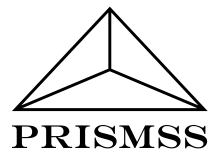




Pacific Invasive Species Battler Series



PROTECT OUR ISLANDS WITH BIOSECURITY





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Our vision: A resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures.

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Cover: Offloading cargo in Niue. Photo: David Moverley, SPREP

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Box 1: Biosecurity case study: People and Singapore daisy

Many invasive plants are successful by producing large numbers of seeds easily transported by wind, water, and animals. However, invasions are started almost exclusively through the actions of people. This is especially true for islands separated by large stretches of water.

Singapore daisy *Sphagneticola trilobata*, also known as Wedelia, is known as an aggressive weed able to damage ecosystems and ecosystem services. It is found in many inhabited Pacific islands where it impacts livelihoods and poses a threat to other islands where it may be transported. Singapore daisy is cultivated throughout much of the tropics and subtropics as an ornamental groundcover. It is a creeping, mat-forming perennial herb that grows quickly. It is commonly planted in extensive plots and planting boxes at tourist resorts, as landscaping around airports, golf courses, and public buildings in towns, on road cuts and river embankments to control surface erosion, and as landscaping in central dividers along roads and highways or around trees in parks and lawns.

It is able to crowd out nearly all other herbaceous species thereby preventing natural regeneration, it has wide environmental tolerance including floating in saltwater, and it can colonise sites at a broad range of elevations from the high-tide mark to 1,400 metres above sea level. One of the ways people spread Singapore daisy is through poor disposal. Pruning it back and dumping the cuttings creates new sites as the weed regrows from cuttings. Dumping cuttings in the sea can also lead to establishment at new sites.



Protecting islands can be easily done by choice at the source of invasion. Singapore daisy is a good example of a plant spread through people's lack of awareness and poor biosecurity choices that can be controlled by improving both domestic and international pre-border control points.

Wedelia, Sphagneticola trilobata. Photos: P. Skelton, SPREP

Dear Invasive Species Battler

We are a diverse bunch of people in the Pacific region, which spans a third of the earth's surface and encompasses about half of the global sea surface. We have ~2,000 different languages and ~30,000 islands. Pacific ecosystems are one of the world's biodiversity hotspots, with a large number of species found only in the Pacific and nowhere else. In fact, there are 2,189 single-country endemic species recorded to date. Of these species, 5.8 per cent are already extinct or exist only in captivity. A further 45 per cent are at risk of extinction. We face some of the highest extinction rates in the world.

The largest cause of extinction of single-country endemic species in the Pacific is the impact of invasive species. Invasives also severely impact our economies, ability to trade, sustainable development, health, ecosystem services, and the resilience of our ecosystems to respond to natural disasters. Fortunately, we can do something about it.

Even in our diverse region, we share many things in common. We are island people, we are self-reliant, and we rely heavily on our environment to support our livelihoods. We also share many common invasive species issues as we are ultimately connected. Sharing what we learn regionally benefits us and our families economically, culturally, and in our daily lives. The "Invasive Species Battler" series has been developed to share what we have learned about common invasive species issues in the region, with information and case studies that can assist you to make a decision about what to do next or where to go for further information.

The [SPREP Invasive Species Team](#) aims to provide technical, institutional, and financial support to regional invasive species programmes in coordination with other regional bodies. We coordinate the [Pacific Regional Invasive Species Management Support Service](#) (PRISMSS), the [Pacific Invasive Learning Network](#) (PILN), a network for invasive species practitioners battling invasive species in Pacific countries and territories, and the [Pacific Invasives Partnership](#) (PIP), the umbrella regional coordinating body for agencies working on invasive species in more than one Pacific country.

For knowledge resources, please visit the [Pacific Battler Resource Base](#) on the SPREP website: www.sprep.org

Thank you for your efforts,

SPREP Invasive Species Team



About This Guide

Battling invasive species already on an island is difficult work. This guide is intended to help you prevent the spread of invasive species between and across islands, for effective inter-island biosecurity. This guide is for anyone involved in inter-island biosecurity management actions but especially for those involved in protecting the natural environment.

Use this guide to check that you have preventive actions in place long before invasive species are detected. Refer to our guide [Catch it early: Invasive Species Early Detection and Rapid Response](#) to be prepared in case these unwanted species do arrive.

We thank our PRISMSS partners including Monica Gruber from Wellington UniVentures, Victoria University of Wellington, for assistance with drafting this guide, and Richard Griffith from Island Conservation and Steve Cranwell from BirdLife International for the provision of additional context and information.

What is biosecurity?

Biosecurity is the term used in invasive species management to define the actions needed to prevent the arrival of unwanted species, in a country or between places within a country. Biosecurity is derived from “biological security”, emphasising safety from exposure to harmful biological agents. Biosecurity covers a wide range of actions with a common goal to protect a country’s economy, environment, and people’s health from biological threats, such as plant and animal pests and diseases.

Why focus on prevention?

Attempts to eradicate or control established invasive species are usually expensive, take a lot of effort, and are often unsuccessful. Spending a relatively small amount of resources on prevention is always better than the large amount of resources required for a cure. Preventing the passage of species across borders, and especially across the natural boundaries between islands isolated by ocean, is the most cost-effective way of managing the threat they pose. The **invasion curve** clearly demonstrates how the costs per species are lower for prevention than for management of established unwanted species.

The COVID-19 pandemic helped us all understand biosecurity better. The principles of barrier gestures, isolation, quarantine, and prevention to slow the spread of a virus are similar to the measures used to prevent, slow down, and eradicate an invasive species. Just as we wash our hands to avoid passing on a virus, we can clean our hiking boots, car tyres, and cargo containers to avoid passing on invasive species.

✕

Box 2: The invasion curve

Invasive species found earlier are more likely to be successfully eradicated, and preventing arrival is the most effective approach of all. As an invasive species spreads over time, infesting an increasingly large area and therefore increasing its potential to reproduce and spread further, eradication becomes less likely (or even impossible). At the same time, control costs increase dramatically. The ‘detection and response point’ indicates when the species is typically detected passively if biosecurity processes such as active surveillance are not in place. We want to detect the problem earlier, when eradication is still achievable. The goal of effective biosecurity is to ‘move’ our detection and response closer to the time of the species’ introduction, when eradication is still feasible and cost-effective. [Early Detection and Rapid Response](#) is a key biosecurity tool to do this.

Image adapted from Harvey & Mazzotti (2018) The invasion curve: a tool for understanding invasive species management in South Florida, WEC347, UF/IFAS, adapted from Invasive Plants and Animals Policy Framework, State of Victoria, Department of Primary Industries, 2010.

What is the difference between within-island, inter-island, and international biosecurity?

People usually think of biosecurity as a way to protect international borders. But the same principles can be used domestically. International, inter-island, and within-island biosecurity all share key control points.

Whether protecting your country, islands within your country, or special places within your islands, the approach is very similar. The key difference is that different groups may be responsible for within-island, inter-island, and international biosecurity.

A fundamental need for effective biosecurity, whether international or domestic, is for roles and actions to be clearly defined and mandated.

International biosecurity roles and actions are typically driven by national laws (often a Biosecurity Act) and international agreements, such as the International Plant Protection Convention (IPPC), which are mandated by organisations, such as the International Plant Protection Organisation (IPPO). On islands that have both domestic and international borders, biosecurity staff may also be responsible for inter-island biosecurity.

Mandates for domestic inter-island and within-island biosecurity are often less clearly defined although typically held in part by agriculture and environment departments.

There are currently no internationally mandated standards for domestic inter-island or within island biosecurity, so it is important to talk to your local agriculture and environment teams to find out how they can assist. These mandates will be identified in [National Invasive Species Strategy and Action Plans](#) (NISSAPs). Some countries also have dedicated National Invasive Species Coordinators (NISCs), whose role includes the oversight of inter-island biosecurity and protected areas.

The control points of biosecurity at each of the three levels (international, inter-island, and within-island) are the same, although the approach differs depending on the geographical scope and the domestic mandates and contexts. These control points include pre-border (sometimes further divided to include pre-export), at-border, and post-border control points and are discussed in more detail in later sections.

The remainder of this guide focuses on inter-island biosecurity, but remember to call upon your colleagues working on international biosecurity, who can assist with achieving your goals to protect your islands.

Border can mean a political border, geographic barrier, formally or informally defined boundary or threshold. High-priority borders include international borders, the ocean between islands, and the edges of conservation areas with threatened native species, among others. Here, we use 'border' to indicate any of these boundary lines.

Pathways are ways invaders can cross a border. A pathway can refer to broad or fine-scale pathways, such as soil on plants, shipping routes, or vessels. Vessels such as boats are also referred to as transport mechanisms. All routes and ways that an invasive species can come in are pathways, and the mechanism of transmission for the invasive species of interest is key in defining and managing a pathway.

Who leads biosecurity activity?

In the Pacific region, coordination of international biosecurity obligations is led by the Pacific Plant Protection Organisation (PPPO) and by a National Plant Protection Officer (NPPO) in each country. These NPPOs are the key contact point for international biosecurity. Their focus is on crop pest management, the control of invasive or migratory pests, plant quarantine, and pesticide management. They are highly trained and are a useful support in inter-island biosecurity. The Secretariat for the Pacific Community (SPC) is also the Secretariat for the PPPO.

A National Invasive Species Coordinator (NISC) is the mandated role in inter-island biosecurity with a focus on ecological threats and protected areas. In the past, NISCs were limited to advocacy or isolated direct actions without the coordination of resources and influence of their counterparts in the agricultural departments. It is acknowledged that a coordinated approach across agencies will be needed at a national level to address long-term environmental security alongside the immediate human health and agricultural priorities.

The most effective biosecurity on the ground is led by communities. In many cases, island or village councils have the final say over all activities on-island, so relationships with these stakeholders are essential to introduce biosecurity measures and ensure effective compliance by the community.

Because there are currently no standards for inter-island and within-island biosecurity in the Pacific, it is important for NISCs to liaise with communities through village or island councils to generate support for biosecurity. Ideally, this will result in incorporating biosecurity into village or council rules. This way, communities themselves can lead biosecurity work.

Why are some islands more likely to be invaded than others?

The susceptibility of an island to invasion depends on the combination of several factors. Vulnerable islands have:

- Short, frequently used invasive pathways
- Large numbers or volume of movement to the island
- Poor biosecurity practices
- Hospitable environments for invasion, such as disturbed ecosystems
- Import of high-risk material, such as soil or untreated fruit
- Poorly informed travellers who might bring invasives, intentionally or unintentionally
- Transport to/from a location with poor biosecurity practices
- Transport to/from a location with large populations or a large variety of invasive species, especially species that are easily transported

Development activities, such as logging, mining, and construction, can change the environment to be more favourable to invasive species and increase the opportunities for invasive species to spread.



Comparing internal and international borders

Feature	International biosecurity	Inter-island and within-island biosecurity	Possible consequence for inter-island biosecurity
Who oversees the biosecurity?			
Mandated organisations	Typically, the Agriculture department via the international obligations of the NPPO role	Often the Environment department. But domestic mandates and obligations may be unclear or divided among different organisations. Village and island councils may have the final mandate	International obligations must be met; domestic compliance is usually less enforceable or not mandated
Coordination of activities	National Plant Protection Officer (NPPO)	National Invasive Species Coordinators (NISC)	NPPO role is mandatory, but NISC role may not be mandated through legislation, so enforcement is difficult
What tools or mechanisms are used?			
Legislation	Significant international conventions	Little if any legislation. Potentially village rules	Little or no mechanism for enforcing compliance
Control of 'borders'	International pre-border actions are controlled through international agreements. Requires trading partner compliance	Inter-island / within-island biosecurity can have more direct control of pre-border actions. Requires stakeholder support	Risk management is possible closer to source of risk. This control at the source can be a significant advantage in preventing the domestic spread of invasive species
Social 'buy-in', awareness, and compliance	Participation in biosecurity mostly by visitors and returning travellers	Participation in biosecurity mostly by local residents	Visitors are less likely to suffer the consequences of invasive species; local residents have more to lose, so have greater buy-in
Equipment and resources	X-ray machines, fumigation facilities, cranes to lift boats	Less technology. Some equipment may be used, such as brushes to clean shoes	Lower chance of detection of invasive species
What other factors also affect biosecurity risks?			
Transport frequency and number of entry points	Controlled, predictable, less frequent	Uncontrolled, unpredictable, more frequent	Higher risk of transporting invasive species
Climate change	Increased international risk, species range changes	Additional increased risk of outbreaks, local transportation (cyclones), but also potential extinctions or extirpation	Implications of climate change are uncertain
Isolation from an international source of risk	Short pathway, in general	Longer pathway, in general	International ports have higher risk; outer islands have less risk

Note that in contrast to international biosecurity, the term 'border' refers to an internal division which can be either a natural geographic barrier such as between islets and atolls or simply the boundary of a protected area.

Box 3: Biosecurity case study: Controlling rat movements

There are three widely introduced rat species (brown or Norway rat *Rattus norvegicus*, black or ship rat *Rattus rattus*, and Pacific rat *Rattus exulans*) present throughout the Pacific region, and a fourth rat species (Asian house rat *Rattus tanezumi*) in Micronesia. All invasive rats originated in other parts of the world, such as India and Southeast Asia. Today, they are present on more than 80% of the world's islands and are found across most habitat types. It is important to note that parts of the western Pacific (Papua New Guinea and Solomon Islands in particular) have a number of native and endemic rat species also.

Introduced rats are considered one of the worst invasive species because they are highly adaptable and omnivorous, eating seeds, plants, insects and invertebrates, reptiles, eggs, and young animals.

Invasive rats can also have severe impacts on crops and agriculture, posing a risk to food security. Rats carry infectious diseases such as leptospirosis that are widespread within the Pacific. Rats damage infrastructure and have other economic impacts such as limiting opportunities for tourism. Along with other invasive species, rats pose the greatest current threat to native biodiversity and have contributed to many extinctions within the Pacific.

In tropical environments, rats can occur at very high density due to their year-round breeding and plentiful food. Rats are also well known to board vessels in ports and infest cargo. Although rats can swim between nearby islands, most introductions to new islands are assisted: rats arrive in cargo and supplies transported between islands. From a biosecurity perspective, this is important because it means you need to consider protecting clusters of islands, rather than individual ones. The Norway rat can swim up to 1 kilometre, and a single pregnant female can establish an island-wide population in less than two years. Preventing invasion by rats must be a focus for island biosecurity, and rat-specific measures can be taken, such as:

- Rat populations should be suppressed to low densities around ports and other sites of possible departure. For more information on techniques, see [Removing rodents from small tropical islands with success](#).
- All cargo destined for rat-free islands should be packed in rodent-proof containers such as sealed buckets, packed inside a rodent-proof facility, and kept in a secure location prior to departure.
- All vessels travelling between islands should be inspected prior to departure and deploy permanent rodent detection and control devices on board.
- Ships should ideally moor offshore and use a clean tender to transport cargo to islands or minimise berthing times. Berthing, loading, and unloading should occur during daylight hours.
- Additional measures, such as early detection and rapid response protocols, should be established and practised (for details, see the Battler guide [Catch it early: Invasive Species Early Detection and Rapid Response](#)).

Adapted from [Review of rat invasion biology: implications for island biosecurity](#). Science for Conservation 286, New Zealand Department of Conservation *Te Papa Atawhai*. Updated to be consistent with current Island Conservation recommendations.

Which species are biosecurity priorities?

Species can be prioritised based on a number of criteria, such as the species that pose the most ecological risk or have the greatest socio-economic impact. Some are chosen by the feasibility of managing the species if it crosses the border. Species must be ranked so limited resources can be used to target the most problematic species.

The priority for staff working in Agriculture might differ from the priority for staff working in Health or Environment. Although often managed within a Department of Environment or equivalent, invasive species are not only an environmental issue. Coordination among sectors is important to identify the true range of risks and address the maximum range of priorities.

The exact list of priority invasive species will be unique to a location. Even so, there are some common priority invasive species for islands in the Pacific region: these include predators such as rats, cats, and mongoose, insects such as ants, spreading weeds such as Singapore daisy, and trees such as Miconia.

Determining which species to prioritise requires research and talking to experts with specific foci such as marine or weed invasive species. Regional support services such as PRISMSS can offer support. Many potentially invasive species will have already been assessed and their distributions mapped where they are have become invasive. We discuss prioritisation further in the risk assessment section below but it is important to also understand invasive species in general.

The success of an invasive species – its ability to establish and spread in a new environment – has long been recognised as being influenced by a combination of traits (characteristics or features) of the invasive species and the new environment.

To become a successful invader, a species must pass through all four stages of the invasion process: transport, introduction, establishment, and spread. Successful plant and animal invaders frequently have a high reproductive output and broad environmental tolerances. Animals with high activity and exploratory behaviour have greater chances of locating cargo and being transported to new locations. Many invasive plants and some invasive animals are successful because they can reproduce clonally or vegetatively, so only a fragment is needed to start a new population.

These types of traits all need to be considered when assessing the risk of a potential new arrival. These traits also affect the kind of biosecurity needed and when biosecurity measures should be taken.

The features of the environment can also assist successful establishment of a newcomer. Many invasive plants and animals are good at establishing in disturbed natural environments. Disturbance in this context might be something like clear-felling trees for roads or creating space for houses. In an inter-island or within-island biosecurity context, these disturbed sites are prime sites for surveillance, especially on the edges of high-value conservation areas.

Maintaining and restoring healthy native ecosystems, sometimes called biotic resistance, is a useful mechanism to increase the resilience of Pacific ecosystems against invasive species. For more, see the guide [Build resilient ecosystems and communities by managing invasive species in high-priority sites](#).

Box 4: Biosecurity case study: Why are ants successful invaders?

There are five major ant species threatening the Pacific:

- yellow crazy ant *Anoplolepis gracilipes*,
- the red imported fire ant *Solenopsis invicta*,
- the African big-headed ant *Pheidole megacephala*,
- the little fire ant *Wasmannia auropunctata* and
- the Argentine ant *Linepithema humile*.



Understanding why some species are more likely to invade requires us to look at the species' characteristics, including their behaviour. Our biosecurity response needs to take into account this behaviour.

Many Pacific islands are threatened by invasive ants, such as red imported fire ants and little fire ants. Social organisation is one of the key factors that contributes to the success of ants as invaders. Their advanced social system has resulted in several benefits that enhance establishment, survival and spread. These benefits include group protection against predators, organised resource exploitation and aggressive colony defence.

Invasive ants share a suite of other features that set them apart from non-invasive ant species. These characteristics enhance their ability to survive and thrive in new habitats:

- colonies with many queens;
- colonies spread by budding;
- association with people and trade;
- formation of supercolonies;
- aggression towards other ants; and
- helpful relationships with plant pests.



Floating raft of red imported fire ant *Solenopsis invicta*.

These traits all combine together to enable invasive ants to sometimes reach super-high abundances. Typically, the abundance of invasive ants is what makes them such a problem for biodiversity, the environment, and economies.

Sometimes ants have population outbreaks that can be driven by their relationships with plant pests, such as aphids, scale insects, and white fly. Dealing with these pests can help diminish ant problems.

For more information and for successful examples of how ant invasions can be prevented, check out the Pacific Invasive Ant Toolkit (PIAT): [Prevention](#)



White footed ants in Suva, Fiji. Photo: Monica Gruber



Photo: Stefan Kropidlowksi USFWS – Pacific Region

How do environmental events increase the risk of invasive species establishing?

Invasive species are, by nature, highly flexible, and their success can be enhanced by disturbances in the natural environment. They can respond quickly to new environments and environmental changes, such as more frequent extreme weather events related to climate change. Many invasive species have traits that enable them to easily be transported to, establish, and spread in new environments (see 'Which species are most likely to invade?'). These traits can make them more competitive than native species in new or changing environments.

Development activities such as logging, mining and construction can change the environment to be more favourable to invasive species, and increase the opportunities for invasive species to spread.

Climate change has implications for biosecurity: potentially more species might become invasive, and species that are already invasive may have more opportunities as climate creates habitats that favour newcomers over natives. Climate change can also create more opportunities for invasion and spread due to the increased frequency or severity of disturbance events, such as cyclones, and due to long-term climatic differences, such as higher temperatures.

One such example may be the recent outbreak of white-footed ants in Fiji. The ants have been in Fiji for many years without being a great nuisance. However, soon after Cyclone Winston in 2016, a major outbreak of these ants and the plant pests they promote caused problems for people and the environment.

Extreme environmental events can also lead to marine debris transporting organisms over vast distances. For example, after the Fukushima earthquake and tsunami, many Japanese marine species were transported across the Pacific to the United States.

Disasters require additional assistance from outside the country. Often this assistance is required urgently to save people's lives, and biosecurity might be overlooked. Rapid movement of people and goods without the usual biosecurity precautions can also lead to the introduction and spread of invasive species.

Climate change increases the impacts of invasive species.



Screen still from a cartoon animation used in the Invasive Species School Challenge from SPREP. Illustrator: Albert Rolls.

What factors make invasions more likely?

There are many activities that people undertake that can increase the risk of invasive species introduction or spread. These are the activities to manage through biosecurity actions.

Not monitoring high-risk pathways, origin points, and transport types.

- Some places are more likely to be a source of invaders. Any management strategies to control transport vectors or pathways coming from those areas must be more stringent.
- Some types of transport between islands are more likely to carry invaders, such as larger, older or 'cargo only' vessels.

Allowing high-risk behaviour.

- Permitting boats closer to shore allowing rats to swim ashore.
- Not restricting or banning certain types of activity.
- Irresponsible tourism that does not restrict numbers or does not inform or gain environmental protection commitment from customers.

Allowing high-risk materials ashore, such as:

- Recycled construction materials
- Untreated timber
- Gravels
- Soils

Changing natural features of the island.

- Landscape disturbance from timber extraction, agricultural conversion, mining, or land-use change.
- Setting up infrastructure to increase access such as roads, ports, airstrips and direct international access to a high value natural feature.



Division of Environment and Conservation (DEC),
Ministry of Natural Resources and Environment (MNRE) Samoa.

Anna Bertram, SPREP

What features do we include in our effective biosecurity management plans?

To plan effective management and see if actions were successful, managers need to prioritise species, pathways, and sites for management, measure the starting situation, and monitor the movement and changing impacts of invasive species.

Identify biosecurity priorities

In consultation, managers need to identify the most important problems and most important species using risk assessment tools (see 'How can we implement pre-export and pre-border biosecurity?'). The needs of the ecosystem, native species, and human community must be considered. The invasive species manager helps to translate a local need, perhaps the protection of a cash crop or an endangered species, into the action required for the invasive species contributing to the problem.

Set baselines

Managers need information on the distribution, abundance, dispersal mechanisms, and impacts of invasives, as well as information on the abundance and distribution of native biodiversity. Knowing all these things sets the 'baseline' description of the current status, and tracking changes from invasive species and native biodiversity baselines is important for setting biosecurity priorities.

Use monitoring

Monitoring is the only way to detect or predict trends and emerging threats, such as effects of climate change on invasive species, new pathways, susceptible sites (sites with high exposure to invasives, such as ports, gardens, or road verges), and sensitive sites (sites that might suffer high impact from invasives, such as protected areas and aquatic systems).

To set biosecurity priorities and monitor the success of your ongoing work, plan to:

- Identify key sites for biosecurity protection.
- Identify and document the pathways and vectors of introduction of invasive and potentially invasive species.
- Periodically review species and site inventories, identify gaps (for ecosystems, islands, or taxonomic groups), and plan priority surveys.
- Carry out priority surveys and update information resources. In consultation with communities and other stakeholders, identify and rank species that cause the most concerning problems for health, biodiversity, livelihoods, economic activity, and other values.
- Publish and share species lists and other information locally and with other islands, including online and in the databases listed at the end of this guide.

More experts, more security

A key biosecurity tool is community awareness. Well-informed communities who understand the risks posed by invasive species are more likely, and more able, to assist in your biosecurity work.

Clear records of priority species characteristics, abundance, and management actions taken over time can help people prevent invasions and support your biosecurity objectives. Collecting and sharing good data will also help managers track project success, gaps, and how resources and effort are distributed in biosecurity efforts.

Observations can come from the community, and the likelihood for people to contribute can be 'incentivised' by the communities. Feeding information back to the community is as important as information collection.

iNaturalist is a biodiversity platform used globally



iNaturalist is an example of a tool that can harness reporting from the community. It can be used by the public—your biggest resource—to report individual observations of suspicious plants and insects. It is also a tool to encourage people to record species in their local environment. This can help increase the probability of detecting new invasive species.

Observations of species can be pooled into an iNaturalist project using filters. An iNaturalist project automatically includes observations that fit places, species g, and dates you define. No one needs to add their observations manually to the project, they just need to make observations that fit the requirements. An iNaturalist project has outreach tools such as a unique URL you can share, leaderboards to encourage participation, and custom banners, icons, and description. Before starting a project in iNaturalist, first become an active member of the iNaturalist community and learn the tool yourself by adding identifications, comments, and observations for your own country and area of personal or professional interest. Remember, creating and maintaining a successful community project requires consistent engagement and outreach.

Maps can be shared, updated, and kept current

Maps are an important communication tool. Consider what resource you have to create and share the changing distribution for each high-profile species. There are free tools online to share your data, such as Google Earth and Google My Maps. Google My Maps has many features familiar to anyone that has used geospatial tools but has the advantage that it uses the Cloud storage of Google Drive and allows easy collaboration and embedding into websites.

Build the use of community information into your management plan

Management plans that define how online collaboration tools and apps that work on mobile devices might be used are more likely to succeed in using those tools. The use of common tools by both conservation professionals and the public builds a common language. Acknowledging the contributions of community members can encourage even greater involvement.



How do we practice biosecurity?

Biosecurity involves identifying pathways and establishing systems and checks to prevent the transport of invasive species. While some people might think of this as protecting national or territorial borders, the same principles should be applied domestically in the movement of goods, materials, and people. Biosecurity actions are all grounded in a biosecurity plan that defines roles and resources.

According to the *Guidelines for invasive species planning and management on islands*, there are four important control points requiring biosecurity plans. As mentioned earlier, the biosecurity principles apply at all scales from the international to the border of a protected area. How the principles can be implemented depends on country specific mandates and the geographic scope of the control. Plans for each control point from the Guidelines are paraphrased follows:

1) Pre-export control

Develop and apply improved control methods for inspection, treatment and packing of commodities including waste. Ensure control methods are applied to the transportation systems used to take commodities to the export area. Apply controls when crossing borders internationally or inter-island, particularly when a priority invasive species is known to be present at the export source.

2) Pre-border control


Apply a rigorous process of risk analysis. Establish a permitting system including a prohibition on the deliberate introduction of species. Also require permitting or prohibit the movement of carriers originating from certain countries. Apply the same controls to the domestic movement of carriers between certain islands. Include biosecurity controls on transport vessels *in transit* to other islands, to prevent accidental introductions en route.

3) At-border control

Establish and maintain effective quarantine, transport, and border control systems at national borders. Adapt these systems so they can also be applied domestically between the islands within countries.

4) Post-border control

Establish and maintain effective systems to detect incursions of invasive species reliably and quickly, and create rapid eradication responses (see *Catch it early: Invasive Species Early Detection and Rapid Response*).

 Biosecurity control points <i>More options are available for earlier control points</i>		
PRE-BORDER/PRE-EXPORT <i>Treatment at source</i> <i>Packing requirements</i> <i>Hygiene at source</i> <i>Banning import</i> <i>Legislation preventing import</i>	AT BORDER <i>Entry point modification</i> <i>Limit access points</i> <i>Quarantine</i>	POST BORDER <i>incursion response and sentinel monitoring</i>

An effective biosecurity system must include all four control points for an end-to-end solution: considering the transport of goods and people that might spread invasive species from the beginning of the transport process to the end.

Biosecurity processes can be simple and straightforward, or very complex, depending on the needs of the country and context. For example, the needs of a single-island country like Niue are very different to those of a country like Kiribati, which is made up of three widely dispersed archipelagos and many atolls. This Battler guide is not intended to specify the needs of all countries and territories, but the following sections provide a general guide to the principles.

How can we implement pre-export and pre-control point biosecurity?

The key to effective biosecurity is identifying and assessing risks (species and transport pathways) and then putting in place ways to manage those risks. These are discussed in more detail below.

Risk assessment

Risk assessment systems help you to predict the invasiveness and impacts of a species before an invasion takes place. Risk assessment for plants is usually called “weed risk assessment” and for animals and pathogens “pest risk assessment”.

Risks will be related to species and/or pathways. We mentioned earlier the need to define your priority species: this is one risk assessment exercise (see *‘What features do we include in our effective biosecurity management plans?’*). The other assessment is to look at pathways. Pathways are the ways that the invasive species can arrive to a country or travel between islands once past the national border. For example, the transport of plants with soil is a major pathway for invasive ants and plant seeds. For this reason, this pathway must be tightly controlled.

Use species and pathway risk analysis to identify priority invasive species that threaten your islands (due to their presence on other islands and sources of transport between these) and to identify the pathways by which they may arrive. It is also important to consider the transport mechanism itself as a source of risk; for example, boats can be a constant source of risk due to rats, birds and insects inhabiting them.

There are many invasive species that threaten the Pacific. Understanding the detail of these risks, both to national interests and within a country, is a key first step in biosecurity. Nationally, the NPPO is responsible for identifying threats outside the country, and domestically this role might be undertaken by your NISC. It is always a good idea for domestic and international biosecurity to be well aligned, and so your NISC and NPPO should work together. Priority species not present in your country can be included in your NISSAP, which describes the risk posed by invasive species already in your country.

It is much easier in many cases to put in place controls on pathways than on individual species. However, for very high-risk species, specific controls might be helpful.

Risk management

A number of tools can assist with managing both international and domestic biosecurity risks. These are lists, such as an Unwanted Organisms Register, Registered Pests, and the Pacific Pest List Database: www.spc.int/pld/. Although these cover agricultural pests, some of these pests can also be invasive species. Similar lists should be developed for inter-island and within-island biosecurity.

More information on pre-border biosecurity, with a focus on international biosecurity, can be found here: <http://piat.org.nz/index.php?page=pre-border-control>.

Your country’s NISSAP should identify the risk pathways, priority species, and ways that these are monitored and managed, as outlined earlier.

Pathway analysis

What pathways need priority management to prevent known pests in neighbouring countries from entering our island?

Examine the major movements of people, cargo, and species into and within your country. You may need to talk with your country's NPPO and biosecurity team, customs officials, tourism operators, and transport industries. The importance of a pathway may depend on the volume (how much cargo is moved) and/or on the risk (for example, movements of untreated soil or gravel are high risks even in small volumes).

To decide where to focus efforts within a limited budget, consider making comparisons of the minimum required action to manage an invasive species problem and the ideal actions to control or eradicate that threat.

"Identify the few most important introduction pathways (such as garden plants, untreated wood, rat-infested freighters, and so on) and work on improving biosecurity controls."

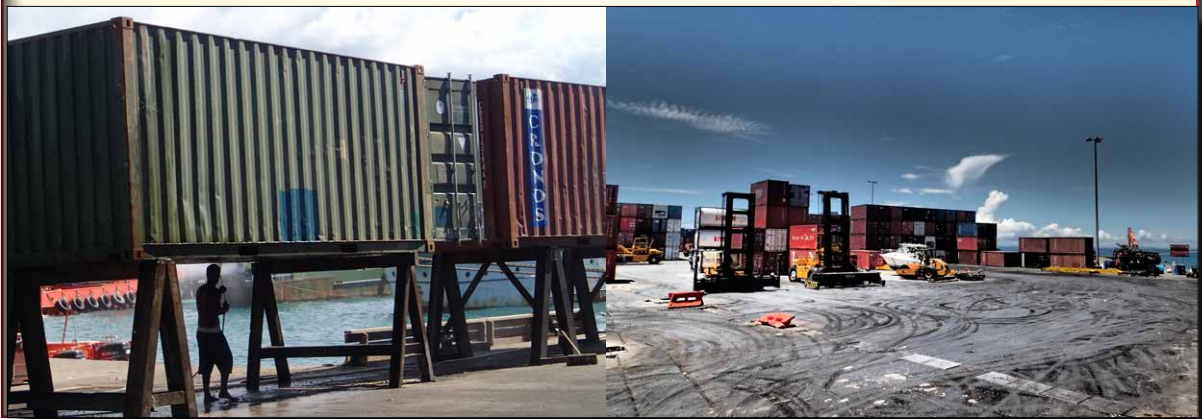
As you plan your preventive actions, remember:

- Not all introduced species are invasive, and action should be prioritised to deal with those that are currently causing, or have the potential to cause, the most harm.
- To maximise effectiveness and value for money, invasive species risk assessment and prioritisation are fundamental and must be based on good science.
- When prioritising species, pathways, and sites for action, consider cost, effectiveness, acceptability, and future problems (such as the possibility of reinvasion).
- Once you have chosen them, stick to the agreed priorities!

Always apply the 'precautionary principle'. Where knowledge is insufficient to accurately assess the risk of a species becoming invasive, or its present or future impacts, it should be assumed that impacts will occur, and action should be taken to prevent the species becoming established or spreading.

A precautionary approach assumes that any species imported to an island to be kept in ponds, pens, cages, or gardens will eventually escape into the wild. This escape is usually a realistic expectation. Plan accordingly.

Adapted from the [Guidelines for invasive species planning and management on islands](#)



Photos: Posa Skelton, SPREP

Secure the entire pathway

1: Use the right approach at the right time

For inter-island biosecurity, management of risk is often about ensuring people behave in a way that supports biosecurity. When possible, gain the commitment of travellers, transport industry professionals, and suppliers to prevent biosecurity risks before the vessel, cargo, or traveller crosses the natural border between islands.

Cooperation with suppliers can control contamination at source. In your prevention campaign strategy, target the tourism and transport industries as channels to promote local biosecurity regulations and positive behaviours prior to crossing a border or control point.

2: Commit to the right practices

Biosecurity practices can be targeted at species and at pathways. These steps should avoid entry of the risk species and protect the pathways of potential invasion.

Because of the Pacific islands' strong dependence on shipping and boat traffic, the shipping pathway is critically important for invasive species management for islands.

Clean ports

Ports should have invasive species management plans and include surrender facilities that are well-marked, easy to find, and easy to use. The plan should be active, clearly define who is responsible for which tasks, and be audited or reviewed regularly.

Some components of the plan might be signage at moorings for international visitors to boost compliance by visiting vessel crews. Port management for biosecurity might include tools like fencing or rodent bait stations at and around the harbour and rodent guards on vessel mooring lines. Facilities for safe, pest-free storage of cargo and clear separation of treated and untreated cargo can help prevent infestation and reduce cross-contamination (see 'Clean cargo' below).

As with all plans, to be effective the 'Clean Port' plan should be audited, especially when it is first set up. The responsibility to maintain the system must be assigned to a specific person who will also keep records of problems and details such as when bait stations are replenished. That person will also be involved in developing training so there is always someone accountable and competent to protect the vulnerable control point.

Clean boats

Every boat owner can make a difference in protecting our islands. In addition to stowaways on board the vessel or in the cargo, marine invasive species can be carried in ballast water or on the hulls of vessels of any size. Hulls should be kept clean at all times.

As of 2019, both new and existing vessels are required to manage their ballast water in a responsible manner. To show this is being done, each ship must have a copy of the water management plan and an auditable log of that management being carried out, among other requirements. Because the enforcement is specific to each Pacific territory, it is up to agents who have a biosecurity role to know how they can respond.



Photo: J. Miles

No stowaways

Cargo and transport vehicles should be inspected, stored, and managed to reduce the likelihood of unintentionally transporting invasive species.

For example, boat masters can reduce the likelihood of invasive species stowaways, like rats, by setting up and assigning someone the role of checking the rodent suppression onboard and using a checklist of other 'clean boat' tasks for each voyage.



A rat guard mounted on the mooring line of a United States warship. Photo: U.S. National Archives.

Clean cargo

Ideally, all cargo will be free of all invasive species. As you work toward this goal, prioritise by considering what types of cargo represent the greatest risk. What facilities are in place to inspect, store, treat, or quarantine cargo?

Other benefits of being 'shipshape' can include crew safety, reduced cargo losses, and improved import/export records.

Is your cargo clean?

Cargo self-inspection guidelines can be used pre-border both for sea container shipping and other cargo before crossing the natural border between islands.

- Visually inspect the outside and inside of cargo for contaminants.
- Sweep, vacuum, or wash containers before packing to remove potential contaminants. *Heavy rains may increase the likelihood of certain types of contamination.*
- Ensure cargo packed into the sea container is clean and free of visible contaminants.
- Clear and clean the cargo staging and packing area to ensure that it is free from contaminants. *Containers placed on grassy areas may be more vulnerable to contamination by insects and snails.*
- Do not keep containers under bright lights, which will attract insects to the cargo staging area and increase the likelihood of contamination. *If containers must be kept under bright lights, check them regularly for signs of insects and egg masses and clean containers as needed to remove these contaminants.*
- Where appropriate, use baits, traps, or barriers to keep pests out of the cargo staging and packing area. For example, you can use a salt barrier to prevent snail infestations.
- Where applicable, sweep, vacuum, or wash containers to remove contaminants, such as soil or animal droppings.
- Container doors must be closed between periods of loading the container and, if possible, loading should only occur during daylight hours.

Source: FAO (2018) *Sea container cleanliness*. See: www.fao.org/3/i8960EN/i8960en.pdf

3: Involve the right people

Crew

- Define who is responsible for checking the control points of biosecurity practice and the actual vessel, cargo, passengers, or gear.
- Are the roles for biosecurity actions clear?
- Are there support mechanisms in place to address questions or reports of biosecurity concerns from crew, the public, customs officials, and other people involved?

Passengers

Individual cooperation is an essential part of effective biosecurity. For passengers to participate in biosecurity actions, they must know what the risks are and what they can do.

- Consider creating easy-to-read lists of practical actions that people can take.
- Provide this information before it is most critical and targeting the risks with highest priority.
- Use graphics and local language because these can help increase understanding and use.

This self-checklist is used to support tourists visiting a pest-free island in New Zealand to take an active role in prevention. What would a checklist for your pest-free islands look like?

Biosecurity checklist for visiting pest free islands

*All visitors staying on Motuora, Tiritiri Matangi, Rangitoto-Motutapu or Motuihe Islands **MUST** complete this biosecurity checklist.*

Stop! Ants in your pants? Mice in your rice?
Unlikely but... Small animals, ants, rainbow skinks and weeds or exotic seeds are the biggest threats to the pest-free status of our special islands.
Gear that has been in the garage or even stored in the house could be hiding rodents, skinks, insects and seeds.

So we need your help.
Complete the checklist below and hand it to the group leader or Island Ranger when you arrive at the island.

Items being carried	Action	Done
Packs	Shake out your pack/bag and check the inside, including the pockets. Make sure there are no holes. Ensure packed bags are done up tightly.	
Footwear	Clean your shoes/boots of dirt and seeds. Check the soles, laces and tongues of shoes for any seeds. Scrub footwear worn in the bush on the mainland in soapy water.	
Clothing	Check your woolly socks, woollen clothing and velcro closures for seeds.	
General gear and clothing	Once you've checked your gear, put it in a pack/bag with a zip and do it up tightly .	
Food	Pack any food into sealed containers.	
Bedding	Check any bedding, including shaking out your sleeping bag and packing it inside another closed bag – not inside the stuff sack.	
Tents	Shake out and check camping gear thoroughly. Pack into bags with zips and do up tight. Camping only allowed on islands with official campsites.	
Boat/Kayak	Check your boat/kayak. It's a good idea to keep a couple of baited traps on board at all times.	

THANKS – you might have just made a huge difference!

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Department of Conservation
Te Papa Ataturangi

New Zealand Government

How can we implement at-border biosecurity?

Any border crossing, international, between domestic islands, or even into a protected area is a key control point for biosecurity. It is important to establish and maintain effective quarantine, transport, and border control systems between islands within countries.

For international biosecurity, inspections are the key tool at the border, along with ensuring any permissions for transport of cargo has been obtained (such as import permits).

For inter-island biosecurity, inspections must be done prior to arrival on a new island. This is because risk is more easily managed closer to its source. Checking before people or cargo arrive is the best time for prevention.

Leading examples of inter-island biosecurity in the Pacific

Strict prevention measures to stop reinvasion by mammals are part of successful predator-free campaigns. The best examples have the actions described in biosecurity plans, are supported by legislation, and include actions to address each of the factors that make islands more likely to be invaded.

Tenania (Tenarunga) is a recently rat- and cat-free atoll in the Tuamotu Islands, French Polynesia. Not permanently inhabited, it is seasonally occupied by community members from the nearby atoll of Tureia who use Tenania as a copra plantation. A critical preventive measure is that all gear is checked prior to travel from Tureia to the predator-free atoll. A specific person is appointed as the biosecurity officer, and this person is responsible for the quality of the checks.

Another example is Kayangel in the north of Palau. This island is permanently inhabited. The biosecurity plan in place is supported by biosecurity legislation that was enacted prior to eradications then updated after successful eradication. The scope of the prevention section in this plan includes:

- Scheduled community awareness and education actions with recommended action frequency, timing, and type of media¹
- Staff training guidelines
- Community meeting guidelines
- A containment system for arrivals and their gear
- Detailed cargo restrictions that explicitly prohibit soil, certain animals, and plant material
- A pest management and recording system for large boats using a Biosecurity Card Tag
- A directive for offshore anchoring unless shore transfers of passengers or cargo are required
- Quarantine guidelines²
- Specific standards for tour operators and small boats and clear consequences of violation
- Disposal/destruction requirements for any material carrying or suspected to be carrying pests

One of the most exceptional biosecurity systems in place is maintained by the privately owned atoll of Nukutepipi, Tuamotu Islands, French Polynesia. The already stringent security is under frequent revision and improvement.

Examples provided by Richard Griffiths, Island Conservation. More details are available in the *Interstate Biosecurity Plan for the Islands of Kayangel State* (Gupta et al. 2018).³

¹ The type of media, who creates it, and when and how often it is used to disseminate invasive species management messaging should be clearly defined. For example:

- Erect signs at specified locations: created once
- Public radio announcements: once per month
- Brochure for island residents and visitors: created once
- Newsprint reminder: once per month
- Update or radio talk show: once per month
- Social media: post an update/reminder/meme monthly, at minimum

² Quarantine actions should be clearly planned, such as:

- Goods will be quarantined at:
 - a) specified location if cargo can get wet
 - b) specified location if cargo cannot get wet
- Goods will be quarantined for at least one night.
- A line of traps will be placed around the quarantined goods, baited with coconut and peanut butter and checked regularly.
- For boats with lots of cargo that cannot be moved during the day (cargo will remain on the boat overnight), a line of traps will be placed on the dock.
- The political leader shall in writing designate and approve a permanent quarantine area as a quarantine station in the defined area of responsibility.
- The Head of the Department of Natural Resources or equivalent may approve in writing a quarantine place other than the quarantine station under unusual circumstances for one quarantine disposal incident, but such temporary place shall immediately close and be restored as soon as the quarantine disposal is conducted.

³ Gupta A., Gibbons-Decherong L., Hall T., Ketebengang H., Griffiths R. (2018) *Interstate Biosecurity Plan for the Islands of Kayangel State*. Kayangel State Government, Kayangel, Palau.



Inter-island passengers in Tokelau prepare to load cargo. To avoid the transport of yellow crazy ants and other invasives between islands, these passengers need to understand the risks and prevention measures they can take before crossing the inter-island borders. Photo credit: Warren Butcher, Pacific Biosecurity.

How can we implement post-border biosecurity?

Early detection and rapid response

Prevention is always better than cure, but even the best biosecurity measures cannot stop all invasive species from entering. Early detection and rapid response (EDRR) is the best-proven way to find and eradicate invasive species in a specific location before they establish and spread. EDRR involves undertaking a set of processes that define the requirements to effectively respond to an invasive species threat as soon as possible after arrival.

The key to EDRR is to estimate which species are most likely to arrive and have all the tools in place just in case they do. This is a bit like an insurance policy: you hope you never need it but are prepared in case the worst situation arises.

Regular surveillance is needed for effective EDRR. Community engagement can increase the speed and effectiveness of EDRR.

SPREP has provided the Battler guide *Catch it early: Invasive Species Early Detection and Rapid Response* to support Pacific EDRR.

For invasive ants, you can find a guide to requirements for EDRR in the Pacific Invasive Ant Toolkit: <http://piat.org.nz/index.php?=-early-detection-and-rapid-response>

Site-specific modifications

Another approach to prevention of post-border establishment is site-specific preventive actions: modifications to the environment to prevent arrivals establishing. These actions can include removing the conditions that favour the establishment of an invader. For example, waste piles that are attractive to rats and ants can be removed and avoided in regular practice.

Ensuring a robust natural environment, for example, by restoring and increasing natural forest remnants, can provide a natural barrier to some invasive species. More information about restoring resilient ecosystems can be found in the Battler guide *Build resilient ecosystems and communities by managing invasive species in high-priority sites*.



Restoration can lower the chance invasion by some weeds that colonise disturbed habitats. Team working on Mt Vaea, Samoa. Photo: David Moverley, SPREP

How can we engage the community to prevent introductions?

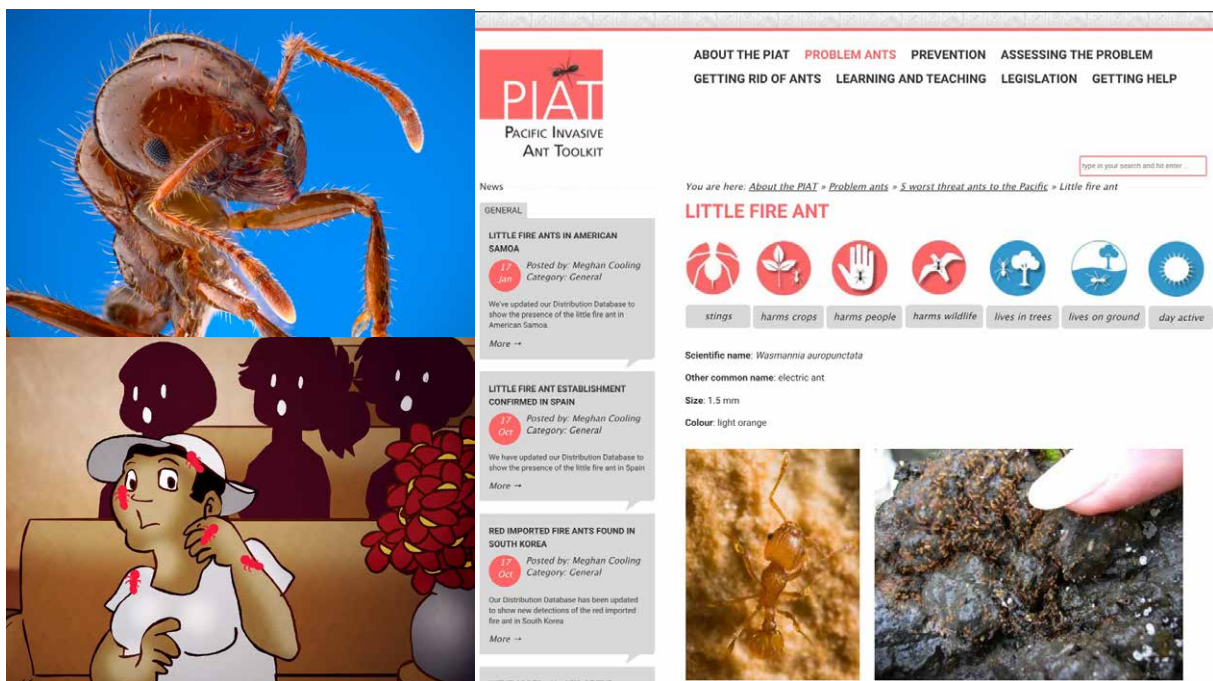
Left unchecked, invasive species threaten native ecosystems and natural areas. Spread by human activities, wind, birds, and water, invasive species can travel long distances to invade new areas. Invasive species can also create havoc in your backyard.

Educate yourself and others

Knowing the importance of native species and the threats that invasive species pose can help you make better decisions about plants you grow, weed out, eat, or share. Talking with your community and advocating for native ecosystems can reduce the cost of invasive species management for all. As an Invasive Species Battler, you can set an example. National environmental managers could partner with village councils to create local teaching resources.

Detect invasives early

Early detection is the most strategic and cost-effective form of invasive species management. When invasive species are detected early, control is more likely to be successful and control will cost less because infestations can be treated when they are less extensive. You can help with [early detection of invasive species](#) by knowing what to look for, where to look, when to look, and who to contact. You can share species that you find using free apps like iNaturalist.



Example outreach and training materials for little fire ant *Wasmannia auropunctata*, available at <http://piat.org.nz/>

Practice good “invasives hygiene”

When you are travelling, leaving a field site, plantation, or even after a walk, check your shoes and clothes for seeds. Washing or brushing off the soles of your shoes can help prevent the transport of weed seeds and pathogens. Seeds can be tiny, so all dirt is suspect and should be removed.

Cleaning and disinfecting field equipment should be part of standard operating procedures. This might include the tyres and other parts of vehicles used to access sites.

No untreated soil or gravel should be moved to the islands for construction or gardening: this prevents not only weeds but also serious threat species like the giant African snail *Achatina fulica* and ants. People must understand that ornamental plants cannot be brought to the island because our tropical environments are so hospitable to so many potential invasive plants. Food that could grow when discarded cannot be left on the island.

Checklists at borders can help you and others comply with biosecurity and assist in preventing invasions: see an example from New Zealand at www.doc.govt.nz/globalassets/documents/parks-and-recreation/plan-and-prepare/pest-free-island-biosecurity-checklist.pdf.

Value community

Everyone has a role to play in invasive species management.

In the traditional land management systems of the Pacific islands, the vested interests of the village council are an important factor supporting the management of invasive species and therefore supporting biosecurity efforts.

Use conversations and campaigns to prevent biosecurity violations, such as sneaking animal and plant products or seeds among islands. Use well-known pest disasters to promote biosecurity, such as the little fire ant which has clear impacts to biodiversity and also the welfare of local people, their pets and livestock.

Consider creating a Voluntary Code of Conduct in your local language to gain social buy-in. How should tourists or hikers in native forests conduct themselves? What do local plant nurseries and garden shops need to do? For example, the Council of Europe has a [series of voluntary codes of conduct and guidelines](#) for a number of industries and activities that might increase the risk of species invasion.

Become an ambassador for native species, many of which are central to traditional cultures.

Every action to stop the introduction of pests into your island will help prevent other disasters in the future.

“Remind people that individuals are not powerless – each citizen can combat invasives through their own decisions and behaviour. What plants they choose for their garden, what pets or animals they choose to keep and how they look after them, how they manage their land – all these are things each person can do responsibly.”
– Guidelines for invasive species planning and management on islands

Key Terms, Concepts and Acronyms

Biosecurity: Sometimes used to include all aspects of invasive species management, but in this document used in the more restricted sense of preventing the spread of invasive species across international or internal borders, including between islands.

International biosecurity prevents the movement of invasive species and diseases between Pacific nations and from entering the Pacific region from trade.

Inter-island biosecurity prevents the movement of invasive species and diseases between the islands of a territory, nation, or island group.

Within-island biosecurity prevents the spread of invasive species across an island such as the spread beyond a port to high-value conservation areas.

Biosecurity control points: Social or physical modifications to reduce the risk of incursion or spread of invasive species. These can occur at several points along the pathway.

Pre-export: changes to the storage and packaging of goods by suppliers; this includes shipping containers.

Pre-border: changes to ports and vessels that suppress common invasive species.

At the border: changes to practices when arriving at an island.

Post-border: detection and response plans when prevention has failed.

Biosecurity Card Tag: A record of a biosecurity check used in Kayangel, Palau for boats leaving a designated port. The card documents:

- Boat operator/ registration number.
- Number of people on the boat.
- Number of pieces of cargo.
- Container type (coolers, cardboard box, plastic containers, metal containers, wooden containers) with a “rodent-proof containers on every trip” reminder.
- Stopover points between departure.

- Signature of boat operator, time, and date + Signature of departure biosecurity officer, time, and date.

Biosecurity Officer: Usually a national role that has a major focus on agricultural pests that have an economic impact. This role often has enforcement capability.

Border: A defined boundary with potential control point for the movement of goods and people; often a national boundary but for inter-island biosecurity ‘border’ can refer to the body of water separating islands or the edge of a protected area. Biosecurity measures can be implemented on both sides of the border.

Clean Boats, Clean Ports: The inter-island biosecurity counterpart to the Shipping Container Hygiene System to maintain environments free of pests, especially ants, rats, and hull-fouling organisms.

Containment: Keeping an invasive species within a defined area.

Eradication: the removal of every individual of a species from the infested country, such that the only way the species could re-establish is to re-enter the country from another country. Eradication should be demonstrated by surveillance.

Incursion: single arrival event of an invasive species in a new environment. Typically, an incursion is identified at the time of first detection, which can be a long time after arrival.

Incursion response/rapid response: plan and process to deal with a newly detected incursion; created before the species arrives. Can be general or specific. Rapid response requires that everything is ready to go (training and supplies) before arrival, and active surveillance is happening.

Infestation: single discrete area where the invasive species is localised. An incursion consists of one or more infestations.

Invasive species: Introduced species that become destructive to the environment or human interests.

Native species: Plants, animals, and other organisms that occur naturally on an island or in a specified area, having either evolved there or arrived there without human intervention.

NISC: National Invasive Species Coordinator. This government role leads the planning and coordination of invasive species management actions within a country or territory. The biosecurity focus of this role is the ecological pests that threaten a country's biodiversity and ecosystem services.

NISSAP: National Invasive Species Strategy and Action Plan; see [Battler Guide](#)

NPPO: National Plant Protection Officer

Pacific Invasive Ant Toolkit (PIAT): online resource at <http://piat.org.nz/>

Pathway: the way in which a risk organism can be transported into the country.

Pest: a prion, virus, microbe, fungus, plant, or animal capable of causing adverse effects to a country's natural and introduced biodiversity.

PPPO: International Plant Protection Organisation

PRISMSS: Pacific Regional Invasive Species Management Support Service.

Quarantine: legal restrictions imposed on an area, animal, place, vehicle, or other item that limit movement for a prescribed period.

Region: When the term is not otherwise qualified, 'region' always refers to the Pacific Ocean with specific reference to the island states and territories members of SPC and SPREP.

Risk: chance of something happening that will have an impact; measured in terms of likelihood and consequences.

SPC: Pacific Community; www.spc.int

SPREP: Secretariat of the Pacific Regional Environment Programme, www.sprep.org

Surveillance: a systematic programme targeted to find and identify a particular new pest.

Active surveillance: a planned process targeted to find and identify a particular new pest.

Passive surveillance: The detection of exotic species through unplanned observations by the general public, farmers, gardeners, and others. Requires awareness to be effective.

Vector: the object that moves an invasive species from one place to another. This may be a vehicle (car, truck, or boat), a commodity (like bananas, taro, or breadfruit), or other method of movement.



For more information

To find out more about managing invasive species in the Pacific, please contact the [Pacific Regional Invasive Species Management Support Service \(PRISMSS\)](#).

Species lists and risk assessments are available from the Pacific Islands Ecosystems at Risk (PIER) project, Institute of Pacific Islands Forestry: <http://www.hear.org/pier/>

As Secretariat of the Pacific Plant Protection Organisation (PPPO), Pacific Community (SPC) hosts the Regional Biosecurity Operating Procedures site at <http://bif.lrd.spc.int/>

The SPC Land Resources Division hosts Biosecurity and Trade resources, including pest databases, at <https://lrd.spc.int/focus-areas/biosecurity-and-trade>

The Pacific Invasive Ant toolkit has an extensive section on biosecurity and the prevention of invasive ant problems at <http://piat.org.nz/index.php?page=preventing-ant-problems>

The Secretariat of the Pacific Regional Environment Programme has created several Pacific Invasive Species Battler guides relevant to biosecurity, including:

- [Find answers online to common invasive species questions](#)
- [Share Pacific invasive species data using the Global Biodiversity Information Facility \(GBIF\)](#)
- [Use economic analysis to battle invasive species](#)
- [Catch it early: Invasive species early detection and rapid response](#)

The complete Pacific Invasive Species Battler series is available from the Battler Resource Base through the Pacific Invasives Learning Network: <https://piln.sprep.org/>

Public domain design files regarding ant invasions are available that can be adapted to local languages:

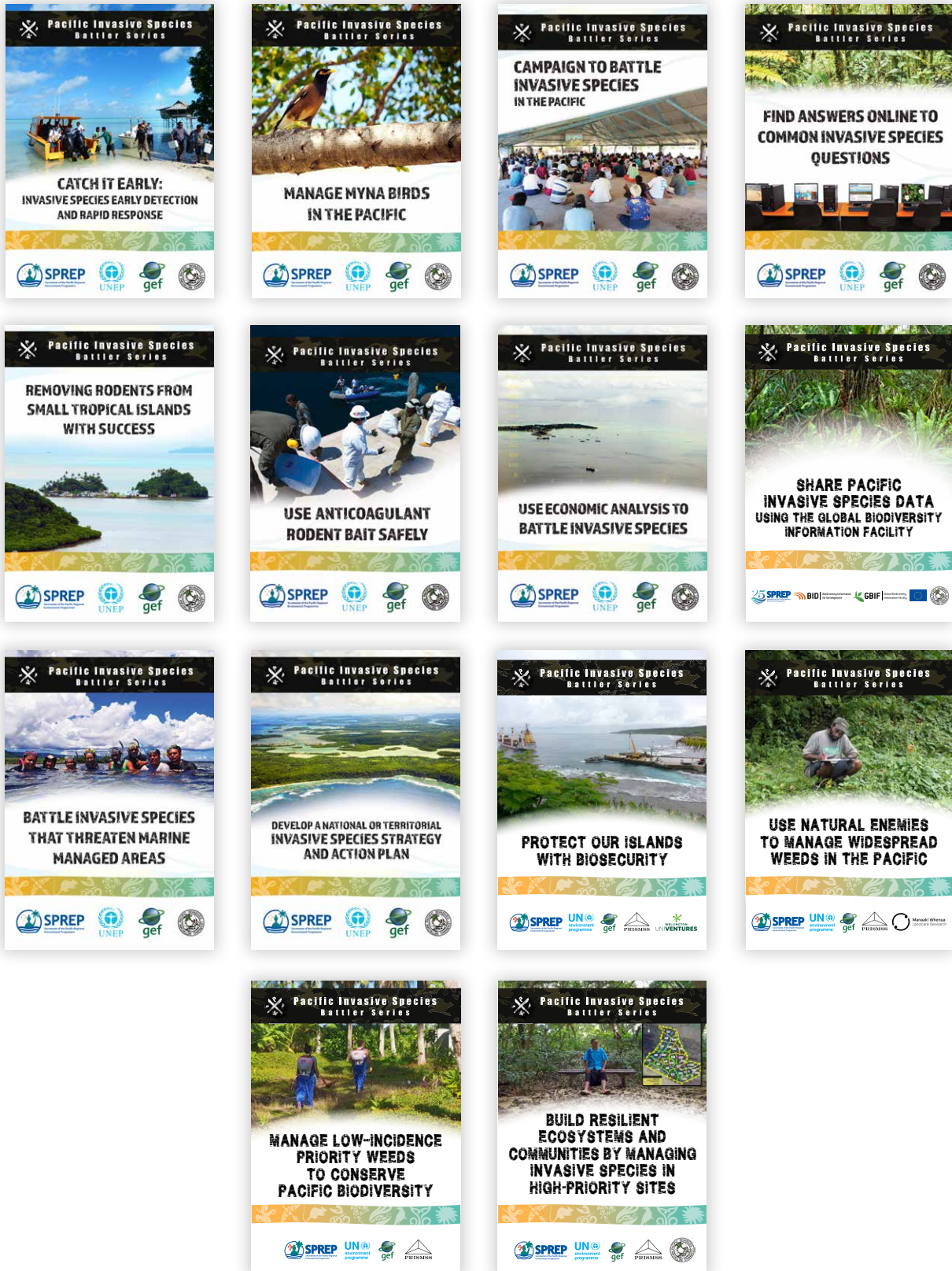
- <http://piat.org.nz/index.php?page=ways-to-help-prevent-invasive-ants>
- <http://piat.org.nz/index.php?page=piat-posters>

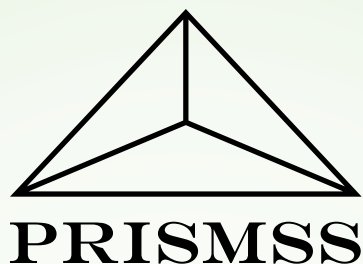
The [Guidelines for invasive species planning and management on islands](#) outline actions for national and international invasive species managers.



Pacific Invasive Species Battler Series

For the complete series and other resources to assist Pacific island invasive species practitioners in their battle against invasive species, please see <https://piln.sprep.org/>





Pacific Regional Invasive Species Management Support Service (PRISMSS)

PRISMSS is a collaboration of leading organisations supporting invasive species management for biodiversity protection in the Pacific.

Background

Invasive species are the leading driver of biodiversity loss in the Pacific. They have a significant impact on ecosystem resilience leading to a loss of production in ecosystem services and a reduced ability to adapt to climate change. Regional tracking of Pacific island countries and territories has identified major gaps both in scope and volume of “management action” underway.

Rationale

The PRISMSS is a coordinating mechanism designed to facilitate the scaling up of operational management of invasive species in the Pacific. PRISMSS brings together experts to provide support within the Pacific region with a focus on protection of indigenous biodiversity and ecosystem function. The intention is to provide a comprehensive suite of support services in a cohesive, effective, efficient, and accessible manner to Pacific island countries and territories. The goal is to reduce the ecological and socio-economic impact of invasive species on ecosystems through the management or eradication of prioritised species and the protection of valued sites.

PRISMSS currently provides technical support across five regional programmes for the Pacific region.

For more, please contact prismss@sprep.org







Join the Fight

Protect our islands from invasive species



Håfa Adâi

Aloha

Mogetin

Rahn Anim

Iokwe

Alii

Kaselehlie Len Wo

Mauri

Ekawomir Omo

Mālō te ma'uli

Halo

Tālofa nī

Halo

Tālofa

Halo

Tālofa

Ni sa Bula Fakaalofa lahi atu

Bonjour

Mālō e lelei

Kia Orana

Ia Orana
Bonjour

Hello

Kia Ora

