## Environmental invasive species

**Indicator Definition**

Invasive species are a huge threat to island biodiversity economic and resource sustainability, human health and the provision of ecosystem services (GoN SOE 1993; NISSAP 2015: 5). Invasive animals such as pigs, rodents, cats and yellow crazy ants predate on native birds, coconut and other land and marine crabs, reptiles, insects and other species including the seeds and seedlings of forest plants essential for forest regeneration and impact the health of ecosystems. (Powleslands 2004). Invasive weeds outcompete native plants and restrict the regeneration of forests, particularly following natural disasters. Food crops are impacted by fruit flies, pigs and rodents. Rodents, cats and other invasive mammalian species also support higher densities of *Aedes spp.* mosquitoes (Nigro e tal., 2017) raising the risk of diseases such as dengue fever, chikungunya and the zika virus. Under the Convention on Biological Diversity (CBD), Parties have agreed to meet the Aichi target 9: “By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated and measures are in place to manage pathways to prevent their introduction and establishment”. The Guidelines for Invasive Species Management in the Pacific (SPREP, 2009) provides a comprehensive framework of thematic areas, on which to base a robust programme to meet the Aichi target 9. Pacific Island Countries and Territories use a National Invasive Species Strategy and Action Plan (NISSAP) to determine national priorities for invasive species management. This indicator assesses the number of introduced environmental species and their impact on the environment, especially on people’s plantations.

**Status and Key Findings**

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| **SDG** | **CBD** | **Status & Trend** |
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|  | Environment and Climate Change Pillar [NNSP 2016-2026]  **Biodiversity**: Protecting biodiversity, maintaining sufficient remaining habitats and ecosystems to support the population of all species and their genetic diversity |

The Global Register of Introduced and Invasive Species (GRIIS) lists 367 verified records of introduced species that have been recorded on Niue. In addition, nine species have been recorded on Niue of which their origin is uncertain.

Niue has identified eighteen priority invasive species with their NISSAP of which eleven have a current management programme.

Feral and semi-domesticated cats (Figure 72) and the two rat species have a significant impact on the population of birds, reptiles and crabs. Trapping studies by Powlesland (2004) found that the two rat species (Ship and Pacific rats) are distributed in plantations and modified habitats, but only the Ship rat is found in primary forest. These rats are implicated in the decline of the hega (blue-crowned lorikeet) and the olive small-scaled skink (Atkinson 1985; Powlesland *et al.* 2000; Powlesland *et al.* 2004). The rats are also known to predate on the seeds and seedlings of trees, and therefore can severely impact the structure of the forest and its ability to regenerate.



Figure 72. Abandoned domesticated cats quickly become invasive predators. Photo: P. Skelton

Feral pigs can devastate plantations by eating crops, or uprooting crops through their digging and foraging behaviour. The 2011 census found that feral pigs targeted established plantations (e.g. plantations at 9 months old – 40% were impacted), more than recently established plantations (3-6 months old, about 20% impacted). Plantations from all over the island were affected with Hikutavake, Lakepa, Liku and Alofi North and South being the most impacted.

Invasive plants are outcompeting native species as well as compromising the quality of forest and vegetated areas. Climate change impacts including those associated with droughts, wildfires and cyclones have been shown to help facilitate the explosion and expansion of many of the invasive plants (Space *et al.* 2004). Efforts to control them at about 40 sites have been successful but there is a need to eradicate them, as the risk of them spreading into new sites is very high (NISSAP 2015). The invasive plants of concern include the Taro vine (*Epipremmnum pinnatum* cv. aureum) (Figure 73), (Wedelia or the Singapore daisy (*Sphagneticola trilobata*), the giant sensitive weed (*Mimosa diplotrica*), the chain-of-love (*Antigonon leptopus*), the Honolulu rose (*Clerodendrum chinense*) and the firework tree (*Clerodendrum quadiloculare*). Lantana was a concern, but the introduction of a biological control agent from Fiji has managed to contain this invasive plant.



Figure 73. The taro vine is a serious invader, often smothers trees. Photo: P. Skelton

The ornamental trade is an area of concern for Niue, given that many of the invasive plants are introduced through this sector (e.g. fireworks tree, chain-of-love, centipede vine and the Singapore daisy). Biosecurity measures and a stringent risk assessment processes must be mandatory to avoid current challenges being repeated in the future. This was a recommendation in Niue’s State of Environment report in 1993, which stated that care must be taken when introducing exotic animal species to coastal waters, and that proper risk assessment should be undertaken prior to the introduction of any new species.

Table 33. Number of invasive and potentially invasive species in selected PICTs. (Source: SOCO 2015).

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| **Country** | **Invasive** | **Potentially Invasive** | **Total** |
| American Samoa | 40 | 156 | 196 |
| Cook Islands | 161 | 59 | 220 |
| Federated States of Micronesia | 22 | 385 | 407 |
| Fiji | 33 | 497 | 530 |
| French Polynesia | 201 | 253 | 454 |
| Guam | 40 | 447 | 487 |
| Kiribati | 42 | 158 | 200 |
| Marshall Islands | 66 | 238 | 304 |
| Nauru | 23 | 261 | 284 |
| New Caledonia | 9 | 462 | 471 |
| Niue | 46 | 287 | 333 |
| Northern Mariana Islands | 26 | 92 | 118 |
| Palau | 61 | 370 | 431 |
| Papua New Guinea | 17 | 385 | 402 |
| Samoa | 56 | 328 | 384 |
| Solomon Islands | 25 | 316 | 341 |
| Tokelau | 3 | 39 | 42 |
| Tonga | 39 | 378 | 417 |
| Tuvalu | 2 | 73 | 75 |
| Vanuatu | 23 | 172 | 195 |
| Wallis & Futuna | 31 | 225 | 256 |

Impacts

If left unattended, invasive species will continue to thrive and expand until a critical point is reached, due to habitat and food availability. Littered along this destructive path are species extinctions, loss of ecosystem services, impact to culture and traditional practices, and a highly compromised island environment.

The overall trend of invasive species and their impact on Niue’s environment is mixed with some positive results in terms of containment and long-term control on some invasive plants (NISSAP 2015). Priority invasive species have been identified through Niue’s Invasive Species Strategic Action Plan, and management actions have been proposed (see Annex 2).

Since the 1993 SOE, 13 new invasive plants have been documented (Whistler 1997; Space & Flynn 2000; Space *et al.* 2004; NISSAP 2015), representing about two introductions per year. The fact that all of these are still present today may indicate the need to implement a rapid response plan to ensure that any invasive plant is not given the opportunity to establish and spread.

Some inroads to managing invasive plants are noted, and this is attributed to the introduction of biological control agents. Serious invasive plants, such as the giant sensitive weed and Lantana, are now considered controlled due to the introduction of these agents. Other invasive plants may need the introduction of biocontrols if eradication is not considered feasible.

Following Cyclone Heta in 2004, many of the invasive plants were noted as increasing in their population and areas being infested, especially *Mikania micrantha* (mile-a-minute), *Passiflora foetida* (wild passionfruit) and *Leucaena leucocephala.* (Space *et al.* 2004)

The harmful impacts caused by invasive species are well documented in many Pacific countries. For example, the extinction of many native bird species in Guam due to the introduction of the Brown Tree Snake during World War 2 (Amand, 2000). Another example is the economic hardship in Samoa due to a fungal disease, that wiped out all of Samoa’s taros (Moorhead, 2011). The extinction of many native snails due to the introduction of the Papua New Guinea flatworm (*Platydemus manokwari*) (Cowie & Robinson 2003) is another reminder of how introduced invasive species can cause significant harm to island biodiversity. The impact caused by invasive species may be direct, such as predation of birds, or indirect, such as forest regeneration restricted due to lack of seed dispersers (no birds). Unfortunately, other threats can accelerate the impact of invasive species, such as a cyclone opening the rainforest canopy allowing fast growing invasive trees to colonise.



Figure 74. Feral pigs often invade plantations causing serious loss to the farmers. Photo: H. Tongatule

**Response and Recommendations**

The high priority placed by the government to address invasive species is evident through the endorsement of Niue’s National Invasive Species Strategy & Action Plan. This provides hope for the future of biodiversity and human wellbeing in the country. Invasive species are a priority issue for the Government. A number of response mechanisms have been put in place to help combat the adverse impacts of invasive species. This response is attributed in part to regional and global initiatives, highlighting the destructive impacts of invasive species, which will continue to grow in scale due to the increased movement of people and goods around the world, development and climate change. The best means of managing invasive species is to prevent the introduction in the first instance. Therefore, having biosecurity measures at ports is a start. Engaging communities, including the tourism industry, will also assist in minimising the bringing into the country of unwanted pests.

The current documented number of invasive species in Niue is 46 species, with another 287 that are potentially invasive. There are at least another 16 species that have been introduced, but have not shown any invasive traits.

Insert NISSAP cover

Managing invasive species requires a risk assessment to identify vulnerable points where actions can be taken to minimise the introduction of any unwanted species. This means identifying pathways including air and sea ports, and visiting yachts, and putting in place strict quarantine or biosecurity measures.

Figure 75. NISSAP

The key agency responsible for leading the coordination of managing invasive species is the Department of Environment. Other agencies including the Plant Protection and Quarantine Division of the Department of Agriculture, Forestry and Fisheries are also responsible for the protection of Niue from the introduction of invasive species. These agencies collaborate under a national invasive species committee, with their main focus on coordination and sharing of information to strengthen each agency’s work. The development and endorsement of the National Invasive Species Strategic Action Plan (NISSAP) in 2015 provides an overall framework for this national committee. There are recently passed laws (Environmental Act 2015 and the Biosecurity Act 2016) that will enhance the protection of Niue’s environment, economy and community wellbeing.

Additional actions include:

* Border Control and Quarantine
* Control of pest insects
* Control of pest plants
* Feral pig control
* Education and awareness