be crippling.

Birds: Invasive birds, such as the common myna and red-vented bulbul, cause extensive damage to fruit crops, such as pawpaw, sour-sop, guava, star apple and abiu.

Insects: Serious insect pests in the Pacific include fruit flies, white fly, taro beetle and the diamondback moth. These cause economic losses directly by the destruction of fruit and vegetable crops and indirectly when importing countries impose restrictions on countries where the insects are present causing reductions in trade.

Snails: The giant African snail is considered one of the worst pests of tropical and subtropical regions. It is a major agricultural pest causing losses in cassava, cocoa, breadfruit, pawpaw and a variety of green vegetable crops. Snails can also spread pathogenic worms and flukes that cause diseases in humans and animals.

Weeds: Weeds spread and can take over areas used for pasture and crop cultivation as well as food gardens. They can displace native trees and other plants disrupting ecosystems. Serious invasive plant species in the Pacific include trees (e.g. guava and African tulip), grasses and sedges (e.g. *Cyperus spp*), shrubs (e.g. lantana, nightshades and sensitive plants), climbing vines (e.g. merremia, mile-a-minute) and creeping plants (e.g. wedelia).

Mammals: Feral mammals, including pigs and goats, pose serious threats by destroying food gardens, native forests and other habitats. Overgrazing can cause accelerated erosion. Dogs, cats and mongooses are the main predators of chickens and other birds, including ground-nesting seabird populations. Rats consume and destroy food crops, stored foods and native plants and animals.

Fish: Introduced fish, like tilapia, compete with, consume and can displace other traditional food fish in the ocean, streams and other aquatic systems.

HAVE THERE BEEN ANY POSITIVE RESULTS COMBATING INVASIVE SPECIES IN PICTS?

Positive results have been seen from invasive species management programmes in the region. For example, since the early 1990s, with assistance in fruit fly control from the Australian Center for International Agricultural Research (ACIAR), Fiji, Tonga and the Cook Islands have successfully exported fruits to markets that were previously denied to them because of fruit flies.

FOCUS ON: TARO LEAF BLIGHT

In 1993, an outbreak of taro leaf blight devastated Samoa's staple food source and severely reduced farmers' incomes from local and overseas markets. In only one year, Samoa's taro production dropped by more than 95%, and the export value fell from US\$3.2 million to only US\$53,000. Estimates put the costs of this one crop disease at US\$40 million -- more than the impact of three cyclones -- to replace domestic consumption, lost exports and the cost of measures to control the disease.



FOCUS ON: MACAQUE MONKEYS

On the island of Anguar in Palau, the introduction of macaque monkeys has led to a near complete disruption of local vegetable food production. It is almost impossible to grow cassava, sweet potato, pawpaw, banana and guava as the macaques destroy them. This has impacted greatly on the way of life for Palauan women (who are the farmers), as they are not only losing their source of income but also having to pay more for food. They now have to purchase rice and bread to replace the staple crops lost.



FOCUS ON: TILAPIA

Tilapia, introduced into many islands for food, has spread into local streams and has become a very serious pest. It is associated with local extinctions of native fishes such as gobies, gudgeons and other important native food fish, and may thereby reduce traditional food sources. More research is needed to determine the impacts of tilapia in the Pacific and to develop non-invasive alternatives.



Prepared by Pacific Invasives Initiative (PII) for the Pacific Invasives Partnership (PIP), the umbrella coordinating body for organisations working on invasive species in the Pacific. PIP is the Invasive Species Working Group of the Roundtable for Nature Conservation in the Pacific Islands.

For more information and/or for a list of sources, please contact:

pji@auckland.ac.nz

<http://www.issg.org/cii/pji/index.html>