



National Ballast Water Management Strategy 2016-2020

Kingdom of Tonga

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1. Executive Summary

The importance of coastal and marine environments to every aspect of the lives of Pacific Islanders cannot be overstated. Pacific Island Countries and Territories (PICTs) maintain resource rights and management responsibilities for over 30million square kilometres of ocean, equivalent to the total land area of Canada, China and the United States of America. The total population of coastal Pacific Islanders is only 2.6 million. There are 11 square kilometres of ocean for each Pacific Islander. Jurisdictionally, the ocean is 200 times more significant to the average Pacific Islander than it is to the average global citizen.

At this level of importance, the impacts of marine pollution are a major concern for PICs. Marine bio-invasions including via shipping vector such as Ballast Water and Hull Fouling is considered one of the greatest threats to the world's oceans today. Global economic impacts are considered at billions of dollars every year. Some of these impacts include the disruption to fisheries, fouling of coastal industry and infrastructure and interference with human amenity.

Invasions have already occurred in the Pacific region including the barnacle *Chthalamus proteus*, several macro-algae species, harmful planktonic algae species and the Black Striped Mussel *Mytilopsis sallei* from the Gulf of Mexico/Caribbean.

There have been a number of activities to assist the region in addressing the issue of invasive marine species. A regional strategy to address Shipping Related Invasive Marine Pests in the Pacific (SRIMP-Pac) was developed and endorsed in 2006. Guidelines for Invasive Species Management in the Pacific were developed jointly by the Pacific Community (SPC) and Secretariat of the Pacific Regional Environment Programme (SPREP) in 2009. These Guidelines included the objective to develop national invasive species strategies. In 2011, model legislation was developed by SPREP to assist PICTs in giving effect to the BWM Convention. The issue of Marine Invasives is one of the Work Plans included in the Pacific Ocean Pollution Prevention Programme (PACPOL) 2015-2020, with a focus on baseline surveys, adoption of the IMO Ballast Water Management Convention, capacity building and risk assessments.

A number of tools have also been developed by the GEF-UNDP-IMO GloBallast Partnerships Programme to assist developing countries to reduce the transfer of harmful aquatic organisms and pathogens in ships' ballast water and prepare for the implementation of the IMO Ballast Water Management Convention. In collaboration with the International Union for Conservation of Nature (IUCN) Global Marine Programme, the GloBallast Programme developed the *Guidelines for Development of National Ballast Water Management Strategies*. The Guidelines were developed in response to requests from countries for assistance in strengthening and developing national regulatory frameworks related to marine Invasive Alien Species (IAS) in particular with respect to the transfer of potentially Harmful Aquatic Organisms and Pathogens (HOAP) in ships' ballast water and sediments.

This National Ballast Water Management Strategy for Tonga has been developed in accordance with the GloBallast Guidelines, and was developed primarily during a National Consultation Workshop held in Nuku'alofa, Tonga on 30 June-1 July 2016. The Workshop was attended by 25 officials representing ten different government agencies and two industry stakeholders. The strategy also applies the requirements of Article 2(5) of the Ballast Water Management Convention. Funding for the workshop was provided by IMO, with in-kind support from Secretariat of the Pacific Regional Environment Programme's PACPOL Strategy, and the Tongan Ministry of Infrastructure. The strategic priorities for Tonga are set out in section 5, with specific action items for each if the strategic priorities set out in the action plan and implementation timetable in section 8.

2. Glossary

APEC – Asia-Pacific Economic Co-operation

BWM Convention - International Convention for the Control and Management of Ships' Ballast Water and Sediments

CBD – Convention on Biological Diversity

GEF – Global Environment Facility

GEF – PAS Inv – Global Environment Facility Pacific Alliance for Sustainability. United Nations Environment Programme: Prevention, Control and Management of Invasive Alien Species in the Pacific Islands

GISP – Global Invasive Species Programme

GloBallast - Global Ballast Water Management Programme

HAOP – Harmful Aquatic Organisms and Pathogens

IAS – Invasive Alien Species

IMO – International Maritime Organization

ITCP – Integrated Technical Co-operation Programme (IMO)

MAFF – Ministry of Agriculture, Forestry and Food (Tonga)

MoF – Ministry of Fisheries (Tonga)

MARPOL – International Convention for the Prevention of Pollution from Ships

MEIDECC – Ministry of Environment, Information, Disaster, Energy and Climate Change (Tonga)

MEPC – Marine Environment Protection Committee of the International Maritime Organization

MOI - Ministry of Infrastructure (Tonga)

PAT – Ports Authority Tonga

PICT – Pacific Island Countries and Territories

PII – Pacific Invasives Initiative

PILN - Pacific Invasives Learning Network

SPC – The Pacific Community

SPREP - Secretariat of the Pacific Regional Environment Programme

SRIMP-PAC – Shipping-related introduced marine pests in the Pacific Islands: A regional strategy

UNDP – United Nations Development Programme

3. Introduction

3.1 Background to the issue of Invasive Alien Species

3.1.1 Internationally

Shipping carries about 90% in volume of world trade (IMO 2008) and moves an estimated 10 billion tonnes of ballast water globally each year. This water frequently contains a multitude of living organisms; one study estimates that 7,000 species are carried around the world in ballast water every day (USGS, 2005, cited in GEF-UNDP-IMO 2009). The presence of these species has become a major environmental challenge and there is a growing body of research and documentation of the detrimental effects of aquatic IAS (GEF-UNDP-IMO 2009).

Over two-thirds of the world's surface is covered by water. Open oceans, semi-enclosed or enclosed seas, coastal areas, estuaries, rivers and lakes are host to highly diverse ecosystems that span all of earth's climatologic zones. The productivity of these ecosystems has largely shaped development of human society and led to human settlement along coastal margins. Globally the number of people living within 100 km of the coast increased from 1 billion in 1990 to 2.2 billion in 1995, or 39 percent of the world's population (WRI 2006). The number continues to increase (Tamelander *et al.* 2010).

The movement of marine species over large distances has prevailed since the beginning of travel by ship; for example, a wooden sailing ship in 1750 could have carried 120 marine organisms fouling and boring into the hull, and another 30 associated with dry ballast (Carlton, 1999). The introduction of sea water ballast with the advent of metal-hulled ships led to a dramatic increase in the movement of organisms, and of the types of organisms that could be transported. With the current rates of increase in ocean transport the movement of species, a proportion of which may have potential as invasive alien species (IAS), the issue has become of great global importance (Bax *et al.* 2003).

Marine invasions are not just historical. At any given moment some 10,000 different species are being transported between bio-geographic regions in ballast tanks alone (Carlton 1999). And ballast water is just one of an ever expanding list of vectors that mirror the worldwide expansion in trade and tourism (Thresher 1999; 2000). Fortunately, most of these potential invaders die. Many species cannot survive the dark and often dirty conditions in ballast tanks over a long voyage; for others, the environmental conditions at the port of discharge are not suitable. Even when conditions are apparently suitable, most organisms fail to establish, and of those that do establish most fail to become invasive—although some may become invasive after decades (or centuries) of otherwise unremarkable existence (Crooks & Soulé, 1999). Nonetheless, as ballast water has become cleaner, ship's transit speeds have increased, and environmental management of ports has improved, marine organisms are likely to find commercial shipping and other vectors an increasingly hospitable means of transport worldwide.

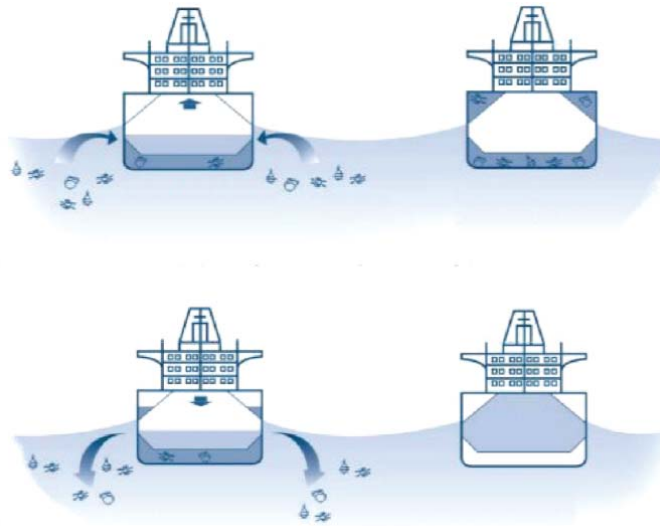


Figure 1: Cross section of a ship showing ballast water and the ballast water cycle.
From GloBallast, IMO.

When a species is transported outside of its native range and introduced to areas where it does not normally occur, it may under suitable conditions become established and, in the absence of natural predators or parasites, drastically change the ecosystem, its functions and species composition (Molnar *et al.* 2008). Such species are called **invasive alien species (IAS)**: non-native to the ecosystem under consideration and causing or likely to cause economic and/or environmental harm (Clinton, 1999; Tamelander *et al.*, 2010). IAS is widely recognised as one of the most significant threats to global biodiversity (Wilcove *et al.* 1998). In a recent report McGeoch *et al.* (2010) state that invasive alien species alter ecosystem processes, decrease native species abundance and richness via competition, predation, hybridization and indirect effects, change community structure and alter genetic diversity. Island ecosystems are especially vulnerable due to their biological and physical features, and the fact that many are hosts to high levels of endemism. Human activities also contribute to the spread of IAS, such as through deliberate introductions as in aquaculture. Regardless, the main vectors for species transport and the majority of marine species introductions are shipping (Cohen & Carlton, 1998; Ruiz *et al.* 2000; Hewitt *et al.*, 2004).

The CBD Global Biodiversity Outlook 2 (CBD 2006) discusses trends in invasive alien species (headline indicator: p. 34). Invasive species are a global problem requiring responses at all levels. Many countries have established systems to prevent and control IAS and, as part of risk assessments, to predict the likelihood of alien species becoming invasive and the potential ecological and economic cost they may incur (CBD 2006). Invasive species can have devastating impacts on native biota, causing extinctions and affecting natural and cultivated ecosystems. Since the 17th century invasive alien species have contributed to nearly 40% of all animal extinctions for which the cause is known. While a major source of marine introductions of alien species is hull fouling and the release of ballast water from ships, other vectors such as aquaculture and aquarium releases are also important and less well-regulated than ballast water. In the marine ecosystem, the movement of non-native species has been well studied. For example, of the 150 species that have arrived in the Great Lakes, 75% originated in the Baltic Sea. Similarly, migration flow from the Red Sea to the Mediterranean through the Suez Canal continues unabated with nearly 300 species of these Lessepsian migrants,

including decapod crustaceans, molluscs and fishes having entered the Mediterranean since 1891 (CBD 2006).

The increases in global maritime traffic and aquaculture and the consequent increases in IAS are now widely acknowledged as a critical trans-boundary problem in marine waters globally (UNEP, 2006). IAS has caused environmental impacts in almost half of the regions considered by the Global International Waters Assessment. In marine habitats there are a greater number of introduced species, but many remain undetected. The impact of IAS in the Black Sea (below) is a powerful example of what can happen when IAS run rampant.

The Black Sea: The collapse of the fisheries of the Black Sea during the last 40 years is a classic case of IAS being introduced when the environment was already severely stressed. Overfishing had depleted the top predators leading to “fishing down” the food web. Since the 1970s urban and industrial expansion, intensive fertiliser use and atmospheric deposition led to eutrophication, hypoxia and bottom up impacts on the food web. Additional stressors in the 1980s included chemical pollution, the alteration of the inflowing rivers and continued overfishing. In the late 1980s ballast water introduced the combed jellyfish (*Mnemiopsis leidyi*), which by 1989 had spread throughout the Black Sea, reaching densities of 15.2 kg/m². *Mnemiopsis* voraciously consumed anchovy eggs and larvae, while eutrophication and intensive fishing of anchovies and other small pelagic fish continued, resulting in the collapse of the pelagic fisheries of the Black Sea. The anchovy catch fell from 534,000 tonnes in 1986, to only 88,000 tonnes by 1991, with a loss of 150,000 jobs (UNEP 2006).

3.1.2 Regionally

“The transboundary nature of shipping and the inter-connectedness of the seas and oceans dictate that no one port or country can effectively control the spread of (IAS) via shipping. In order to be effective, countries must work cooperatively with both their neighbours and the broader global community to implement harmonized measures. The SRIMP-PAC Strategy provides a regional framework for cooperation between Pacific Island countries and territories and also with Pacific-Rim countries, including through APEC.” (Anderson et al., 2003).

Information about terrestrial invasive species in the Pacific is well documented: however, this cannot be said for marine invasives (also referred to as “harmful aquatic organisms and pathogens” in the Ballast Water Management Convention, see below), where most of the existing research has been carried out in Hawaii and the American territories and very little in the other SPREP member countries. The difficulties with investigating marine invasives include:

- The cost of carrying out surveys;
- A lack of taxonomic expertise for the identification and recognition of invasives;
- A lack of historical information on when or how invasives arrived; and
- A lack of information on the impact of invasives on the local ecosystems, and the consequent economic impacts.

The importance of coastal and marine environments to every aspect of the lives of Pacific Islanders cannot be overstated. Pacific Island Countries and Territories (PICTs) maintain resource rights and management responsibilities for over 30 million square kilometres of ocean, equivalent to the combined land areas of Canada, China and the United States of America. The total population of Pacific Islanders is only 6.7 million people and only 2.6 million if the largely inland population of Papua New Guinea is excluded. There are 11 square kilometres of ocean for each and every Pacific Islander. Jurisdictionally, the sea is nearly 200 times more significant to the average Pacific Islander than it is to the average global citizen. At this level of importance, the impacts of marine pollution are a major concern for Pacific island countries and territories (PICTs). For many PICTs the ocean is their only significant natural resource and the good governance and sustainable management of their ocean resources is the key to their economic and social well-being.

Marine bio-invasions including via shipping vectors such as Ballast Water and Hull Fouling is considered one of the greatest threats to the world's oceans today. Global economic impacts are considered at billions of dollars every year. Some of these impacts include the disruption to fisheries, fouling of coastal industry, impact on tourism, and infrastructure and interference with human amenities. Invasions have already occurred in our region including the barnacle *Chthamalus proteus*, several macro-algae species, harmful planktonic algae species and the Black Striped Mussel *Mytilopsis sallei* from the Gulf of Mexico/Caribbean.

There have been a number of activities to assist the region in addressing the issue of invasive marine species. A region-wide study on the management of ship's waste in Pacific Island Ports (Nawadra & Polglaze, 2002) described the capabilities of ports in the region for dealing with waste from shipping and provided a wide-ranging series of recommendations for improvements. It was noted that only a handful of ports within the region (Apra, Guam; Papeete, French Polynesia and Noumea, New Caledonia) had at that time the capability to properly deal with the entire spectrum of ship-generated waste. In May 2015 the Marine Environment Protection Committee of the International Maritime Organization endorsed a Regional Reception Facilities Plan (RRFP) for the Small Island Developing States (SIDS) in the Pacific Region. This plan was submitted by SPREP and co-sponsored by Australia, New Zealand and a number of Pacific island countries. The RRFP formally commenced in May 2016 and allows SIDS to satisfy their waste reception facility obligations under MARPOL through regional arrangements by identifying ports that will serve as Regional Waste Reception Centres.

A regional strategy to address Shipping Related Invasive Marine Pests in the Pacific (SRIMP-Pac) was developed and endorsed in 2006. A number of tools have since been developed by the GloBallast Partnership UNDP/GEF Project being implemented by the Project Coordinating Unit (PCU) at IMO where SPREP is a Regional Coordinating Organisation (RCO). SPREP together with IMO GloBallast PCU have implemented many activities in the region including the model act development and regional training in various aspects of ballast water management.

The establishment of the Pacific Invasives Learning Network (PILN) through SPREP is coordinating a national, regional and international communications network and the establishment of national teams focussing on invasives: Marine invasives are within the general mandate of PILN.

A number of important initiatives focussed on invasives are also partners within the region, such as the Global Invasive Species Programme (GISP; www.gisp.org), and the Pacific Invasives Initiative (PII; pacificinvasivesinitiative.org).

The Regional Invasive Species Strategy (RISS) 2000 (see www.sprep.org) was the first regional strategy of its kind in the world, and provided a framework for efforts to increase country capacity to take the five steps in relation to invasive species. This strategy was a lead-in to the establishment of PILN. With respect to marine invasives steps 1 and 2 may be possible, but the remainder are either extremely difficult and costly, or impossible to implement. There are very few examples where marine invasives have been eradicated, and only then at great cost.

The steps to address invasive species as identified in the RISS 2000 are:

1. Prevent invasives getting to each island;
2. Detect them quickly if they do;
3. Respond rapidly to the incursion;
4. Control the population; and
5. Eradicate the species from the island.

SPREP (Tye, 2009) published guidelines for invasive species management in the Pacific. While focussing mostly on the management of terrestrial IAS, the guidelines do provide a comprehensive framework for IAS management overall. There are nine thematic areas which apply equally to the management of all IAS. The Bio-security Management Action (C1: Bio-security) has direct value for any management strategy for marine IAS.

3.1.3 National (Tonga)

Tonga is a constitutional monarchy with the Government consisting of the Monarch, the Privy Council, Cabinet, Legislative Assembly and Judiciary. The Tongans, as citizens of an independent kingdom have their own nationality. The last census in 2006 estimated population was 101,991 of which 3475 were part Tongan and others. Tonga is also known as the “*Friendly Islands*” are a wide scattered group of islands lying between 18° 01’ S and 21° 28’ S and 173° 54’ W and 175° 25’ W. The group consists of over 100 islands and islets which are divided into three main groups, namely Tongatapu, Ha’apai and Vava’u which extend for about 200 miles in a NNE/SSW direction. The outlying islands of Niuatoputapu and Niua Fo’ou situated about 250 miles N, are included in the Kingdom of Tonga.

Most of the islands are of raised coral with an overlying soil developed from volcanic ash which is fertile. The islands forming the W chain are generally volcanic. Submarine volcanic eruptions occur from time to time in the area SW and NW of Tongatapu where earth tremors are frequent.

Coral reefs are widely distributed throughout Tonga. There are three main types of reef recognized: fringing, barrier and submerge reef. It is estimated that the number of reefs in each reef type are 37 fringing reefs, 7 submerged reefs and 6 barrier reefs.¹ Typically, coral reefs are of great ecological and resource significance for their habitat heterogeneity, extremely high biodiversity, and distinct trophic structure and primary production.²

¹ Lovell, E. R., and Palaki, A., 2001. National Coral Reef Status report Tonga. Prepared jointly by the International Ocean Institute (IOI) South Pacific and the Kiribati Fisheries Division for the International Coral Reef Initiative (ICRI) and the South Pacific Regional Environmental Programme (SPREP)

² Tonga Department of Environment 2004. Tonga Biodiversity Stocktaking. Technical Report No.1 for the Development of a National Biodiversity Strategic and Action Plan (NBSAP).

Mangroves are widely distributed throughout Tonga especially in Tongatapu and Vava'u. The largest mangrove forest are found in Fanga'uta Lagoon which covers an area of approximately 45km of the total area of 58km of the lagoon coastline about 80% of the total mangrove forest in Tonga. There are eight indigenous species of mangroves in Tonga over a total area of 1000 ha.

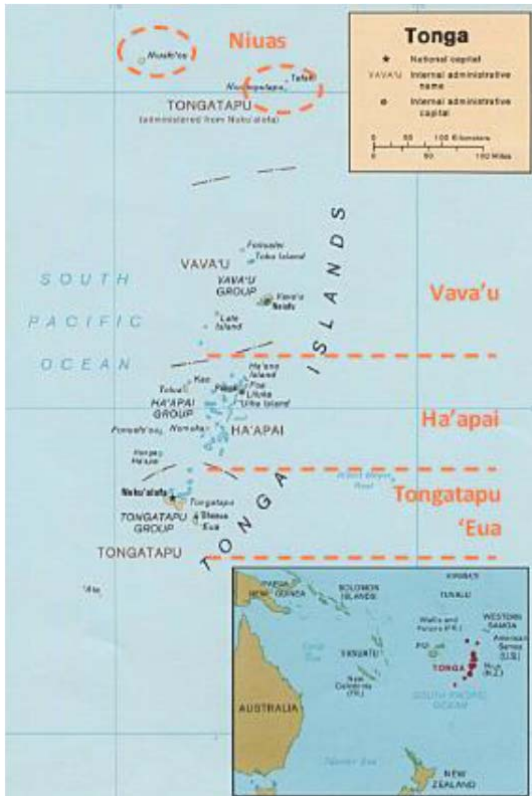


Figure 2 - Kingdom of Tonga

Passengers and cargoes to Tonga's islands are linked by air and sea transportation. Most of the smaller or outer islands are served exclusively by domestic shipping services. Therefore, the marine service is the backbone to Tonga's inter-island transport for passengers and cargo.³

The major international ports in Tonga are Nuku'alofa and Neiafu Ports, located at Tongatapu and Vava'u sub regions. Shipping is still the main supply of trade for the Kingdom of Tonga. Fisheries and tourism as well as remittances are the major source of income for the country.

Fisheries resources contribute significantly to the wellbeing of the people of Tonga, through utilization and production both at subsistence and commercial levels. The majority of Tongan households located in the outer islands and coastal areas depend on nearshore fish and other seafood for home consumption. Although many of these households sell surplus fish, it is the private sector catching fish for export (i.e. tuna fishery & deepwater snapper) that injects substantial economic benefits at the national level.

Commercial aquaculture in Tonga has developed significantly since the late 1990s, after establishing a link to the international market for giant clams (*Tridacnidae*) as an ornamental species for the aquarium market.

A project to determine the economic value of Tonga's marine resources is nearing completion, under the Marine and Coastal Biodiversity Management in Pacific Island Countries (MACBIO) Project. The project has indicated the following annual values for the key marine resources:

- Near-shore "artisanal" fishing – T\$4.21m – T\$7.3m;
- Beche de-mer – T\$.9m;
- Subsistence fishing – T\$5.46m;
- Offshore tuna fishing – T\$1m;
- Deep-water demersal – T\$1.1m; and
- Marine and coastal tourism – T\$2.2m – T\$5.5m.

³ BMT Asia Pacific Ltd, Nautical Consulting International. 2012. *Maritime Needs Safety Assessment* Final Diagnostic Report. Transport Sector Consolidation Project. Ref. R8859/01. Issue 1.

Tonga became a party to the IMO Ballast Water Management Convention on 16 April 2014, although specific implementing legislation is not yet in place. The legislation is, however, currently being prepared and will take the form of amendments to the Marine Pollution Prevention Act 2002. This Act provides for the prevention of and response to marine pollution and the dumping of wastes and other matters and to give effect to international marine pollution conventions. Section 6 of this Act currently deals with ballast water, and prohibits the discharge of ballast water containing non-indigenous harmful aquatic organisms and/or pathogens from a vessel into Tongan waters. The master of a vessel that intends to discharge ballast water in Tongan waters is required to complete and submit a Ballast Water Reporting Form.

According to the SRIMP-PAC report, Tonga is one of the high risk ports in the Pacific region. Knowing that source ports are Australia and New Zealand, vessels routes by Fiji and Samoa may carry same invasive species from the source and transit ports into the Pacific and into Tongan waters.

In 2012, several Tongan government agencies collaborated to produce a report, *“Tonga National Ballast Water and Bio-fouling Status Assessment”*. This report concluded as follows:

“Invasive Species from ballast water and bio-fouling have not been identified in Tonga due to the lack of appropriate equipment, human capacity and financial resources to conduct appropriate research. A baseline survey of the ports and harbours in Tonga would be the basis for the invasive species transferred into Tongan waters by ships’ vectors which are ships’ ballast water and bio-fouling. Although the lack of documentation regarding ballast water and bio-fouling has been identified in this report as a result of non- implementation of the convention, there is a need for moving forward with the existing legislation. Shipping cannot be avoided for that is the main mechanism on trading for Tonga. However, the trade statistics shows that more cargoes discharged into Tonga than loaded from Tonga. Therefore, it identifies that loading of ballast water in Tongan ports would more relevant than discharging ballast water. Almost the whole maritime waters of Tonga (EEZ) can be said to be of concern due to the shipping activities, shipping vectors transferring invasive (new) species and because of the geological/ geographical location of Tonga.”

In 2013, the Tongan National Invasive Species Strategy and Action Plan 2013-2020 (NISSAP) was adopted. While the focus of the NISSAP was to address the threat to the terrestrial ecosystem, it was noted that “The marine and freshwater components will be expanded as information becomes available”. Under Outcome 3.1, titled *“Mechanisms are established to prevent the spread of invasive species across international or internal borders and quickly detect and respond to those that arrive”*, the following activity is listed in the NISSAP:

“Identify and address issues associated with ballast water and hull-fouling of commercial and recreational vessels at all ports of entry and main vessel routes.”

3.2 Ballast Water Management Convention

The International Convention for the Control and Management of Ships’ Ballast Water and Sediments (BWM Convention) was adopted at an International Maritime Organization (IMO) Diplomatic Conference in 2004. The Convention will enter into force 12 months after ratification by 30 States, representing 35 per cent of world merchant shipping tonnage. The BWM Convention aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships’ ballast water and sediments. Tonga has ratified the BWM Convention.

Under the Convention, all ships in international traffic are required to manage their ballast water and sediments to a certain standard, according to a ship-specific ballast water management plan. All ships will also have to carry a ballast water record book and an international ballast water

management certificate. The ballast water management standards will be phased in over a period of time. As an intermediate solution, ships should exchange ballast water mid-ocean. However, eventually most ships will need to install an on-board ballast water treatment system.

A number of guidelines have been developed to facilitate the implementation of the Convention. The Convention will require all ships to implement a Ballast Water and Sediments Management Plan. All ships will have to carry a Ballast Water Record Book and will be required to carry out ballast water management procedures to a given standard. Existing ships will be required to do the same, but after a phase-in period of less than five years, depending on the scheduling of MARPOL surveys for the particular vessel.

Parties to the Convention are given the option to take additional measures which are subject to criteria set out in the Convention and to IMO guidelines. The Convention places obligations on Flag States, Port/Coastal States as well as ships. Flag state obligations include putting in place appropriate legislation and arrangements for the survey and inspections of registered vessels and issuing/inspecting the required documentation, as set out below. Port State obligations are primarily set out in the IMO Guidelines for Port State Control under the BWM Convention (Resolution MEPC.252(67) adopted in October 2014. These Guidelines include procedures for ship inspections, sampling, control actions and reporting requirements.

International Ballast Water Management Certificate

Ships of 400 gross tonnage and above are subject to the survey by the Administration or by an organization recognized by the Administration. After completion of a survey, an International Ballast Water Management Certificate has to be issued by the Administration or by an approved Classification Society.

Ballast Water Management Plan

Each ship is to have on board and implement a ballast water management plan that is approved by the Administration. Such a plan is to be developed taking into account BWM Convention requirements and relevant guidelines. The ballast water management plan should include:

- Ship's name, shipowner's name and address, flag, port of registry, gross tonnage, IMO number, length, beam, international call sign;
- The total ballast capacity of the ship in cubic metres;
- A brief description of the main ballast water management methods used on the ship; and
- Ballast tank arrangement etc.

Additionally, the ballast water management plan is to include designation of the officer in charge of reviewing the plan and ensuring that the plan is properly implemented. The plan is to be written in the working language of a ships' personnel and kept on board the ship and available for inspection by port/flag State authorities. The plans developed for each ship in accordance with the requirements of Ballast Water Management Convention are to be regularly reviewed by shipowner, ship operator and ship master. Any amendments to the plan should be approved by the Administration.

Ballast Water Record Book

Each ship is to have on board ballast water record book written in the working language of a ships' personnel and kept on board the ship and available for inspection by port/flag State authorities.

Each operation concerning ballast water is to be fully recorded in the ballast water record book and each entry signed by the officer in charge of the operation concerned. Officers duly authorized by the Administration may inspect ballast water record book on board any ship, and may make a copy of any entry.

Entries in the ballast record book are to be made on each following occasions:

- When ballast water is taken on board;
- Whenever ballast water is circulated or treated for ballast water management purposes;
- When ballast water is discharged into the sea;
- When ballast water is discharged to a reception facility; and
- Accidental or other exceptional uptake or discharge of ballast water.

3.3 Shipping Activity

Pacific leaders have stated that Pacific Countries are not Small Island Developing States but are in fact Large Ocean States. Our leaders have said – the Pacific Ocean is our lifeblood. The Pacific Ocean is vast, in fact comprising 98% water, 2% land.

As Large Ocean States, island members of SPREP such as Tonga are overwhelmingly dependant on shipping for economic survival. Shipping in the region can be grouped into the following broad categories:

- Transit shipping: Ships which pass through the region without stopping, en-route to other destinations;
- International shipping (as distinct from transit shipping): Ships calling at the major ports of the region from outside the region, either with incoming cargo or tourists (cruise ships) or exports;
- Regional shipping: Ships trading (both cargo and passengers) between the countries and territories within the region;
- Domestic shipping: Ships trading (both cargo and passengers) within each country in the region;
- Foreign fishing fleet: Fishing vessels from distant water fishing nations operating within the region;
- Domestic fishing fleet: Fishing vessels from the Pacific islands themselves; and
- Miscellaneous: Special purpose vessels such as Navy ships and research ships and smaller vessels such as tourist vessels, yachts and private pleasure and fishing craft.

The Marine and Ports Division under the Ministry of Infrastructure is the Tongan governmental body responsible for the following:

- develop, implement and enforce maritime legislation and regulation to ensure safety in sea transportation and related activities;
- provide safe work facilities and effective employment procedures in Tonga's maritime sector;
- formulate a maritime contingency plan and perform regular test to update and ensure its effectiveness;
- facilitate the saving of life and property at sea;
- training of Seafarers to comply with Standard of Training, Certification and Watchkeeping Convention as amend;
- protect the marine environment from pollution from ship and all other potential sources of marine pollution incidents in Tongan territory; and
- facilitate the employment of Tongan seafarers.

While the Marine and Ports Division does not currently conduct Port State Control inspections, in 2014 Tonga became an observer member of the Tokyo MOU. Inspectors are currently being trained, with a view to commencing regular PSC inspections – including with respect to the BWM Convention - in the near future.

The Government subsidizes the shipping company, which provide shipping services to the outer islands since 20th September 2006 and extended the agreement on 04 May 2009. The purpose of this agreement to promote affordable shipping services to the outer islands.

In March 2009, the IMO in collaboration with SPREP conducted a workshop on “Introduction to Ballast Water Management and Port Biological Baseline Survey” for the Pacific Island States. Two senior officers from the Marine and Ports Division attended these workshops.

Ports of Nuku'alofa is the Kingdom of Tonga's leading port, on the main island of Tongatapu, serving the country's vital international trades through a broad range of cargo handling and logistics services. The port handles Ro-Ro, container, breakbulk and cruise vessels. During 2014, 161 commercial vessels (excluding yachts and warships) used the port (see below), an increase of 9% over the previous year. Cruise vessel in particular increased significantly in both numbers and sizes as bigger vessels like *Queen Elizabeth*, *Queen Victoria*, amongst other vessels called during the year. More detailed information on shipping, in particular the routes of ships passing through Tongan waters, are expected to be available as a consequence of a new World Bank-funded AIS project that is expected to be operational by the end of 2018. This will assist in the assessment of the risk of marine IAS.

OPERATIONS	2014	2013	2012	2011	2010
Trade (Tonnes)	250,664	238,307	243,195	235,197	210,055
Container Throughput (TEUs)	14,751	13,414	12,185	12,047	10,303
Vessel Arrivals	161	148	149	169	181
Total Vessel GRT	1,726,250	1,329,849	1,277,374	1,377,137	1,173,792
Employees (FTE's+CEs)	146	148	152	148	156

Figure 3 - Port of Nuku'alofa Statistics. Source: Ports Authority Tonga 2014 Annual Report

In 2014, 246,148 tonnes of cargo was imported into Tonga, with exports totalling 18,876 tonnes for the same period. This assists in minimising the risk of marine AIS incursions in Tonga, as large ships would in most cases be taking on ballast in port, and not discharging.

3.4 Existing Introductions

As noted above the 2012 report, “*Tonga National Ballast Water and Bio-fouling Status Assessment*”, invasive species from ballast water have not been identified in Tonga. However, the 2012 report also notes the following:

As stated in the SRIMP-PAC report, 2006, introduced species of concern has been found in the Pacific region and are threatening to become invasive including the barnacle *Chthamalus proteus* and the Black striped Mussel from the Gulf of Mexico/ Carribean known as *Mytilopsis sale* (SRIMP-PAC, 2006). Strong chance of possibility that such invasive species be found in Tongan waters due to heavy traffic of shipping routes in the Pacific region...

The 2013 NISSAP notes the following:

A desktop review found reports of 394 introduced species in Tonga, from both plant and animal kingdoms, and in terrestrial, marine and freshwater ecosystems. Of those 394 species, 149 have been reported as invasive (141 plants, 8 animals). However, a number of species known to be invasive elsewhere have been recorded in Tonga, but have not been identified as invasive by those reporting them. So the actual number of invasive species is probably higher.

There are many invasive species threats in neighbouring countries, in countries that trade with Tonga and in countries that supply many of Tonga's visitors. Some of the possible pathways that those threats could use to reach Tonga are identified in the (desktop) review. Those pathways must be closed to prevent new invasive species arriving and establishing in Tonga.

The 2016 National Ballast Water Strategy Workshop, however, noted information provided by the Ministry of Fisheries that an outbreak of mussels had recently been seen on the wharf at Nuku'alofa, and that this mussel had to date not been observed at any other locations. Investigations to determine the type and possible origins of this mussel have yet to be undertaken.

3.5 Scope

This Strategy applies to all areas of Tonga.

4. Purpose of the Strategy

The purpose of this strategy is to minimise the risks of IAS by seeking to avoid adverse economic, environmental and public health impacts, whilst not unduly impeding trade; and taking a practical approach to ballast water management. This will be achieved by establishing a work plan and a system to monitor the implementation of a ballast water management strategy for Tonga and provide for future revision on the plan.

5. Strategic Priorities

The strategic priorities agreed during the National Ballast Water Strategy Workshop for inclusion in this Ballast Water Management Strategy were:

Develop procedures/policies to give full effect to the BWM Convention: The Ministry of Infrastructure has commenced the development of specific legislation to give effect to the Ballast Water Management Convention, in the form of amendments to the Marine Pollution Prevention Act 2002. The implementing legislation is expected to be in place by the end of 2017. The need for this legislation is also a recommendation from the 2012 *"Tonga National Ballast Water and Bio-fouling Status Assessment"*, specifically recommendation 2:

"Tonga may incorporate the appropriate provisions of the BWM convention into a national legislation for enforcement and compliance."

The Ministry of Infrastructure will also consider delegating enforcement powers to officials from other agencies, such as Ministry of Agriculture, Forestry and Food (Quarantine).

Given the potential problems associated with biofouling, SPREP will add provisions into their model legislation for PICs to incorporate the IMO 2011 *Guidelines for the Control and Management of Ship's Biofouling to Minimise the Transfer of Invasive Aquatic Species (IMO Resolution MEPC 207 (62))* into national legislation should they wish to do so.

Baseline and Monitoring: A baseline survey of marine invasive species specifically transferred by shipping vectors i.e. ships ballast water and hull bio-fouling, is to be carried out in Tonga for adequate and more relevant information. It was noted that the potential introduction of a mussel in the port of Nuku'alofa means that this needs to be done as a matter of priority. This is also a recommendation from the 2012 *"Tonga National Ballast Water and Bio-fouling Status Assessment"*, specifically recommendation 4:

"A baseline survey of marine invasive species specifically transferred by shipping vectors i.e. ships ballast water and hull bio-fouling, should be carried out in Tonga for adequate and more relevant information."

Raising awareness: The development of awareness materials on the potential threat of invasive species were supported, noting that it was also timely given the likelihood that the Ballast Water Management Convention will enter into force internationally by the end of 2017. It was also recognised that materials needed to be targeted to specific sectors, for example the diving and/or fishing industries could be utilised to report sightings of any new species in Tongan waters. It was noted that the BBC Video *"Invaders from the Sea"* is still being shown on Tongan TV.

One of the activities listed in the NISSAP – to incorporate invasive species content into the biodiversity curriculum of schools (See also NISSAP 1.1.1) - will be extended to include harmful aquatic organisms and pathogens.

Hull fouling on recreational craft was identified as a significant concern. It was agreed that SPREP will develop an information brochure on hull fouling for distribution to owners and operators of recreational craft. The brochure is to be based on the IMO *Guidance for Minimising the Transfer of Invasive Aquatic Species as Biofouling (Hull Fouling) for Recreational Craft* (IMO Circular MEPC.1/Circ.792).

Building Capacity: The need to build the capacity of Tongan Government agencies in marine invasive species was supported. It was recognised that capacity building was also required in the areas of ballast water sampling and inspecting ships (where training is already under way) for compliance with the Ballast Water Management Convention, as well as more general enforcement of the Convention.

Management Action: It was agreed that responsibility for this strategy should be shared between the National Marine Pollution Committee (lead by the Ministry of Infrastructure for matters related to the Ballast Water Management Convention only) and the Tonga Invasive Species Council (lead by the Ministry of Environment, Information, Disaster, Energy and Climate Change for all other matters related to harmful aquatic organisms and pathogens). Terms of reference and membership of the Committee and Council will need to be updated.

Consideration will also be given to undertaking additional work to identify and address issues associated with transfer of invasive aquatic species through hull bio-fouling.

Specific action items under each of these strategies are set out in section 8 below.

6. Leading Agency

GloBallast defines the responsibilities of the Leading Agency for the purposes of a National Ballast Water Management Strategy as follows:

- Integration of the National Strategy into pertinent national policies/strategies and ensuring that necessary legislation is in place;
- Devising and ensuring implementation of necessary scientific, operational and administrative arrangements for all ships visiting the country's ports;
- Ensuring that all key stakeholders are fully conversant with the National Strategy, appropriately trained and properly authorized to act on its behalf, where required;
- Monitoring and reviewing on an ongoing basis how effectively the National Strategy is being implemented and introducing changes, as necessary;
- Ensuring effective enforcement of national laws and regulations;
- Administration of relevant international instruments related to ballast water management;
- Incorporating into the National Strategy improved measures that become possible due to experience gained in operating the National Strategy and/or through developments in research or technology, or changed international requirements or 'best practice';
- Ensuring the ongoing liaison and cooperation of all key stakeholders; and
- Participating in international, regional and national matters relating to BWM.

In Tonga, the Marine and Ports Division under the Ministry of Infrastructure (MOI) is *inter alia* responsible for regulating the maritime transport system under the mandate of the *Marine Pollution Prevention Act 2002* and associated maritime Acts. The MOI is therefore the "Lead Agency" for the purposes of administering the operational arrangements of the BWM Convention.

However, Ministry of Infrastructure resources are limited and there are at least three other agencies in Tonga with active roles in broader invasive species management:

- The Ministry of Environment, Information, Disaster, Energy and Climate Change (MEIDECC) has responsibility for the overall coordination and management of invasive species problems, including monitoring and response plans, as well as the implementation of biodiversity and environmental conservation and legislation. MEIDECC is also the lead agency for the purposes of the National Invasive Species Strategy and Action Plan 2013-2020 (NISSAP).
- The Ministry of Agriculture, Forestry and Food regulates the import of food and other goods to ensure that Tonga is safeguarded against exotic animal and plant pests and diseases, and includes quarantine.
- Ministry of Fisheries.

7. National "Task Force"

The GloBallast Guidelines provide for the establishment of a "Task Force" to oversee and review implementation of the strategy. GloBallast defines the responsibilities of the "Task Force" as being to work together after the development of the National Strategy to provide guidance, oversight, and advice on matters relating to harmful aquatic organisms and pathogens, while the Lead Agency is primarily responsible for administering the operational arrangements.

Section 16 of the Tongan Marine Pollution Prevention Act 2002 provides for the establishment of a National Marine Pollution Committee to give advice to the Minister on a number of marine-pollution related matters, with the additional provisions for the Committee to provide advice on "...any other matters related to marine pollution as required by the Secretary". Membership of the Committee is also prescribed, and includes the key government agencies as well as ports and industry. The

Ministry of Infrastructure will work to extend the functions and membership of this Committee to oversight the implementation and ongoing monitoring of this Strategy in so far as it relates to the implementation of the Ballast Water Management Convention.

The Tonga Invasive Species Council was established in 2014 in response to the National Invasive Species Strategy and Action Plan 2013-2020. The Ministry of Environment, Information, Disaster, Energy and Climate Change will work to extend the functions and membership of the Council to oversight the implementation and ongoing monitoring of this Strategy with respect to action items that do not relate to the implementation of the Ballast Water Management Convention.

8. Action Plan and Implementation Timetable

Strategy/Theme	Action item	Responsible Agency/Agencies	Funding source/s?	Timing
Develop procedures/policies to give full effect to the BWM Convention (also 1.3.1 of NISSAP)	Incorporate the appropriate provisions of the BWM convention into the Marine Pollution Prevention Act 2002. (See also Recommendation 2, 2012 Status Assessment)	Mol/PAT/Attorney-General Office	N/A	2017
	Give further consideration to providing Ballast Water Management convention enforcement powers to officials from agencies in addition to Mol.			
	Revise NISSAP to include references to the Ballast Water Management Convention and/or harmful aquatic organisms and pathogens as necessary, including relevant action items from this Strategy.	MEIDECC, Mol	GEF6 Invasive Species	2017
	Include provisions in model legislation to give effect to <i>2011 Guidelines for the Control and Management of Ship's Biofouling to Minimise the Transfer of Invasive Aquatic Species (IMO Resolution MEPC 207 (62))</i> .	SPREP	SPREP	2017
Baseline and Monitoring (also 2.1.1 of NISSAP)	A baseline survey of marine invasive species specifically transferred by shipping vectors i.e. ships ballast water and hull bio-fouling, should be carried out in Tonga for adequate and more relevant information.* (See also Recommendation 4, 2012 Status Assessment and 2.1.1 of NISSAP).	MEIDECC, MoF, Mol	MEIDEC/SPREP to seek funding possibilities GEF6	2017 2018

	Continue progressing the World Bank-funded Automatic Information System (AIS) project in order to provide data on shipping routes through Tongan waters, with a view to carrying out further risk assessments with regards to harmful aquatic organisms and pathogens. (See also 2.2.1 of NISSAP)	MEIDECC (Meteorology/coastal radio), PAT	World Bank	2018/2019
Raising awareness	Develop and utilise awareness materials on the potential threat of harmful aquatic organisms and pathogens to Tonga to coincide with the Ballast Water Management Convention coming into force.** Materials to be targeted to specific sectors, for example diving and/or fishing industries and outreach to local communities, in particular to report sightings of new species. (See also NISSAP 1.1.2)	Mol, MAFF Quarantine, MoF, MEIDECC	GEF, National budget, IMO, port fees, SPC, SPREP, marine private sector companies (shipping companies, dive companies)	2017**
	Incorporate IAS including harmful aquatic organisms and pathogens content into the biodiversity curriculum of schools (See also NISSAP 1.1.1) Raise awareness and carry out outreach on the impacts of harmful aquatic organisms and pathogens.	MEIDECC, Ministry of Education and Training	Seek for funding GEF6 IMO Donors/Private sector	2017
	Develop information brochure on hull fouling for distribution to owners and operators of recreational craft to be based on <i>Guidance for Minimising the Transfer of Invasive Aquatic Species as Biofouling (Hull Fouling) for Recreational Craft (IMO Circular MEPC.1/Circ.792)</i> ;	SPREP	SPREP/industry	2016/2017
Building capacity (also 1.2.3 of NISSAP)	Ensure that compliance with the Ballast Water Management Convention is part of future Port State Control inspections in Tongan ports, and ensure appropriate training is provided.	Mol, MAFF Quarantine	IMO Tokyo MoU NZ Aid	2017 (before BWMC in force)

	<p>Ensure appropriate sampling equipment is provided to Tongan Port State Control officers.</p> <p>Ensure that a ballast water sample testing capability is developed, taking into account IMO Guidelines for ballast water sampling.</p>	<p>Mol, MAFF Quarantine, MoF, Ministry of Land Survey and Natural Resources, MEIDECC</p>	<p>SPREP (Donor funding) IMO TCP</p>	<p>2017</p>
	<p>Tonga officials from line ministries to attend training course in Port Biological Baseline Survey</p>	<p>Mol/MEIDECC (lead) MoF, MAFF, Min of Land Survey and Natural Resources</p>	<p>GEF6 IAS IMO ITCP</p>	<p>2017/18</p>
	<p>Strengthen existing fisheries laboratory for identification and testing/monitoring of HAOP</p> <p>Using BWMC Guidelines for testing (IMO document BWM.2-Circ.42-Rev.1)</p>	<p>MoF</p>	<p>Funding to be sought (GEF6?)</p>	<p>2018</p>
Management action	<p>The National Marine Pollution Committee be invited to:</p> <ul style="list-style-type: none"> • review its composition to identify any other key stakeholders in the implementation of the BWM Convention that could contribute to the Committee's work;* and • amend its terms of reference to assume responsibility for oversight of the operational aspects of the BWM Convention. 	<p>Mol</p>	<p>No funding required</p>	<p>2016/17</p>
	<p>The Tonga Invasive Species Council (established in 2014) be invited to:</p> <ul style="list-style-type: none"> • amend its terms of reference to assume responsibility for harmful aquatic organisms and pathogens, other than the operational aspects of the BWM Convention; • review its composition to include Mol and any other agencies 	<p>MEIDECC</p>		<p>2016/17</p>

	<p>relevant to harmful aquatic organisms and pathogens; and</p> <ul style="list-style-type: none"> consider whether the SPC Emergency Response Plan should be extended to encompass harmful aquatic organisms and pathogens. 		GEF6 IAS (SPREP) (ERP)	
	Review NISSAP to include management aspects of harmful aquatic organisms and pathogens.	MEIDECC	GEF6 IAS	2017/18
	<ul style="list-style-type: none"> Consider undertaking additional work to identify and address issues associated with transfer of invasive aquatic species through hull bio-fouling (biofouling), taking into account the information provided in: <ul style="list-style-type: none"> 2001 Guidelines for the Control and Management of Ship's Biofouling to Minimise the Transfer of Invasive Aquatic Species (IMO Resolution MEPC 207 (62)); Guidance for Minimising the Transfer of Invasive Aquatic Species as Biofouling (Hull Fouling) for Recreational Craft (IMO Circular MEPC.1/Circ.792); and SRIMP-PAC, in particular pre-border and at-border fouling management measures (sections 11.1 and 11.2 respectively) and the Generic Hull Fouling Management Template (Appendix 1). 	Mol, MEIDECC, MAFF Quarantine	PILN	TBA

* Based on an Action Items from *Tonga National Ballast Water and Bio-fouling Status Assessment*.

**Timing will be dependent on international entry into force of the BWM Convention.

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