SAMOA
NATIONAL INVASIVE SPECIES STRATEGY AND ACTION PLAN (NISSAP)

2019-2024






DIVISION OF ENVIRONMENT

DIVISION OF ENVIRONMENT AND CONSERVATION

MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT

FA'AVAE I LE ATUA SAMOA

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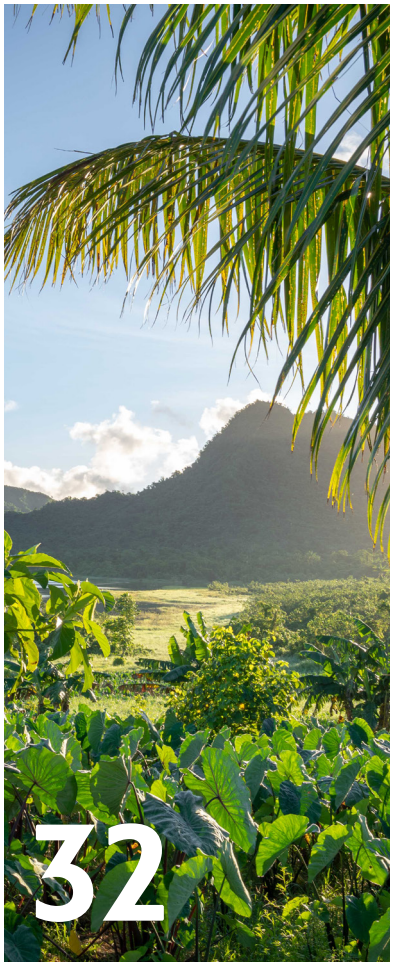
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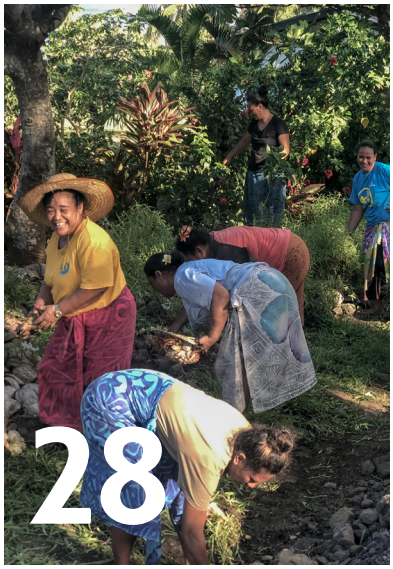
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FOREWORD

The development of this revised NISSAP signifies Samoa's commitment to safeguarding its natural resources and economic development from the overwhelming threats and devastating impacts of invasive species. The globalization of trade networks have increased the rate of invasive species substantially over the past 200 years, with the impacts of IAS forecasted to increase with time due to unprecedented global climate change. While past efforts have addressed the issue at face value, there is still more work that needs to be done on the ground.

The Samoa National Invasive Species Strategy and Action Plan 2019-2024 is the culmination of the works led by the Division of Environment and Conservation of the Ministry of Natural Resources and Environment and its partners to review the status of Invasive Species Work in Samoa and to navigate opportunities and lay out priority actions to improve management actions to minimize the impacts of invasive species on Samoa's economy, socio-cultural welfares and natural environment.

The NISSAP highlights work in the past that includes the establishment of the Samoa National Invasive Species Task Team charged with coordinating the national multi-sectoral work to combat invasive species. It further acknowledges the work that the various government institutions, non-government organisations and our development partners have contributed to address invasive species management at the local, national and international level.

Based on the review and assessment of the past work, and noting past limitations experienced with implementation, the new NISSAP focuses on;

- strengthening the infrastructure and legal frameworks,
- up-scaling local knowledge on invasive species management,
- strengthening the coordination and collaboration with relevant agencies and institutions working on invasive species,
- building human and resource capacity of the institutions implementing invasive species-related programs, and
- improving access to financial resources.

It is anticipated that this important plan of actions will generate and enable the political and financial support it requires for the effective implementation of invasive species management for the benefit of the government and people of Samoa.

Hon. Fiame Naomi Mataafa
Minister of Natural Resources and Environment

EXECUTIVE SUMMARY

The NISSAP 2019-2024 is an updated version of the initial NISAP 2008-2011, developed in alignment with the key actions identified in the Samoa National Biodiversity Strategy and Action Plan 2015-2020; the key actions provide the framework for conservation works and sustainable management of biological resources in Samoa. The NBSAP is the principal instrument for implementing the Convention on Biological Diversity and its adopted Aichi Biodiversity Target set for all Parties to the CBD. All the 20 Aichi Targets have been adopted and integrated into Samoa's NBSAP, with Aichi Target 9 setting the motion for invasive species works, noting *"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."*

Samoa has been involved with the management of invasive species prior to the establishment of the first National Invasive Species Action Plan (NISAP 2008-2011), however, the response to accidental introductions such as the African snail, mint weed and a few others was that of a reactive approach. The Ministry of Agriculture and Fisheries has had a long involvement through the Quarantine's border control and with the Integrated Pest Management program for pests associated with agriculture and animal protection. Since the NISAP 2008-2011, many of the actions identified in the plan have been implemented through the Samoa National Invasives Task Team (SNITT), a technical group of local practitioners and experts from various agencies, institutions and organisations responsible for the coordination and implementation of invasive species management in Samoa. The completion of the Samoa Invasive Species Emergency Response Plan (SISERP) was a significant milestone on setting the platform for addressing border control and biosecurity issues as well as the eradication of accidental or unintentional introduction of species such as cane frogs and mongoose. Contemporary actions have been taken on the eradication of rats from the Nuutele Island, water lettuce at Satitoa and rattan palm at Papase'ea. Control programs were carried out at the national level on the more prevalent invasive species like mynas, merremia vines, water lettuce, rhinocerous beetle, and fruit flies. These programs are ongoing and require a significant amount of resources and time for sustain ability.

The NISSAP 2019-2024 was developed over a 9-month period from October 2018 to June 2019. A consultant was recruited by the Department of Environment and Conservation to work in conjunction with the SNITT and carry out consultations and workshops with relevant stakeholders to review and assess the status of preceding invasive species activities in Samoa with DEC engaging a consultant to work with the DEC, the SNITT and wider stakeholders through consultations, workshops and reviews to assess the past work on invasive species, and prepare the new NISSAP.

The strategy for the NISSAP framework is based on the Regional Invasive species guidelines developed through SPREP and Pacific Islands with 3 thematic areas being

1. Foundations,
2. Prioritization and Decision-making and
3. Management Actions.

The three thematic areas set the basis for the development of strategies and objectives, and were further conceptualized into specific actions. A monitoring matrix was determined to guide the implementation and monitoring of action over the next five years. The Action Plan therefore highlights the need to;

1. Strengthen the frameworks for coordination and collaboration amongst the respective agencies and organizations
2. Improve and strengthen the technical capability of agencies to assess and undertake relevant actions to address invasive species
3. Improve baseline and collection of information for decision-making, and
4. Implement management actions on the border control, eradication of priority species and controlling of prevalent species that constrain Samoa's economy and natural environment.

The NISSAP 2019-2024 leans towards strengthening of coordination and collaboration between the relevant agencies, and building institutional and technical capacity to help enable the effective implementation of identified actions.

ACKNOWLEDGEMENT - The development of the NISSAP 2019-204 would not have been possible without the support and assistance provided by various stakeholders such as the MAF, MNRE, SCS, etc.






GLOSSARY

Biocontrol or biological control: is a method of reducing or eliminating the impact or damage caused by a target pest or weed using a bio-control agent, usually a predator, herbivore or pathogen.

Biological Diversity (Biodiversity): The variability among living organisms from all sources including inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (Convention on Biological Diversity). Components include:

- **Ecological (ecosystem) Diversity:** The variety of ecosystem types (for example, forests, deserts, grasslands, streams, lakes, wetlands and oceans) and their biological communities that interact with one another and their non-living environments.
- **Genetic Diversity:** The variability in the genetic makeup among individuals within a single species. In more technical terms, it is the genetic differences among populations of a single species and those among individuals within a population.
- **Species Diversity:** The variety of species – whether wild or domesticated – within a geographical area. A species is a group of organisms which have evolved distinct inheritable features and occupy a unique geographic area. Species are usually unable to interbreed naturally with other species due to such factors as genetic divergence, different behavior and biological needs, and separate geographic location.

Biosafety: The policies and actions taken to manage risks from the intentional introduction of new organisms, including genetically modified organisms, which could adversely affect biodiversity, people or the environment.

Biosecurity: The protection of people and natural resources, including biodiversity, from unwanted organisms capable of causing harm.

Border Control: The policies and actions taken to prevent the accidental or illegal introduction of unwanted organisms across national borders. Border control includes re-import pest control, certification, inspection and surveillance, and emergency responses.

Conservation: The prevention and protection of natural and historic resources for the purpose of maintaining their intrinsic values, providing for their appreciation and recreational enjoyment by the public, and safeguarding the options of future generations.

Control: Suppression, containment of an invasive species from an area.

Eradication: Elimination of an entire population of alien invasive species from an area,

Introduced species: Plants, animals and other organisms taken beyond their natural range by people, deliberately or unintentionally.












Native Invasive Species: Native Invasive Species are those that proliferate and become destructive following environmental changes caused by human activities or natural events.

Native Species: A plant or animal species that occurs naturally in Samoa. A synonym is "indigenous"

Protected Area: A geographically defined area that is protected primarily for nature conservation purposes or to maintain biodiversity values, using any of a range of legal mechanisms that provide long term security of either tenure or land use purpose. It may be either publicly or privately owned.

Species: A group of organisms, sharing common features (similar phenotype) and being isolated from other groups in terms of reproduction.

Surveillance: An official process which collects and records data on pest occurrence or absence by survey, monitoring or other procedures.






ACRONYMS

ABT ..... Aichi Biodiversity Target
APHD ..... Animal Protection and Health Division
CBD ..... Convention on Biological Diversity
DEC ..... Division of Environment and Conservation
GEF ..... Global Environment Fund
GMO ..... Genetically Modified Organisms
IAS ..... Invasive Alien Species
IPC ..... Invasive Pest Control
ISU ..... Invasive Species Unit
LFA ..... Little Fire Ant
MAF ..... Ministry of Agriculture and Fisheries
MNRE ..... Ministry of Natural Resources and Environment
MWCSD ..... Ministry of Women, Community and Social Development
NBSAP ..... National Biodiversity Strategy and Action Plan
NESP ..... National Environment Sector Plan
NISAP ..... National Invasive Species Action Plan
NISSAP ..... National Invasive Species Strategy and Action Plan
NUS ..... National University of Samoa
PIP ..... Pacific Invasive Partnership
PRISMSS ..... Pacific Regional Invasive Species Management Support Service
SDS ..... Strategy for the Development of Samoa
SISERP ..... Samoa Invasive Species Emergency Response Plan
SMSMCL ..... Strengthening Multi Sectoral Management of Critical Landscape
SNITT ..... Samoa National Invasive Task Team
SPREP ..... Secretariat of the Pacific Regional Environment Program
SROS ..... Scientific Research Organisation of Samoa
UNDP ..... United Nations Development Programme
USP ..... University of the South Pacific
WRD ..... Water Resources Division

1. INTRODUCTION

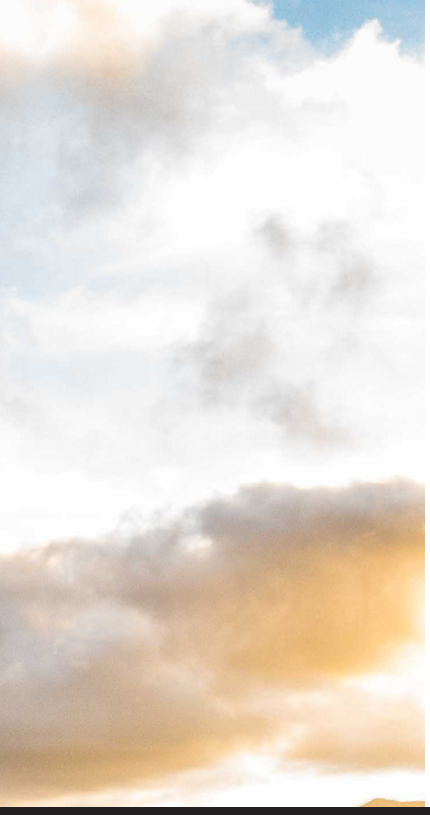
In this evolving world and its changing environment, the ecological balance becomes even more fragile when new species are introduced into different environments through human interventions or natural events, often resulting in some positive changes, but in some instances, the new species become invasive impacting negatively on the environment. The presence of invasive alien plants significantly threatens the structure, function and productivity of natural ecosystems, and are generally associated with declines in diversity and fitness of resident biota To prevent and minimize the negative impacts of invasive species, countries must plan actions to address them, which for Samoa, is the essence for developing the Samoa NISSAP.

The Samoa NISSAP is part of Samoa's national commitment and obligation to the implementation of the Convention on Biological Diversity (CBD) Article 8/h that states: "Each contracting Party shall, as far as possible and as appropriate: Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats, or species."

In efforts to provide guidance for the Parties on addressing alien invasive species, the CBD COP Decisions: UNEP/CBD/COP/6/20: resolute "the need to strengthen national capacities and international collaboration through the development of (a) National invasive alien species strategies and action plans"

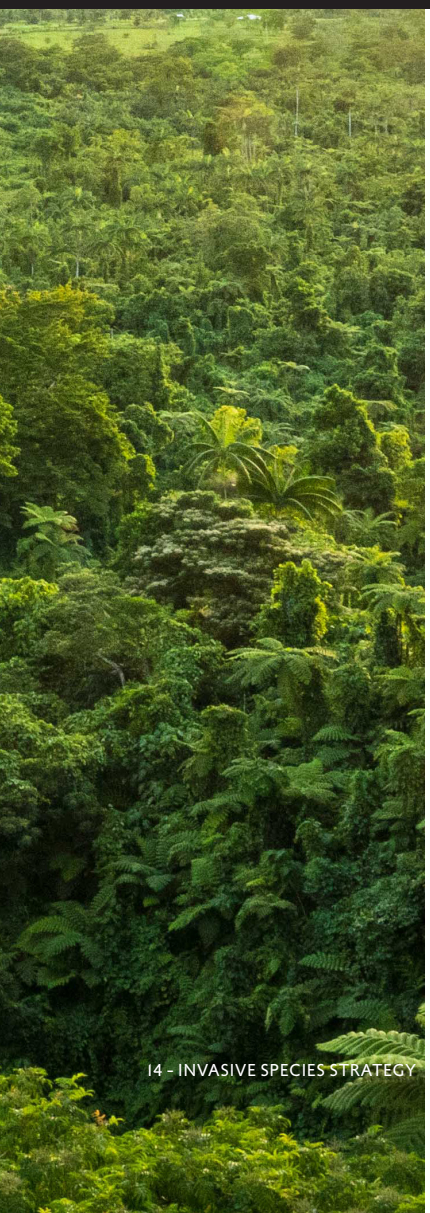
In setting the targets for the implementation of the CBD, the Aichi Biodiversity Target concerning invasive species management has been adopted and blended in the Samoa NBSAP Target 9 which states "By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment".

Funding for the preparation of the NISSAP was made possible through the GEF-UNDP funded project for Strengthening Multi-Sectoral Management of Critical Landscape (SMSMCL).



2. INVASIVE SPECIES

2.1. WHAT ARE INVASIVE SPECIES



Invasive species are species introduced into an area in which they do not occur naturally, usually as a result of human activities, and which threaten environmental or economic resources, or human health, due to the damage they cause, or are likely to cause.

Invasive species addressed in this action plan include plants, animals, diseases and parasites within marine (including ballast water and sessile species), freshwater and terrestrial environments.

Native Invasive Species are those that proliferate and become destructive following environmental changes caused by human activities or natural events.

Genetically Modified Organisms (GMO's) are identified as potential invasive species in the NBSAP, however they are not addressed in this action plan. They will be addressed when new information comes in.

2.2. INVASION PATHWAYS

New species may enter Samoa through different types of 'invasion pathway'. Natural pathways include wind, ocean currents and using of morphological (e.g. flight) or behavioural (e.g. population budding by some ant species) dispersal mechanisms. However, with increasing global mobilisation and trade, humans are now believed to be the key vector for new invasions.

There are two major categories of human-related pathways;

Accidental introductions – species introduced unintentionally, such as in ships ballast water, or their hulls, on people's clothing and luggage, or as contaminants on equipment and in imports. For example, the giant African snail arrived in Samoa via ship cargo and has since spread across both Upolu and Savaii. The pathways that have the greatest potential for accidental introductions to Samoa are the sea and air links.

Intentional introductions – species introduced deliberately for the purpose of agriculture, fisheries and forestry production, or as garden plants, pets, or biological controls. For example, the common myna bird, Acridotheres tristis, was introduced to control ticks on cattle and is now itself an invasive species.

2.3. INVASIVE SPECIES MANAGEMENT

Invasive species management in the holistic sense is a complement of various methods and/or techniques which are aimed at the prevention/exclusion; containment; control/suppression; mitigation; and removal/eradication of a target species from a designated area. Each technique and or method used achieves a different level of impact reduction and requires various degrees of skill, technology, resources (both human and capital) and commitment and is specific to each target species and prevailing environmental circumstances.

There are four basic management strategies to deal with problematic invasive species:

1. prevention;
2. early detection;
3. eradication and/or
4. control.

Prevention of introductions is the most ideal and cost-effective option as "prevention is better than cure". There are three major methods by which to prevent species invasions:

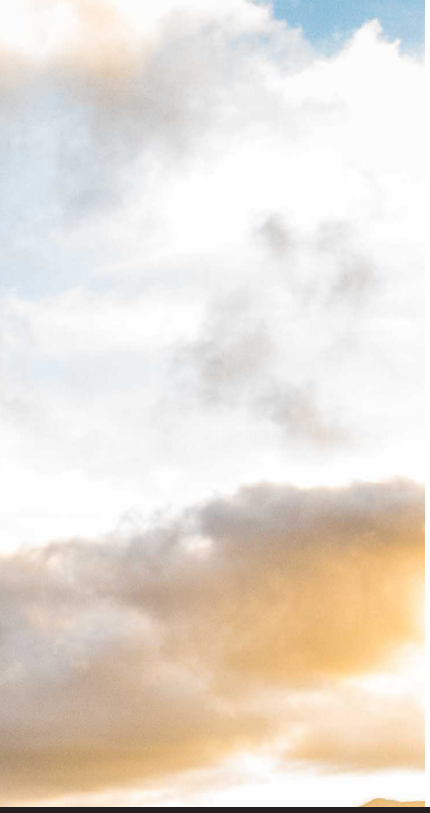
a. interception based on regulations enforced with inspections and fees;
b. treatment of material suspected to be contaminated with invasive species and
c. prohibition of certain commodities in accordance with international regulations.

Early detection of potential invaders is usually critical in determining whether eradication is feasible. Early detection involves surveys of the species of concern or a site where the species is thought to be found. Since the prospect of early eradication or at least containment of the invasive species is much cheaper than later control or eradication once the species has spread widely, investment in early detection is essential..

When prevention has failed, the next preferred management option is eradication. However, a very careful assessment of the costs and likelihood of success must be made and enough resources mobilised before eradication is attempted. Eradication often requires very significant resources and the employment of many different methods at once but is preferred over control as costs are not ongoing after eradication is completed. Eradication has most successfully been applied to vertebrate pests (such as rats, pigs and goats), rather than plants or invertebrates which tend to be very hard to eradicate, except in relatively small areas.

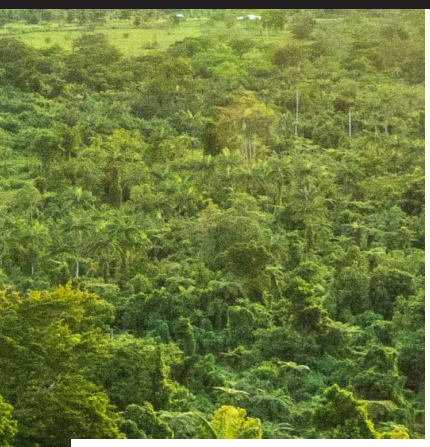
The final step in the sequence of management options is the control of invasive species when eradication is not feasible. The purpose of control is to reduce the density and abundance of invasive organisms to below an acceptable threshold. Over the long run control can be very costly because by its nature it must be continued indefinitely unless populations of the pest are reduced to a level where eradication becomes feasible.

Invasive species control uses many of the same techniques as eradication such as mechanical (e.g. pulling weeds), chemical (e.g. using toxic baits against vertebrates or poisons against plants), habitat management (e.g. sanitation, habitat removal, barriers, grazing, flooding and prescribed burning) and prescribed hunting of invasive vertebrates. Biological control can be another very cost-effective measure but careful assessment of the environmental impacts of bio-control agents is necessary before introduction. With eradication, the integration of several control methods often provides the most effective management strategy.



3. INVASIVE SPECIES IN SAMOA

3.1. SAMOA'S FLORA AND FAUNA



Samoa's natural environment has been exposed to introduction of new species from the very beginning of its existence. All of what now constitutes native flora and fauna were once introduced through natural pathways. Some of the species had since evolved into endemic ones found only in Samoa while others had co-existed into a natural equilibrium.

Other species were introduced through human-made pathways initially by the Samoans, and later by the spread of global migration and now trade. As noted in Table I: there has been many introduced species into Samoa, some of these have not caused many problems within the natural environment while others have become invasive. Additionally, some of the native species due to changes in the environment have become invasive.

Table 1:Samoa's Flora and Fauna

Life Form	Native Species	Introduced Species	Percent of all Species Introduced	Percent of Native Species Threatene
Flowering Plants	540	~500	48%	~25%
Land Birds	33	4	11%	42%
Land Mammals	3	13	81%	67%
Ants	30	7	19%	?
Reptiles	4	11	73%	100%
Land Snails	64	14	18%	20%?

Source: /James Atherton 2008

3.2.INVASIVE SPECIES IMPACTS IN SAMOA

The impacts of invasive species have been extensive and costly financially, ecologically and culturally. Impacts range from adversely affecting the productivity and subsequent economic output of primary industry such as agriculture, forestry and fisheries, as well as threatening the integrity and biodiversity of natural ecosystems, including vital ecosystem processes.

Some examples of the invasive species and their impact on Samoa

NATIVE INVASIVE SPECIES:

- **Merremia peltata** (fue lautetele) Although a native species, this vine has spread and become abundant and problematic in many areas due to forest disturbance. A notoriously aggressive vine species is widespread and causing significant damage around Samoa. Perhaps 50% of the remaining lowland native forest is now dominated by Merremia vines. Although the economic costs have not been quantified, the impacts of the vine via the rapid colonisation of disturbed sites, inhibiting the growth of crops and the regeneration of native vegetation (including secondary forest growth) following forestry operations and other disturbance events, is clearly visible and affecting the natural regeneration of forests.

- **Crown of Thorns Alamea.** A marine invasive during outbreaks usually associated with varying environmental conditions

ALIEN INVASIVE SPECIES

Intentional Introductions

- **Albizia chinensis** (tamaligi uliuli, tamaligi ena'ena Chinese Albizia, silk tree) **Falcateria moluccana** (tamaligi paepae, Moluccca Albizia) were introduced as nitrogen-fixing trees around (what year). These species are widespread and have now for the most part, dominated forests ecosystems, especially in the uplands. The species is known to have a wide crown cover range, that drives native species decline due to their high

- Two rubber trees, **Castilla elastica** (pulu mamoe, Panama rubber tree) and **Funtumia elastica** (pulu vao, African rubber tree), were introduced as trials for a commercial rubber industry sometimes between 1920 and 1930. The trees are native to South America, and Africa respectively. This is now so common throughout the country especially along the watershed and mountain ridges and in close forest areas.

- **Cordia alliodora** (kotia, Ecuador laurel, salmwood) was introduced to Samoa as a forestry tree. It is spreading where it is present in Samoa and will, over time, undoubtedly become a major component of Samoa's forests. This species was found to be common along south Savaii in the Salega district compared to other parts of the country. The most common action is to cut them down during replanting with native vegetation or when clearing for plantations.

- **Myna species** (Acridotheres tristis, A. fuscus) introduced as a biological control for cattle lice has become a pest not only for native birds but also in open areas and human settlements.

- **Capra hircus** (Feral goat) some of the goats that escape for the farms in Savaii have made it into the forest and can cause extensive impact to the forest

3.3. HIGH RISK INVASIVE SPECIES

Accidental introductions

- **Spathodea campanulata** (African tulip tree) is common as an ornamental tree. Large trees do not stand up well to wind. This was common throughout the country and mostly around open areas. The main eradication action is to cut the trees where they are found.

- **Anoplolepis gracilipes** (yellow crazy ant) a notorious invasive species is now prevalent in Samoa.

- **Taro leaf** blight not only devastated Samoa's staple food source, but also decimated farmers' incomes from local and overseas markets. Taro production in Samoa dropped by over 95% (Chan, 1995), and the export value fell from $US 3.2 million in 1993 to only $US 53,000 one year later (IPGRI, 2002).

- **Rattus Rattus** (Isumu) introduced during the time of the Polynesian migration and the other varieties most likely were introduced during the early European settlements. Rats are a pest and along with cats can be attributed to the possible extinction of the Punae, the only known bird extinction in Samoa.

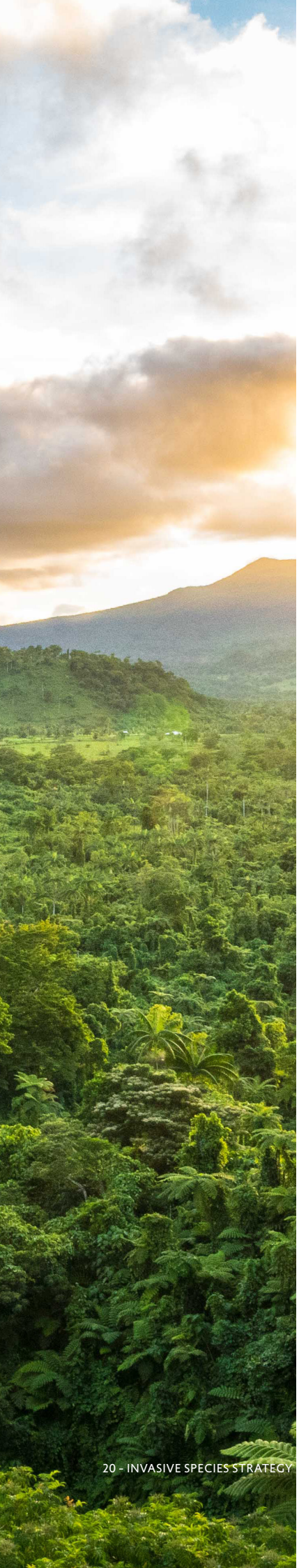
- **Achatina fulica African snail**. A recent accidental introduction but has spread widely around the country despite several eradication and control programs in the late 1990's

- **Hyptis pectinata** (vao mini, mint weed) was accidentally introduced in the 1990's most possibly as part of the cattle shipment but has since spread around the country despite eradication work coordinated by the MAF.

The potential of new and emerging invasive species loom over Samoa with the frequent movement of people and cargoes between countries is of major concerns. High risk species like reptiles, amphibians, mammals and birds will potentially and continue to have serious impacts on Samoa's agricultural production, the environment, and hinder the long-term sustainability of rural communities. The main threats for invasive species being accidentally introduced into Samoa comes from neighbouring countries like American Samoa, Fiji, New Zealand, Australia, Hawaii, and Tokelau. It can be via air and sea ports. More recently, the increasing importation of cars that arrive from Asian ports is only an indicative of how Samoa is open to global trade, thus becoming vulnerable to more accidental and to some extent, intentional introductions.

With the presence of the Little Fire Ant (LFA) being confirmed in American Samoa, their introduction to Samoa's borders is very plausible. Samoa has already received high risk species such as the cane toad and mongoose in the past through the border. Cooperation and coordination on the borders of entry therefore becomes more critical than ever to avoid any new and emerging high risk species from entering the country. This biosecurity concern forms the basis for the NISSAP, and more particular the establishment of the Samoa Invasive Species Emergency Response Plan (SISERP), however, the implementation of planned actions has not been up to the task due to various constraining issues related to poor access to scientific data and information, lack of financial and human resources including insufficient capacity, poor enforcement and compliance and lack of coordination between relevant ministries, institutions, organisations, and communities at the national level.

The NISSAP, and associated response plans such as SISERP as implemented strengthens the coordination, collaboration amongst the respective management agencies as well as having the technical capacity in-country to address any threats, and more importantly, having the necessary financial and technical resources to protect Samoa's borders.



4. REVIEW OF INVASIVE SPECIES WORK IN SAMOA

Much of the work in the past has been predominantly on pest control programs implemented by MNRE and MAF. Notably, the NISAP 2008-2011 was successful in producing several outcomes that have contributed to advancing actions for the management of invasive species. These include the preparation of the SISERP, the production of public awareness materials and undertaking awareness and eradication campaigns on priority invasive species and site-led projects. Generally, control operations were successful in terms of meeting the target thresholds, however, most of the eradication programs still require significant amounts of time and resources for their achievement. The absence of a specific unit or a fulltime staff to coordinate and facilitate administrative and implementation, coupled with the lack of technical capabilities and financial resources were some of the outstanding issues recognised when reviewing the old NISAP.

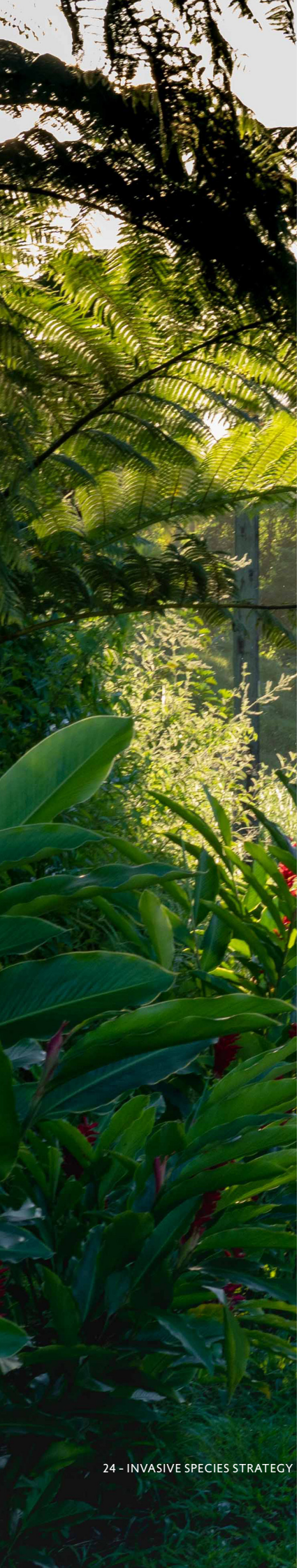
Fortunately, high risk pests such as the mongoose and cane toads that found their way to Samoa through shipping containers were successfully eradicated through a multi-sectoral collaboration by government agencies and communities. Table 2 below provides the summary of invasive species management activities in the past under specific strategies and objectives.

Table 2: Key Activities on Invasives Species Work based on the NISAP 2008.Framework

Key Strategy	Objectives	Actions Taken
Strategy I: Manage established invasive species	**Objective:** To develop appropriate programs and procedures to minimize the impacts of established invasive species by eradicating them where practicable, or otherwise control them.	Control and eradication programs were undertaken for the following species, all with varying degrees of success at site level or on the national scale. *Species specific* • Terrestrial plants: Trees: Rattan; *Merremia vine; albizia trees, 2 rubber trees, African tulip,* Weeds and vines: *mile a minute, mint weed navua sedge, pico, milkweed, giant sensitive weed, wild peanut, lantana, sida, blue rats-tail, Honolulu rose, knobweed, sword weed* • Terrestrial animals: *my*na birds; rats, mongoose; Cane toad; dog; African *snail Yellow crazy ant, fruit fly, rhinoceros beetle* • Marine and aquatic: *crown of thorns*; water lettuce *Area specific* • Protected Areas and Reserves: *Mt Vaea Reserve, Aleipata Islands, Malololelei Reserve, Biodiversity Park,* • Conservation Areas; *Uafato; Falealupo* • Marine Protected Areas and Reserves: *Aleipata and Safata MPA; Palolo Deep Marine Reserve: Traditional Fisheries Reserves;* • Watershed and Forestry replanting and community forestry rehabilitation programs

Key Strategy	Objectives	Actions Taken
Strategy 2: Promote public support through awareness and education	**Objective:** To enhance the knowledge and understanding of the Samoan community to increase levels of compliance and support for preventing the introduction of invasive species that have not yet reached Samoa and managing those already here.	• GEF-PAS initiatives produced factsheets, videos and awareness programs, posters and several studies on targeted species • MAF has on-going pest control awareness programs for rhinoceros beetle, fruit flies, and invasive weeds, • Samoa Conservation Society has implemented several invasive species programs • National Invasive Species Awareness Programs targeting five (5) representatives from each village which includes the village Pulenuu, village mayors, women's committee, untitled men, and youth groups • National myna bird awareness programs • DEC's on-going invasive programs within sites under its management as well as integrating invasive species in all its outreach programs • Water lettuce community consultations • Enhancing Climate Resilience Program for Samoa integrated invasive species as an important component of its CIM Plan consultations with 36 districts in Samoa

Key Strategy	Objectives	Actions Taken
Strategy 3: Prevent the introduction of new invasive species	**Objective 1:** To strengthen the existing Import Risk Assessment (IRA) procedure and associated import protocols for proposed new introductions	MAF through APHD, Crops and Fisheries do conduct IRA for any introduced species, with some being referred for review at SNITT such as?
	Objective 2: To review and enhance the Emergency Response Plan (ERP) to ensure an immediate and effective response to the detection of any potential invasive species	SISERP 2019-2024 approved in April with implementation initiated for the Little Fire Ant.
	Objective 3: Enhance the current inspection and surveillance systems and procedures for potential invasive species	Implemented by Quarantine through the Biosecurity Act 2004
Strategy 4: Foster regional and international cooperation on invasive species	**Objective 1:** To foster regional and international cooperation on invasive species, to effectively address the threat of potential new invasions and manage established invasive species.	• Pacific Invasive Species Database: • Pacific Invasive Partnership: • Pacific Invasive Learning Network: • Pacific Islands Invasive Species program coordinated through SPREP

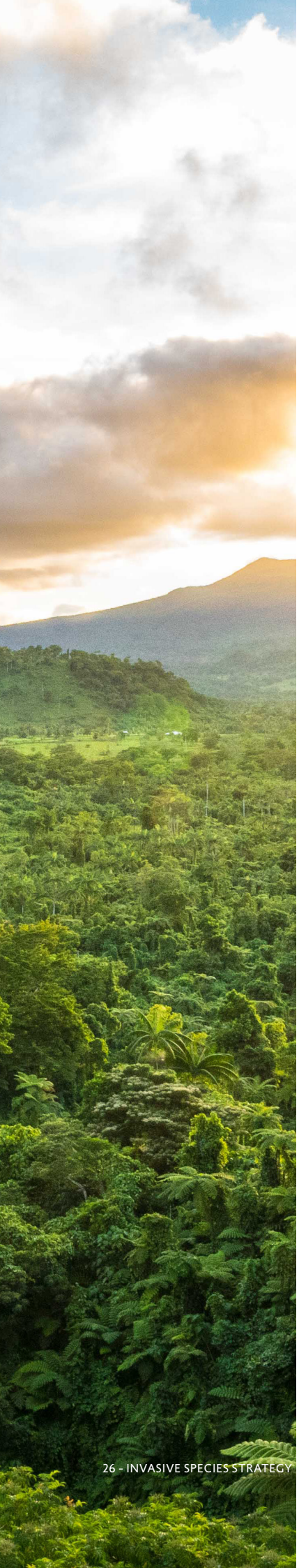


5. DEVELOPING OF THE NISSAP 2019-2024

The NISSAP was developed over a 9-month period from October 2018-March 2019 which included the;

- Review of the NISAP 2008-2011
- Assessment of work undertaken by other stakeholders
- Stocktaking and assessment of activities (1 workshop)
- Strategic planning workshop (1) for the NISSAP,
- Review of the NISSAP Draft (1 national workshop), and
- Consultation with various stakeholders
- Literature Review

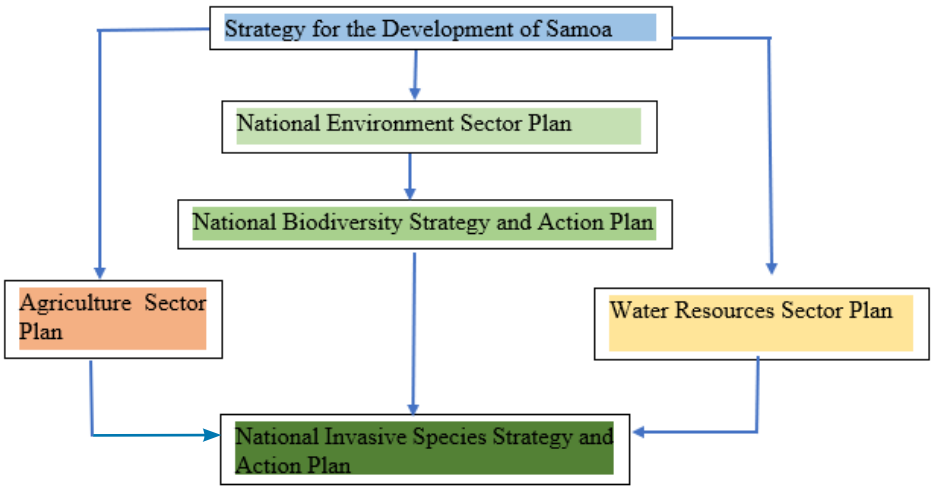
The NISSAP preparation coincided with the mid-term review of the NBSAP and preparation of Samoa's 6th National Report to the CBD, so additional consultations through the participation of the consultant at the said review.



6. STRATEGY AND ACTION PLAN

The NISSAP is not a stand-alone strategy but a part of a collection of national development and environmental frameworks set out in the Strategy for the Development of Samoa (SDS). The SDS sets the national goals which are then incorporated and assimilated into each sector plans such as the National Environment Sector Plan (NESP), the Agriculture Sector Plan, and the Water Resources Policy, all of which include invasive species actions (Figure I). The NISSAP is directly linked to the NBSAP for which Target 9 is specific to addressing invasive species.

Figure I: NISSAP Institutional Framework



6.1. GOAL:

To reduce the negative impacts of Invasive species on Samoa's fragile natural heritage, communities and livelihoods.

The NISSAP is developed based on Target 9 of the NBSAP which states:

> **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.**

In addressing target 9, NISSAP adopts the three Key Thematic Areas (SPREP 2009) outlined in the Guidelines for Invasive Species Management in the Pacific, which aims to;

- establish a comprehensive framework for all invasive species work in the Pacific
- Address action and improve implementation
- Increase efficiency, increase cooperation and reduce duplication,
- Guide the work of international and regional agencies, including donors
- Guide the development of country programs
- Guide strategic and local fundraising

6.2. GUIDING PRINCIPLES

The NISSAP aims to:

- Prevent the introduction and establishment of potential invasive species
- Eradicate and control the spread of invasive species already present in Samoa
- Strengthen the legislative framework to support invasive species work
- Improve coordination and cooperation
- Support regional and international engagement including donors
- Improve the knowledge and understanding of key stakeholders and the wider public of invasive species and their impacts;

6.3. THEMATIC AREAS

6.3.1 FOUNDATIONS

Having the appropriate foundation in the form of right information, technical financial resources and the legal frameworks are critical in the efforts to combatting, controlling and eradication the threat of invasive species in Samoa.

Strategy I: Generating Support

Raising awareness of the impacts of invasive species to generate support for action to manage and reduce them.

Objectives:

I. Compile all the national invasive species and pest management into one document/ poster for production and distribution
II. Prepare and implement a nationwide invasive species campaign based on the poster

Strategy 2: Building Capacity

Strengthening the institutions capacity and necessary skills for the technical support required to manage invasive species effectively.

Objectives:

I. Establish and provide resources for the DEC Invasive Species Unit
    a. Establish an Invasive Species Unit
    b. Incorporate funding costs into National Budget at a Senior position to head and coordinate the work of the Invasive species unit
    c. Coordinate regular meetings and trainings for SNITT and relevant partners
    d. Explore training opportunities for ISU staff and other partners
II. Provide necessary training and qualifications for ISU staff to undertaken invasive species
III. Strengthen the coordination and regular meetings of the SNITT
IV. Coordinate with SPREP and PRISMSS for technical assistance that can be provided on NISSAP actions

Strategy 3: Legislation, Policy and Protocols

Institutionalization of appropriate legislation, policies and procedures underpinning the effective management of invasive species.

Objectives:

I. Support the finalisation of the Environment Management and Conservation Bill with the incorporation for Invasive Species Management and establishment of SNITT
II. Endorse and implement the SISERP

6.3.2. PROBLEM DEFINITION, PRIORITIZATION AND DECISION-MAKING

This thematic area focusses on the improving knowledge on invasive species, specifically, the status and distribution each invasive species, prioritize management actions and monitoring programs to assess the effectiveness of programs as well as for detecting trends and emerging threats.

Strategy 4: Baseline & Monitoring

Establishing a baseline of information on the status and distribution of invasive species and implementing a programme for detecting change and emerging impacts.

Objectives:

I. Establish the invasive species database
    a. Develop funding proposal for equipping the ISU including the development of an invasive species database, annual monitoring assessments, and compilation of information from various stakeholders regarding invasive species
II. Develop and implement the invasive species monitoring program in coordination with the respective authorities addressing the various types of invasive species

Strategy 5: Prioritization

Establishing effective systems for assessing risk and prioritizing invasive species for management

Objectives

I. Review criteria assessing and prioritizing national and local invasive species and produce a revised National Priority Invasive Species list

Strategy 6: Research on priorities

Understanding priority invasive, including species biology and impacts, and developing effective management techniques.

Objectives:

I. Prepare comprehensive information of priority invasive species including biology, impacts, locations, distribution and management actions needed
II. Integrate Invasive species GIS map layers from the database into the Samoa Ecosystem maps and make available for public use

6.3.3. MANAGEMENT ACTION

With a good understanding by all the stakeholders of invasive species and their impact on Samoa, and with the appropriate legislative frameworks to support the work, coupled with the identification of where the invasive species are located and how much of an impact they have, this thematic area focusses on the necessary actions that are to be taken. This can be best achieved when done collaboratively between the relevant government agencies, technical support regional and international expertise and with support of the local communities.

Strategy 7: Biosecurity

Strengthening the Risk Assessment systems for assessing risk and prioritizing invasive species for management.

Objectives:

I. Expand the Risk Assessment procedures for new species and genomes introduction to include environmental, social and economic impacts
II. Integrate the risk assessment review as an integral component of SNITT meetings
III. Coordinate with regional technical invasive species support group when reviewing any new species introduction

Strategy 8: Management of established invasives

Reducing or eliminating the impacts of established invasive species, by eradication, containment, exclusion, or population reduction by physical, chemical or biological control.

Objectives

I. Develop and implement actions for at least 5 top priority invasive species
    a. Invasives on Native biodiversity
        i. Merremia
        ii. Myna birds
        iii. 2 alibizia trees (tamaligi)
        iv. 2 rubber trees (Funtumia and Castilloa elastica)
        v. Rattan
    b. Agriculture and livestock pests
        i. Rhinoceros beetle
        ii. Mint weed;
        iii. Leucaena,
        iv. Solanum torvum
    c. Marine invasive
        i. Crown of thorns
    d. Potential invasive
        i. Little Fire Ant
II. Integrate invasive species management components in other relevant environment and climate change projects

Strategy 9: Restoration

Restoring native biodiversity or ensuring recovery of other values, after invasive species management.

Objectives

I. Develop and implement invasive species management programs for high biodiversity sites
    a. National Parks and Protected Areas
    b. Conservation Areas
    c. Key biodiversity Areas
    d. Watershed Areas
    e. Marine Reserves
    f. Traditionally Managed marine reserves
II. Replanting programs in forests and watershed areas affected by invasive species

6.4. IMPLEMENTATION FRAMEWORK

The NISSAP sets the framework and identifies the key initial actions that need to be undertaken to effectively manage the threat and impacts of new and existing invasive species. The actions have been prioritized, with timeframes and identification of the lead agency/group and relevant partners that will be involved in implementation.

It is intended that the action plan is owned and driven by the Samoan community. This is a living document, to be reviewed annually and revised every three years through a consultative process and will therefore continue to evolve over time.

6.4.1. ROLES AND RESPONSIBILITIES

The effective implementation of the NISSAP requires the acknowledgement of various authorities with jurisdiction and technical expertise in different areas, and as such, it is important that these groups working through the SNITT will be able to coordinate and collaborate both in compiling the necessary information and implementing the necessary actions.

MNRE is noted as the lead Agency coordinating the implementation of the NISSAP and act as Secretariat for the SNITT.

INVASIVE SPECIES UNIT (ISU): Establish an ISU within DEC to coordinate and monitor the management of invasive species in Samoa

- Secretariat for the SNITT
- Manage the invasive species database
- Conduct monitoring programs for existing invasive species
- Implement management programs for priority invasive species affecting native biodiversity and ecosystems
- Coordinate public awareness programs on invasive species

SNITT:

- Chaired by MNRE CEO
- coordinate the implementation of the action plan,
- facilitate collaboration amongst its member authorities in providing technical advice, implementing eradication and control programs, coordinate import risk assessments on introduced species, emergency response to possible infestation; and
- review and monitor on the progress of implementation,
- initiate the activation of Emergency Response Program when a potential invasive species is suspected or known to be present in-country

MAF

- MAF: Quarantine: responsible for the implementation of the border control and biosecurity components of the NISSAP
- MAF: Crops: responsible for Integrated Pest Control (IPC) and weed control
- MAF: Fisheries: responsible for marine invasive species within its area of work
- MAF: APHD: responsible for the management of invasive species impact on livestock

MNRE

- MNRE: Forestry: reforestation and control on spread of invasive trees in National Parks
- MNRE Water Resources: lead implementation of invasive species works in watershed area:
- MNRE DMO: coordinate Invasive Species Emergency Response
- DEC: integrate NISSAP actions and invasive species activities into the work plan of the different units (marine, terrestrial, waste, protected areas and reserves)
- PUMA: integrate assessment of invasive impacts in development consent application requirements
- Environment Sector Coordination Division: Coordination of environmental sector programs and monitoring of all relevant environmental plans

MWCSD: Village Councils, Committees and general public:

- detect and report new invasions;
- contribute their knowledge and skills to the development and implementation of eradication and/or management programs;
- initiate and facilitate the participation of villages in local management initiatives; and
- participation in awareness and education in relation to invasive species.

NGO's/Civil Society Organizations: implementing specific projects as per any funding they receive

NUS/USP/SROS: conducting invasive species research and biocontrol when technical capacity is available

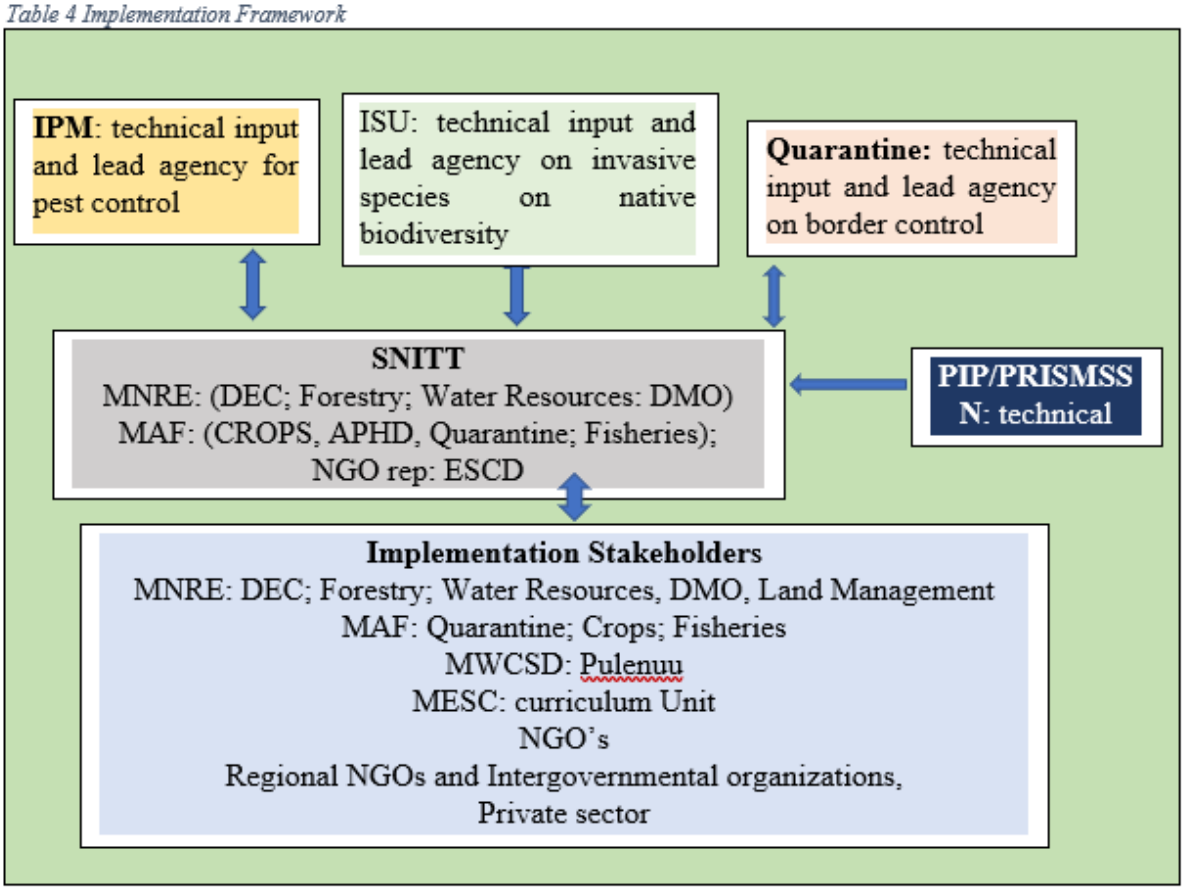
SPREP: backstopping for technical review and support to SNITT and ISU.

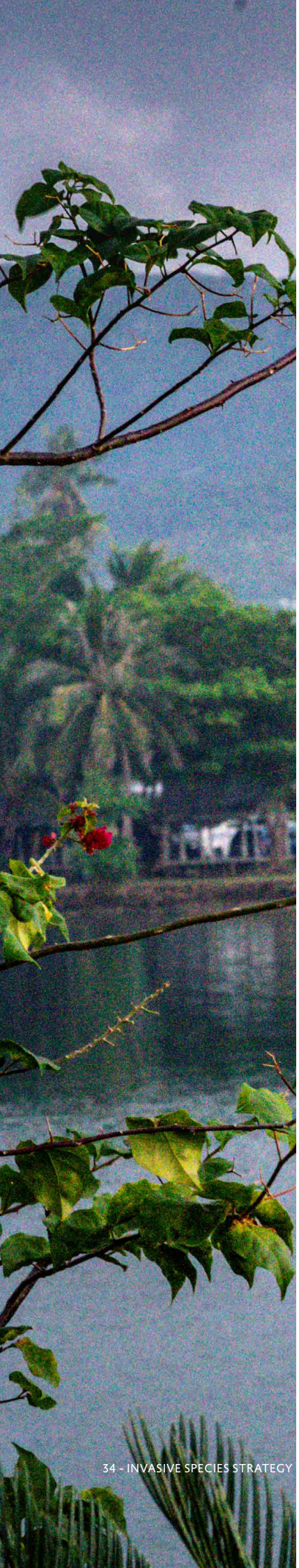
PRISMSS:

- provide advice and in-country assistance to foster on the ground actions
- assist in the adoption and the development of best practice and innovation
- share technical information and publications
- provide training and project planning assistance, prior to project execution

Table 4 Implementation Framework

Table 4 Implementation Framework





7. ACTION PLAN MONITORING MATRIX

NBSAP Target 9 states that "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. As such, the NISSAP's overarching goal is to reduce the negative impacts of Invasive species on Samoa's fragile natural heritage, communities and livelihoods.

Over $2,190,000 is initially allocated for the implementation of programs and activities for a 5 year period, with the bulk of the allocations leaning towards the Management of established invasive species, and restoration. Prioritized activities are mostly under thematic area A: Foundations, on the capacity building element, in which an Invasive Species Unit is to be established to provide full commitment to the coordination and the implementation of invasive-related activities addressed in this planning document.

Strategy	Objectives	5-year Indicators
		THEMATIC AREA A
A1. Generating Support		
A1.1. Raising awareness of the impacts of invasive species to generate support for action to manage and reduce them	A1.1.1. Compile all the national invasive species and pest into one document/poster for production and distribution	Public Awareness materials produced on all nationa species and pests
	A1.1.2. Prepare and implement a nationwide invasive species campaign based on the poster	National invasive species campaign implemented
A2. Building Capacity		
A2.1. Strengthening the institutions capacity and necessary skills for the technical support required to manage invasive species effectively.	A2.1.1. Establish and provide resources for the DEC Invasive Species Unit a. Establish an Invasive Species Unit b. Incorporate funding costs into National Budget at a Senior position to head and coordinate the work of the Invasive species unit c. Coordinate regular meetings and trainings for SNITT and relevant partners d. Explore training opportunities for ISU staff and other partners	Invasive Species Unit established and staffed, with a work plans approved and financed
	A2.1.2. Provide necessary training and qualifications for ISU staff to undertake invasive species	At least 1 person attained graduate level invasive sp qualification At least 1 training conducted each year to build tech capacity on invasive species for ISU and relevant SN personnel
	A2.1.3. Strengthen the coordination and regular meetings of the SNITT	Reports of at least 3 SNITT meeting per year
	A2.1.4. Coordinate with SPREP and PRISMSS for technical assistance that can be provided on NISSAP actions	Assistance identified and input provided
A3. Legislation, Policy and Protocols		
A3.1. Institutionalization of appropriate legislation, policies and procedures underpinning the effective management of invasive species	A3.1.1. Support the finalization of the Environment Management and Conservation Bill with the incorporation for Invasive Species Management and establishment of SNITT	Environment Management Act passed with Invasive management included in relevant sections
	A3.1.2. Endorse and implement the SISERP	SISERP is approved by Cabinet
		THEMATIC AREA B: PROBLEM DEFINITI
B1. Baseline & Monitoring		
B1.1. Establishing a baseline of information on the status and distribution of invasive species and implementing a programme for detecting change and emerging impacts	B1.1.1. Establish the invasive species database a. Develop a funding proposal for equipping the ISU, including the development of an invasive species database, annual monitoring assessments, and compilation of information from various stakeholders regarding invasive species	Invasive species database developed and updated a
	B1.1.2. Develop and implement the invasive species monitoring program in coordination with the respective authorities addressing the various types of invasive species	Annual report on updated status of Invasive species monitoring program
B2. Prioritization		
B2.1. Establishing effective systems for assessing risk and prioritizing invasive species for management	B2.1.1. Review criteria assessing and prioritizing national and local invasive species and produce a revised National Priority Invasive Species list	Criteria for priority invasive species produced
B3: Research on Priorities		
B3.1. Understanding priority invasive, including species biology and impacts, and developing effective management techniques	B3.1.1. Prepare comprehensive information of priority invasive species including biology, impacts, locations, distribution and management actions needed	Factsheets produced for all the priority invasive spe
	B3.1.2. Integrate Invasive species GIS map layers from the database into the Samoa Ecosystem maps and make available for public use	I. Updated Samoa Ecosystem Maps with Invasive layer integrated

	Timeline	Priority	Responsible	Cost (SAT$)
A: FOUNDATIONS				
l invasive	**(YEAR 1-2)**	High		Budget: $40,000
	(YEAR2-4)	High		$150,000
nnual	**(YEAR 1)**	High		$200,000 Annual budget of $40,000 to include salary and unit expenses *Funding Source*: Government Budgetary Allocation
ecies nical ITT	**(on-going)**	High		
	(on-going)	High		
	(on-going)	Medium		
s Species	**(YEAR 1)**	High		In-kind support
	(YEAR 1)	High		
ON, PRIORITIZATION AND DECISION-MAKING				
nnually	**(YEAR 1)**	High		Budget: $100,000 for the set-up of the database with annual maintenance costs to be integrated into ISU budgetary allocations
from the	**(on-going**	Medium		
	(YEAR 1)	High		$50,000
cies	**(YEAR1-2)**	Medium		$50,000
species		Low		$50,000

Strategy	Objectives	5-year Indicators
THEMATIC AREA C. MANAGEMENT ACTION		
C1. Biosecurity		
C1.1. Strengthening the Risk Assessment systems for invasive species management	C1.1.1. Expand the Risk Assessment procedures for new species and genomes introduction to include environmental, social and economic impacts	Risk Assessment review guidelines established and u
	C1.1.2. Integrate the risk assessment review as an integral component of SNITT meetings	SNITT annual reports include Risk Assessments unde during the year
	C1.1.3. Coordinate with regional technical invasive species support group when reviewing any new species introduction	Regional technical input provided based on SNITT re
		I. Implement SISERP when introductions are know
C2. Management of established invasive		
C2.1. Reducing or eliminating the impacts of established invasive species, by eradication, containment, exclusion, or population reduction by physical, chemical or biological control.	C2.1.1. Develop and implement actions for at least 5 top priority invasive species Invasives on Native biodiversity - Merremia - Myna birds - 2 alibizia trees (tamaligi) - 2 rubber trees - rattan Agriculture and livestock pests - Rhinoceros beetle - Mint weed; - Leucaena, - Solanum torvum (lapiti) Marine invasives - Crown of thorns *Potential invasives* - *Little Fire Ant*	Invasive species Management programs implement least 3 of the top 5 priority invasive species Actions Plans produced for the identified priority inv species Project prepared and submitted to potential donors
	C2.1.2. Integrate invasive species management components in other relevant environment and climate change projects	Invasives species work integrated into relevant proj
C3. Restoration		
C3.1. Restoring native biodiversity or ensuring recovery of other values, after invasive species management.	C3.1.1. Develop and implement invasive species management programs for high biodiversity sites - National Parks and Protected Areas - Conservation Areas - Key biodiversity Areas - Watershed Areas - Marine Reserves Traditionally Managed marine reserves	Invasive species Management programs implement least 5 of the high biodiversity and protected area s
	C3.1.2. Replanting programs in forests and watershed areas affected by invasive species	At least 50% of the forestry and watershed replantir programs ort reflect changes from recovery and res programs

	Timeline	Priority	Responsible	Cost (SAT$)
used	**(on-going)**	High		$50,000 annual budget
ertake	**(on-going)**	Medium		
equest	(**on-going)**	Medium		
vn	Annual report reflecting any SISERP actions	**(on-going)**		
ed for at vasive		High		$500,000
ects		Medium		Costs conditional on specific project
ed in at tes		Medium	DEC, WRD, Forestry, and MAF (Fisheries) integrate invasive species management into work plans for all their sites	$500,000
ng toration		Medium		$300,000

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GEF-PAS Invasive Alien Species (IAS) Project Reports:

- Exercise Invasive Species Emergency Response" Simulation Report June 26 – 2015
- IAS Consultation in Aleipata District, Samoa (November 2015)
- Invasive Alien Species Survey Aleipata Islands, Samoa September-December 2015
- Invasive Species Consultation Report: 2014
- Results of Invasive Mammal Survey in the Mt Vaea Reserve: April 25-28, 2016
- Review of Information on Invasive Species and Results of IAS Survey: O le Pupu Pu'e National Park Restoration Project 2016-2020
- Review of Invasive Alien Species Management in The Aleipata Islands, Samoa

ANNEX I: PRIORITY INVASIVE SPECIES

The NISAP 2008-2011 compiled a list of priority invasive plants already present in Samoa based on a prioritisation workshop coordinated by MNRE and SPREP in 2007. Additional to the list of plant species, the Ministry of Agriculture and Fisheries has conducted their own assessment for weeds and pests affecting agriculture and livestock. These and the regional priority invasive species list generated through SPREP are basis of the revised National Priority list used in this NISSAP.

The priority invasive species identified below follows criterion developed through the Samoa–Invasives Prioritization and

Table 4: Priority Invasive Species for Management in Samoa

Life forms	Samoan name	Common name
Mammals	Isumu	Pacific rat Polynesian rat Ship rat
Birds	Maina: Lupe palagi Manu palagi	Common myna bird Jungle myna bird Feral pigeon Red vented bulbul
Terrestrial invertebrates	Sisi Aferika Loi Manu'ainiu:	Giant African snail Yellow Crazy Ant Fruit fly Rhinoceros beetle
Plants	lopa,	Coral bean tree
	tamaligi uliuli	Silktree
	Ratana:	Rattan
	pulu mamoe	Rubber tree
	tinamoni	Cinnamon
	losa Honolulu	Honolulu rose Leucaena
	la'au lau mamoe	Koster's kurse
	kotia	Cordia
	tamaligi paepae	Albizia
	pulu vao	Rubber tree
	vao mini,	Mint weed
	tuise tele	Navya sedge
	latana	Lantana
	fua pepe	
	fue lautetele	Merremia vine
	fue saina	Mile a minute
	lapiti,	Torvum weed
	Faapasi	Africa tulip
Marine	Alamea: Limu Limu	Crown of thorns
Aquatic		Water hyacinth Water lettuce
Total		

Management Planning Workshop in 2007 which are

1. Current and potential impact of species (economic, cultural and environmental) The higher the impact the higher the management priority
2. Current extent and invasiveness in Samoa: The more limited and localised the spread and the higher the potential to spread the higher the management priority
3. Difficulty of control: the easier and cheaper to control the higher the priority management

	Scientific name	Total
	Rattus rattus, *Rattus exulans*, and *Rattus norvegicus*	3
	Acridotheres tristis and, *Acridotheres fuscus* *Columba livia* *Pycnonotus cafer*	4
	Achatina fulica *Anoplolepis gracilipes* *Bactrocera xanthodes*, *Oryctes rhinoceros*	4
	Adenanthera pavonina	16
	Albizia chinensis	
	Calamus spp	
	Castilla elastica	
	Cinnamomum verum	
	Clerodendrum fragrans	
	Clidemia hirta	
	Cordia alliodora	
	Falcateria moluccana	
	Funtumia elastica	
	Hyptis pectinata	
	Kyllinga polyphylla	
	Lantana camera	
	Leucaena leucocephala	
	Merremia peltata	
	Mikania micrantha	
	Solanum torvum	
	Spathodea campanulata	
	Acanthaster planci *Codium Arenicola;* *Spatoglossum macrodontum*	3
	Eichhornia crassipes *Pistia stratiotes*	2
		32

ANNEX 2: REVIEW OF THE NISAP 2008-2011 AND ASSESSMENT OF WORK UNDERTAKEN BY OTHER STAKEHOLDERS

Introduction:

The following report is the review on the status of Invasive Species Work in Samoa and the NISAP 2008-2011.

International and Regional Frameworks

The development of a national invasive species plan is part of Samoa's national commitment and obligation in support of the implementation of the **Convention on Biological Diversity** (CBD) Article 8/h of the) which stipulates: *"Each contracting Party shall, as far as possible and as appropriate: Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats, or species."*

COP Decisions: UNEP/CBD/COP/6/20: *the need to strengthen national capacities and international collaboration through the development of (a) National invasive alien species strategies and action plans*

The **Aichi Target** made under the CBD also states that *"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."*

At the **Pacific Islands** level, a Regional Invasive Species Plan was produced with a goal *to assist Pacific island countries and territories in planning the effective management of invasive species, thereby reducing the negative impacts of invasive species on their rich and fragile natural heritage, communities and livelihoods*. Through the GEF-PAS project, several resources were produced to assist PIC address invasive species

- Regional Invasive Species Battler Resource Base: a searchable resource base providing the latest information on invasive species issues, case studies, and introductory guides on common invasive species issues
- Guidelines for Invasive Species Management in the Pacific: A Pacific Strategy for managing pests, weeds and other invasive species
- Pacific Invasive Species Guidelines Reporting Database:
- Pacific Invasive Partnership: umbrella group of invasive species experts focused on coordinating invasive species assistance in the Pacific
- Pacific Invasive Learning Network: peer network of cross-sectoral invasive species practitioners in the Pacific

National Frameworks

Legislation:

- Biosecurity Act 2005: regulates the prevention or control of the introduction, establishment or spread of pests and diseases that could cause significant damage to human beings, animals, plants, other aspects of the environment or economic activities.
- Agriculture and Fisheries Ordinance 1959: devise, promote, and carry out experiments, researches, investigations, and measures in relation to the health, and the diagnosis, prevention, and treatment of diseases of stock, poultry, bees, plants, and trees, the management of soils, and the production and improvement of livestock,

crops, and pastures and in relation to any other matters affecting the operations of any of the industries which it is the function of the Department to promote and encourage;
- Lands Survey and Environment Act 1989: regulates the conservation and sustainable use of natural resources and protection from
- Forestry Act: have the primary control and management over production forests, including: management and control over State forest lands; and regulating the production, extraction, conversion, transport, sale or other disposal of forest produce from production forests in accordance with approved forest policies and the provisions of this Act
- Fisheries Management Act: to advise government agencies, villages and other communities on the management of coastal fisheries resources, aquaculture, environment and the protection and conservation of the fishery resources for the present and future generations of the people of Samoa;
- PUMA Act: through the EIA process, assessment is undertaken for the introduction and use of species not native to the development area.

Policies and Plans

- Samoa Development Strategy 2016-2020
- Environment Sector Plan
- Water Sector Plan
- Forestry Sector Plan
- Environmental Impact Assessment Regulations
- NBSAP
- NISAP 2008-2011
- SISERP

Eradication and Pest Control programs implemented up to 2018

Numerous invasives species management work was undertaken in the period of the NISAP from 2008-2011 and the years 2011-2018. The programs had varying degrees of success at site or national level. Some were successful in eliminating the invasive species at specific sites but had not been eliminated at the national level. Only the mongoose and cane toad which were successfully eliminated when individuals were found on island

Species Specific

- Terrestrial plants:
  Trees: *Rattan; Merremia vine; albizia trees, 2 rubber trees, African tulip,*

  Weeds and vines: *mile a minute, mint weed navua sedge, pico, milkweed, giant sensitive weed, wild peanut, lantana, sida, blue rats-tail, Honolulu rose, knobweed, sword weed*
- Terrestrial animals
  myna birds;

  rats, mongoose; Cane toad; dog;

  African snail Yellow crazy ant, fruit fly, rhinoceros beetle
- Marine and aquatic
  - » *crown of thorns; water lettuce*

Area Specific

- Protected Areas and Reserves:
  Mt Vaea Reserve, Aleipata Islands, Mallololelei Reserve, Biodiversity Park,
- Conservation Areas;
  - » *Uafato; Falealupo*
- Marine Protected Areas and Reserves:
  Aleipata and Safata MPA; Palolo Deep Marine Reserve: Traditional Fisheries Reserves;

Public awareness campaign and programs

1. Several awareness programs had been carried out during the period of 2008-2018, with most associated with the GEF-PAS programs coordinated through SPREP. GEF-PAS initiatives produced factsheets, videos and awareness programs, posters and several studies on targeted species
2. MAF has extensive programs focusing on pest control awareness programs for rhinoceros beetle, fruit flies, and invasive weeds,
3. Samoa Conservation Society has implemented several invasive species programs
4. National Invasive Species Awareness Programs targeting five (5) representatives from each village which includes the village Pulenuu, village mayors, women's committee, untitled men, and youth groups
5. DEC and MAF as the main agencies implementing pest management and invasive species management work had integrated invasives species into all the work they carried out as part of other programs, as well as some specific programs for the myna birds
6. DEC's on-going invasives programs within sites under its management as well as integrating invasive species in all its outreach programs
7. Enhancing Climate Resilience Program for Samoa integrated invasive species as an important component of its CIM Plan consultations with 36 districts in Samoa

REVIEW COMMENTS:

The review noted that there is no specific legislation that regulates or provide provision for the coordination of work addressing the control and eradication of invasive species in Samoa. The Biosecurity Act is the closest Act that provides for the control of pest introductions. Other Acts including the LS&E, the Forestry Act, the Fisheries Management and the Animals and Fisheries Ordinance only refer to the need for protection and conservation of the environment and human impact.

The Review also found no specific Policy on tackling Invasive Species despite existing plans such as the NBSAP, NISAP and others.

To ensure support and consistent implementation of the proposed NISSAP, the revised EMC should ensure to include invasive species management and ensure close coordination with the Biosecurity Act.

Additionally, the Review noted that the implementation of the previous NISAP and other invasive species program were project oriented, in that activities were only implemented when there is funding available or as in the case of some specific interest on a particular species.

The uncoordinated implementation can be attributed to the absence of the dedicated Invasive Species Sections and a desk officer tasked full time with the implementation. The GEF-PAS which addressed and funded several of the invasive species programmes could have been integrated into the government programme to fund the position once the project was completed. Unfortunately, this did not happen, thus the work is currently coordinated as one of the many tasks managed by the Senior Terrestrial Biodiversity Officer.

REVIEW of 2008-2011 NISAP

ACTIONS
Strategy 1: Manage established invasive species
Objective: To develop appropriate programs and procedures to minimize the impacts of established invasive species by eradicating them where practicable, or otherwise ma
1.1. Identify and Prioritise specific species or key sites for management
1.1.1 Identify the existing invasive species in Samoa, drawing from the Space and Flynn (2002), Skelton et. Al. (2007) and other studies, as well as further surveys, including: - freshwater survey - marine survey - terrestrial invertebrate survey
1.1.2 Undertake a preliminary assessment of the potential environmental, economic and social impacts and values of each of these invasive species, and prioritise the species identifying the top 10 for each species group both terrestrial and aquatic (e.g. plant, vertebrate, invertebrate, pathogens, etc.)
1.1.3 Determine and map where possible the current distribution, past spread, and potential future dispersal of the top 10 species in each group;
1.1.4 Record and maintain information relating to all invasive species on a digital database.
1.1.5 Assess the feasibility of and select appropriate management options for the identified key species - Where necessary, conduct feasibility or pilot studies to determine the problems and constraints (financial, technical, public awareness and support, or legislative) ass implementing management programs, and the capacity to overcome such constraints.
1.1.6 Identify small infestations that have the potential to become invasive, e.g. Satellite populations of the giant African snail on Savaii, and develop and initiate eradicati where feasible. And where necessary, develop and implement effective restoration methods for affected areas.
1.2.1 Identify key areas, species, communities, crops and other resources which must be protected from the spread of invasive species.
1.2.2 Conduct feasibility or pilot studies to determine and test the effectiveness and maintenance of barriers and other preventative measures to stop the spread of priorit invasive species into non-infected areas; - Where practicable, use the adaptive approach to management
1.2.3 Develop and implement effective monitoring of the spread of priority established invasive species.
1.2.4 Where feasible, develop and implement management programs to minimise the impact of established infestations of invasive species, considering community attitu requirements, and potential risks and constraints. - Where practicable, use the adaptive approach to management
1.3 Other actions to minimise the spread of established invasive species:
1.3.1 Review legislation and recommend appropriate amendments to ensure adequate support for all management actions
1.3.2 Identify training needs, and develop and implement necessary training and capacity building programs to strengthen Samoa's capacity to research invasive species management techniques.
1.3.3 Review existing protocols to reduce the risk of native species and invasive species escaping from Samoa and invading other nations.
1.3.4 Review the Vailima Botanic Garden living collection and dispose of any species that have the potential to escape and become invasive.
1.3.5 Incorporate into EIAs an assessment of the invasive threat posed by proposed developments, and introduce mandatory operating procedures as a condition of approv the spread of established invasive species, e.g. Procedures for the translocation of machinery and equipment.
1.3.6 Review plant species used for revegetation of roadsides and development projects, and restoration efforts in watershed and forestry areas, and develop a list of approv
1.3.7 Establish a Code of Practice for the plant nursery industry to prevent the sale or distribution of invasive species.
STRATEGY 2: PROMOTE PUBLIC SUPPORT THROUGH AWARENESS AND EDUCATION
Objective: To enhance the knowledge and understanding of the Samoan community to increase levels of compliance and support for preventing the introduction of invasive
2.1 Establish a Public Awareness Working Group (PAWG) that is responsible for developing a comprehensive awareness and understanding program that targets key stakeh
2.1.1 Undertake preliminary public awareness activities, utilising television, radio, newspapers, and also posters and fact sheets.
2.1.2 Conduct workshops of key stakeholders to determine the extent of their knowledge of invasive species and their impacts, their needs and concerns, and the existing role of each group in protecting Samoa and its resources from invasive species.
2.1.3 Identify target groups and tailor information to meet their needs and concerns - Identify appropriate incentives for community ownership and support
2.1.4 Based on the need's assessment, produce, package and disseminate information on invasive species and their impacts, preventing new species from entering Sar management of existing invasions: - Review secondary school and university curricula and make recommendations; - Review existing government programs to identify opportunities to incorporate information on invasive species, for example, extension programs for farmers and communities best practice techniques in the management and/or eradication of invasive species; - Enhance awareness of relevant legislation and enforcement

	OUTPUTS	ACTIONS TAKEN
naging them.		
	Comprehensive list of invasive species produced	✔
s accordingly,	Impacts assessed and species prioritised	some
	Past, present and potential future distribution determined	Mapping for some species
	Database updated at least annually.	No database
sociated with	Species and sites identified and eradication efforts initiated	Rodents in Aleipata islands, Myna birds, rattan, mint weed, taro blight, Battler series conducted assessment for the Pacific region
on programs,	Eradication programs commenced.	No work has been done in this area
	Key areas identified for protection	No work was done on this objective
y established	Priority list of species and areas for management action prepared	Was done for African snail but didn't stop the spread into Savaii; some done for Myna birds; rodents on Aleipata islands
	Barriers and other preventative measures developed and tested	No monitoring program undertaken
des, resource	Management programs developed and implemented for at least the top 5 priority species / areas	Some eradication program was undertaken at site level with varying degrees of success.
		Environment Management Bill under review will incorporate invasive species management functions
impacts and		No assessment report on was produced
		Coordinated as part of the SPREP regional invasive species program
		Eradication program on going along trails
al to mitigate		Not done
ed species.		Not done
		Not done
species that have not yet reached Samoa, and managing those already here.		
olders and other groups. The sub-committee should undertake the following:		
	Awareness activities undertaken	Some awareness work has been done over the years, with mostly tied to the GEF PAS.
and potential	Workshops undertaken	Not done, although this can be regularly updated through the SNITT
	Workshop results analysed and presented to TSC	Not done
moa, and the	Program commence d	Not done
s to introduce		

Strategy 3: Prevent the introduction of new invasive species
Objective 1: To strengthen the existing import risk assessment procedures and associated import protocols for proposed introduction
3.1.1 Establish a Prevention Working Group (PWG) to review relevant legislation and procedures, and recommend necessary amendments to ensure there is appropriate support for the IRA process.
3.1.2 Develop and introduce EIA procedures for proposed imports of new organisms.
3.1.3 Continue to strengthen the IRA process, incorporating comprehensive assessments of environmental, social and economic costs and benefits. - Review the membersh Technical Committee (IRATC); - Review and recommend improvements to the IRA methodology and consultative process;
3.1.4 Implement necessary training and capacity building programs to support the IRA process.
3.1.5 Review and update the Pest List (Quarantine) and Biodiversity (DEC) databases to ensure information remains current and readily accessible.
3.1.6 Implement the regional strategies and national legislation to prevent the introduction of new marine invasive species.
Objective 2: To review and enhance the Emergency Response Plan (ERP) to ensure an immediate and effective response to the detection of any potential invasive species
3.2.1 Revise the existing ERP and associated protocols to ensure that appropriate actions are initiated immediately following the detection of potential invasive species;
3.2.2 Recommend legislative amendments to ensure effective support for the ERP (undertake in conjunction with legislative review under Objective 1)
3.2.3 Incorporate the ERP under the National Disaster Management Plan (NDMP), or other appropriate legislation, to ensure adequate resources and support for the ERP.
3.2.4 Review invasive species present amongst Samoa's trading partners and ensure existing databases include essential information for an effective response, especi environmental and economic pests. - Assign species to very high, high, medium and low priority categories.
3.2.5 Develop specific contingency plans for high priority species (as identified under Objective 3);
3.2.6 Develop and test a simulated invasive species incursion.
3.2.7 Develop a comprehensive illustrated manual that covers the key invasive organisms of most concern to Samoa, based on their potential environmental, social and econo
Objective 3: Enhance the current inspection and surveillance systems and procedures for potential invasive species
3.3.1 Identify all likely entry pathways and the relative risk for entry of potential high-priority invasive species
3.3.2 Assess the adequacy of current surveillance for high-risk invasive species: - Assess the effectiveness of existing early-warning traps for the fruit fly and other high-risk or recommend any appropriate changes; - Identify other high priority species for which early warning systems and other specific preventative measures would be valuable (in conjunction with preparation of conti under Objective 2), and identify appropriate mechanisms; - Assess the effectiveness of private and commercial transport and cargo inspections & surveillance, and recommend improvements to aerial and marine pathways - Review current reporting and coordination procedures between agencies, including points of contact, formalise protocols and recommend improvements
3.3.3 Conduct an audit of current skills and experience, identify important gaps and recommend appropriate training for border control, quarantine and general surveillance.
Strategy 4: Foster regional and international cooperation on invasive species Objective 1: To foster regional and international cooperation on invasive species, to effectively a
4.1.1 Assess Samoa's participation in regional and international conventions, treaties, and non-binding resolutions, and recommend further action in relation to binding and instruments not yet ratified or endorsed;
4.1.2 Reinforce Samoa's existing partnerships and establish new links and cooperative arrangements in relation to invasive species to maximise the sharing and exchange of research, technologies, technical capacity and other resources. MNRE

and effective	Legislation reviewed and amendment proposed	PWG not established but work can be incorporated into SNITT
	EIA process in operation for proposed imports of organisms.	Not done
hip of the IRA	IRATC reviewed and amendments implemented IRA standards reviewed and improvements implemented	Not done
		Not done
	Training needs identified and schedule proposed	Not done
	Databases updated and maintained to meet information needs	Not done
	ERP revised and endorsed by key stakeholders	SISERP produced
	Legislative amendments recommended	No evidence of work although the new EMC has included DEC in its review. Some of the issues from this review can be incorporated to the EMC
	ERP included under the NDMP	ERP incorporated to NDMP
ally potential	Species identified & databases updated	Not done
	Contingency plans developed	Not undertaken
	Simulation undertaken	Completed simulation using LFA
omic damage.	Manual produced	Not undertaken
	Entry pathways and level of risk for priority species identified	SISERP
rganisms, and ngency plans	Early warning system reviewed and changes recommended to MOA and TSC for action. Further preventative measures identified and proposed to MOA and TSC. Effectiveness assessed and improvement s recommended to Review undertaken and protocols formalised	SISERP
	Audit conducted and training program scheduled	Not undertaken
address the threat of potential new invasions and manage established invasive species.		
d non-binding	Participation in relevant instruments reviewed and further action recommend ed.	✔
f information,	Regional collaboration on invasive species further reinforced.	PILN, PIP

ANNEX 3: CRITERIA TO ASSESS THE FEASIBILITY OF LOCAL ERADICATION (ADAPTED FROM BRAYSHER & SAUNDERS, 2002)

To help determine whether eradication is likely to be successful, six criteria can be applied: three are essential for the achievement of eradication and three will help managers decide whether eradication is preferable to ongoing control.

Essential criteria

- *Invasive species can be killed at a faster rate than they can replace themselves*

  This seems obvious but it is difficult to achieve in practice. There are two main reasons. Firstly, many populations of invasive species have a high natural rate of increase. Secondly, as the density of an invasive species declines, it takes progressively more time and more expense per individual animal to locate and remove the last few individuals.

- *Immigration can be prevented*

  This criterion can be met for small islands but is very difficult to achieve over a wide area. If an invasive species can recolonise an area from nearby populations, or by escape or release from captive populations, elimination of the species will at best be temporary. Immigration to a local area may be prevented where a suitable structure and control creates a perfect barrier.

- All reproductive individuals are at risk from the available techniques

  It is not necessary to remove all individuals of an invasive species at the first attempt. However, all reproductive or potentially reproductive members of the invasive species pest population must be able to be taken by the techniques available. This is rarely possible in part because there is only a limited armoury of techniques, and trap-shyness, bait-avoidance, and resistance to poisons, are common among pest animals.

Desirable criteria

- *The invasive species can be monitored at very low densities*

  If the invasive species cannot be detected at very low densities, then there is no way of knowing whether all individuals have been eliminated. However, most population assessment techniques cannot detect individuals at very low densities.

- *The socio-political environment supports eradication*

  Even when all the technical problems can be met, social and political factors may prevent successful eradication. Community attitudes may oppose killing large numbers of animals on moral, emotional or cultural grounds. Also, eradication is expensive. Political factors may withdraw funds from the program before eradication is achieved.

- *Eradication programs should not have detrimental impacts on native flora and fauna*

  Eradication programs should not be implemented if there is potential for the direct and/or indirect effects of the program on the environment to be greater than the expected positive outcomes of removing the invasive species.

ANNEX 4: REALITY CHECK

Assessing the likelihood that invasive species management in a defined area will be feasible, desirable and effective in reducing impact

A reality check can help determine whether invasive species management is likely to be feasible, desirable and effective. The following questions should be considered. Consultation with individuals, agencies and local stakeholders with knowledge of the species and the area may identify other issues and help answer the questions.

Is management affordable? Are sufficient resources available to manage the species effectively, both for initial costs and continued management? For eradication, the total cost to eradication should be estimated, so that adequate resources can be identified before even commencing an eradication attempt. For biological control, the total cost of a development, release and monitoring programme may also be estimated. For other long-term management options such as containment and population control by chemical-physical methods, annual costs for maintaining the pest population at a defined level should be estimated.

Consider the following:

- the estimated cost of total eradication, including resources for essential follow-up
- the estimated cost of a biological control programme, including research and development where necessary
- the annual costs of a continuing management programme, such as costs required to bring the pest population to a defined level or to prevent it from spreading beyond defined boundaries
- resources available for adequate monitoring and evaluation.

Is management desirable? Is the cost of the management plan worth the expected benefits?

For an environmental pest, the benefits may not be readily estimated in economic terms, but for a pest whose primary impact is economic, such as a crop pest which does not also significantly impact natural areas, the costs of management may be directly compared with the expected marginal gain in production. For example, the most effective technique to control rabbits in central Australia may be ripping rabbit warrens. However, the cost per square kilometer to rip rabbit warrens, and long-term follow-up is estimated to be three to four times the gross margin per square kilometer from free-range cattle production.

Is management practicable? It may be technically possible to undertake management action, but it may be impractical to apply it on the scale necessary. For example, the technique might work at a small experimental site, but farm management practices and other difficulties may make it impractical at a large scale.

Is management environmentally acceptable? Widespread aerial poisoning for example may have unacceptable impacts on non-target wildlife or domestic animals.

Is management politically and socially acceptable? Is the proposed action consistent with?

- prevailing government policy?
- local community or catchment group priorities and issues?

The cost and impact of the proposed management may have such negative consequences that action will be blocked at the political level or may be unacceptable to parts of the community on conservation and/or animal welfare grounds.

Does the action build on past work, and if so, how successful has that work been? Is the action an important initiative that sets the scene for subsequent actions by other key managers such as adjoining landholders?

Is there:

- local enthusiasm and ownership by management for the proposed action on the invasive species?
- commitment to long-term follow-up and maintenance?
- the required neighbour cooperation/ support?

Does the work have high demonstration value to encourage similar work in other areas?

Does the work improve the awareness and understanding of the local community about the production and/or conservation values of the area?

Will the work improve our understanding of the effectiveness and efficiency of invasive species management to achieve production and/or conservation outcomes?

NOTE: If the answer to any of these questions is no, then effective management (= reduction of the impact) of invasive species is unlikely or will be difficult. Before effective invasive species management can proceed, the 'no' should be changed to a 'yes', for example, by gaining the support of a key blocking group through a targeted communication campaign.

ANNEX 5: ADAPTIVE MANAGEMENT

Complete knowledge of the damage caused by invasive species and how to best manage them is often not known. To deal with this uncertainty it is best to adopt an adaptive approach to management.

For most species, there is no standard method for all situations, and often there are limited resources and time to research the problem. In these cases, the best management approach is to use each invasive species management program as an ongoing experiment from which to learn and build on existing knowledge. This is called adaptive management or 'learning by doing'. The key is to be specific about the objective of each program, to monitor progress and to evaluate results. In doing so it is important to realise that knowledge and insights can come from programs that fail to meet the desired result as well as from those that succeed. Adaptive management is particularly important given the wide range of situations that require the management of invasive species and their impacts. Flexibility is also important, that is, recognising the different circumstances and restrictions at each site, and the need to adapt to changing circumstances or conditions.

Where practicable, the adaptive management approach should underpin the development of the overall outcomes and objectives of management plans for managing invasive species.

Adaptive management addresses the need to:

- accept that knowledge of the system being managed is always incomplete- not only is the science imperfect, but the system itself is a moving target, evolving because of the impacts of management and the progressive expansion of the scale of other human activities;
- develop an integrated experimental design that allows clear separation of the effects of as many changes as possible, so that a sensible balance of management tools and policies can be developed; and
- • explore imaginative ways to set priorities for investing in research, monitoring and management.

If the adaptive management approach is to be used as the basis of the management plan, advice should be sought from groups or individuals with appropriate knowledge and experience in its use.








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Faamolemole faatuatusi uma mai fesootaiga uma i le Ōfisa Sili