CLEANER PACIFIC 2025:

Pacific Regional Waste and Pollution Management Strategy 2016-2025

29 July 2015

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Source: http://www.oanda.com/currency/travel-exchange-rates							

Foreword

To be completed by SPREP.

Contents

Acronyms

AFD	Agence Française de Développement
AS	American Samoa
CNMI	Commonwealth of the Northern Marianas Islands
CI	Cook Islands
FSM	Federated States of Micronesia
FJ	Republic of Fiji
FP	French Polynesia
GEF	Global Environment Facility
GU	Guam
IWRM	Integrated Water Resources Management
KI	Republic of Kiribati
MOU	Memorandum of Understanding
MSW	Municipal Solid Waste
MI	Megalitre
NA	Republic of Nauru
NI	Niue
NC	New Caledonia
NI	Niue
PA	Republic of Palau
PICs	Pacific Island Countries
PICTs	Pacific Island Countries and Territories
PNG	Papua New Guinea
RMI	Republic of the Marshall Islands
SA	Samoa
SI	Solomon Islands
SPREP	Secretariat of the Pacific Regional Environment Programme
TK	Tokelau
TO	Tonga
TV	Tuvalu
VU	Vanuatu
WF	Wallis and Futuna
WHO	World Health Organisation

Executive Summary

Cleaner Pacific 2025: Pacific Regional Waste and Pollution Management Strategy 2016-2025 is a comprehensive long-term strategy for integrated sustainable waste management and pollution prevention and control in the Pacific islands region until 2025. It provides a strategic management framework to address waste, chemicals, and pollutants (WCP) that will reduce associated threats to sustainable development of the region. Priority areas for management include municipal solid waste (MSW), asbestos, electrical and electronic waste (E-waste), healthcare waste, chemicals (such as persistent organic pollutants (POPs), ozone depleting substances (ODSs), and mercury), used oil and lubricants, marine litter, ship-sourced pollution, disaster waste, and liquid waste (such as sewage and trade waste).

Cleaner Pacific 2025 integrates strategic actions addressing priority waste and pollution issues, and incorporates lessons learnt from the implementation of regional strategies that it replaces, specifically: the Pacific Regional Solid Waste Management Strategy 2010-2015 (SPREP, 2010); An Asbestos-Free Pacific: A Regional Strategy and Action Plan 2011 (SPREP, 2011); Pacific E-waste: A Regional Strategy and Action Plan 2012 (SPREP, 2012); Pacific Health Care Waste: A Regional Management Strategy and Action Plan 2013-2015 (SPREP, 2013); and the Pacific Ocean Pollution Prevention (PACPOL) Strategy 2015-2020.

Cleaner Pacific 2025 incorporates the lessons learnt from the implementation of the previous regional waste and pollution management strategies with the aim of improving implementation into the future. The key lessons learnt include **the importance of evidence-based strategic planning** that requires the investment in the development of data at country and regional scales in order to support clear definitions of strategic long-term goals, articulation of practical strategies and actions to progress towards these goals, and establishment of clear and measurable targets to monitor progress; **the importance of a robust and flexible strategy** that can be adapted to emerging priorities and take advantage of new (unexpected) funding opportunities and donor interest; **the challenges of PICTs capacity to implement WCP programmes**, which require that development and implementation of specific programmes of actions in PICTs be accompanied by in-country human resource support to enhance implementation success; **the relevance of the technical cooperation approach**, which is a learn-by-doing approach that develops the technical capacity of Pacific islanders, engenders pride in accomplishments, and if replicated sufficiently, may ultimately lead to a degree of self-sufficiency in PICTs; **the importance of regional coordination** to reduce duplication and wastage of resources; **the effectiveness of national and sub-regional training approaches** that are potentially more cost-effective than regional training; activities and allow for customised instruction suited to the local situation; and the **importance of sustainable funding and ongoing support mechanisms** that are integrated into waste, chemicals and pollution management programmes.

The overview of *Cleaner Pacific 2025* is shown in Table ES1. The vision is of "***a Cleaner Pacific environment****",* and its mission is *"**to implement practical and sustainable solutions to the prevention and management of waste and pollution in the Pacific**"*.

To improve uptake of *Cleaner Pacific 2025* at the national level, PICTs are urged to table the regional strategy through appropriate national processes in order to obtain national endorsement at the highest level. This is expected to improve the mainstreaming of PICT-level activities from *Cleaner Pacific 2025* into national and corporate work programmes and budgets, thereby improving implementation.

Cleaner Pacific 2025 will undergo a participative mid-term review in 2020 coordinated by SPREP, with the active involvement of PICTs and other stakeholders. The main purpose of the mid-term review is to verify and evaluate the relevance of the 15 strategic actions to the waste, chemicals and pollution agenda in the Pacific. The mid-term review shall also identify necessary corrective actions and strategic recommendations for the second half of the strategy period (2021-2025).

Table ES1: Overview of *Cleaner Pacific 2025*

Vision	**A cleaner Pacific environment**
Mission	To implement practical and sustainable solutions for the prevention and management of waste and pollution in the Pacific.

Guiding Principles	Strategic Goals	Performance Indicators	2014 Baseline	Targets		Strategic Actions
				By 2020	By 2025	
1. Reduce, Reuse, Recycle, Return (3R + Return) 2. Product stewardship 3. Polluter pays principle 4. Proximity principle 5. Transparency 6. Public consultation and participation 7. Multi-sectoral approach 8. Regionalism 9. Sound decision-making 10. Precautionary approach 11. Adherence to regional and international conventions 12. Public-private partnership 13. Selection of appropriate and affordable technology	Prevent and minimise generation of wastes and pollution and their associated impacts	Per capita generation of municipal solid waste (kg/person/day)	1.3	1.3	1.3	**Strengthen institutional capacity** 1. Undertake regular WCP data collection and management (including storage, interpretation, dissemination, and sharing) 2. Develop and enforce national policies, strategies, plans and legislation and strengthen institutional arrangements **Promote public private partnerships** 3. Develop new public private partnerships including through strengthened PPP frameworks **Implement sustainable best practices in WCP management** 4. Implement best practice occupational health and safety measures 5. Implement WCP prevention and reduction programmes 6. Implement resource recovery programmes 7. Remediate contaminated sites and WCP stockpiles 8. Expand user-pay WCP collection services 9. Improve WCP management infrastructure and support sustainable operation and maintenance 10. Implement best practice environmental monitoring and reporting **Develop human capacity** 11. Implement sustainable human capacity development programmes **Improve dissemination of outcomes and experiences in WCP management** 12. Utilise project outcomes to implement regional and national WCP education and behavioural change campaigns **Promote regional and national cooperation** 13. Establish a regional Clean Pacific Roundtable 14. Strengthen national and regional cooperation and coordination 15. Cooperate to ensure timely monitoring of Cleaner Pacific 2025
		No. of marine pollution incidents	6 (2 PICTs)	0	0	
		No. of port waste reception facilities	5	10	20	
	Recover resources from wastes and pollution	Waste recycling rate (=amount recycled, reused, returned/amount recyclable) (%)	47%	60%	75%	
		No. of national or municipal composting programmes	18	30	40	
		No. of national or state container deposit programmes	4 (KI, PA, Kosrae, Yap)	7	10	
		No. of national EPR programmes for used oil	2 (NC, FP)	3	10	
		No. of national EPR programmes for E-waste	1 (NC)	5	8	
	Improve life-cycle management of residuals	No. of national or state user pays systems for waste collection	9	14	21	
		Waste collection coverage (% of population)	88% (urban) (= 35% nationally)	100% (urban) (= 40% nationally)	60% (nationally)	
		Waste capture rate (= amount collected/amount generated) (%)	Insufficient data	Establish baseline & targets		
		No. of temporary, unregulated, and open dumps	Over 250	237	225	
		Quantity of asbestos stockpiles (m^3)	> 187,891 m^2	159,700 m^2	131,500 m^2	
		Quantity of healthcare waste stockpiles (tonnes)	> 76 tonnes	< 20 tonnes	0 tonnes	
		Quantity of E-waste stockpiles (tonnes)	Insufficient data	Establish baseline & targets		
		Quantity of used oil stockpiles (m^3)	2,960 m^3	1,480 m^3	0 m^3	
		Quantity of pharmaceutical and chemical stockpiles (tonnes)	Insufficient data	Establish baseline & targets		
		Urban sewage treated to secondary standards (%)	65%	Establish after regional assessment		
	Improve monitoring of the receiving environment	No. of water and environmental quality monitoring programmes	~ 3 (AS, CI, GU)	5	7	
		No. of national chemicals and pollution inventories	2 (SA, PA)	3	6	

1 Introduction

1.1 Introduction

Wastes and pollution are grave threats to sustainable development in the Pacific islands, perhaps second only to climate change. Inadequate management of wastes and poor control over polluting activities can affect the health of Pacific communities, degrade natural ecosystems and reduce their resilience to climate change impacts, and ultimately retard the social and economic development of Pacific Island Countries and Territories (PICTs). Indeed, many PICTs face heightened risks from the impacts of poor waste and pollution management, since their economic bases (tourism, fishing, and agriculture) are heavily reliant on an environment relatively free of waste and pollution. Furthermore, many waste and pollution issues are trans-boundary in nature, which means that poor control and management in one country (or region) can negatively affect neighbouring countries.

Cleaner Pacific 2025 is a comprehensive long-term strategy for integrated and sustainable waste management and pollution prevention and control in the Pacific islands region over the next decade (2016-2025).

Cleaner Pacific 2025 provides a strategic management framework to address waste, chemicals, and pollutants (WCP) that will reduce associated threats to sustainable development of the region. Priority areas for management in the Pacific region include municipal solid waste (MSW), asbestos, electrical and electronic waste (E-waste), healthcare waste, chemicals (such as persistent organic pollutants (POPs), ozone depleting substances (ODSs), and mercury), used oil and lubricants, marine litter, ship-sourced pollution, disaster waste, and liquid waste (such as sewage and trade waste).

With the progress being made in waste management and pollution control in the region, largely through donor-funded projects, *Cleaner Pacific 2025* seeks to further strengthen regional cooperation and collaboration. This will occur primarily through a proposed Clean Pacific Roundtable mechanism that will facilitate waste management and pollution control (WMPC) dialogue and networking in the region. The Roundtable will also provide a forum to share experience on WMPC and to disseminate information on new and existing opportunities. *Cleaner Pacific 2025* integrates strategic actions addressing priority waste and pollution issues, and incorporates lessons learnt from the implementation of regional strategies that it replaces, specifically: the *Pacific Regional Solid Waste Management Strategy 2010-2015* (SPREP, 2010); *An Asbestos-Free Pacific: A Regional Strategy and Action Plan 2011* (SPREP, 2011); *Pacific E-waste: A Regional Strategy and Action Plan 2012* (SPREP, 2012); *Pacific Health Care Waste: A Regional Management Strategy and Action Plan 2013-2015* (SPREP, 2013); and the *Pacific Ocean Pollution Prevention (PACPOL) Strategy 2015-2020*.

Four-yearly action plans will be developed to implement *Cleaner Pacific 2025*, and implementation will be monitored through a framework that includes targets and key performance indicators that align with those of this Strategy, and through annual reports submitted by participating PICTs.

Cleaner Pacific 2025 was developed with the financial and technical support of JICA and in close consultation with PICTs, strategic partners, and others interested in the future direction of waste and pollution management in the Pacific islands region.

1.2 Scope

Cleaner Pacific 2025 focuses on the management of wastes and chemicals, and the control of pollution within the 21 countries and territories that are members of SPREP[1]. Wastes addressed include solid waste materials from all sources (including households, businesses institutions, and government entities); waste arising from disasters; asbestos; electrical and electronic waste (E-waste); hazardous waste from healthcare activities; used lead acid batteries; used oil; and liquid wastes such as sewage, trade wastes, and animal wastes.

Cleaner Pacific 2025 also focuses on the management of chemicals including persistent organic pollutants (POPs) as defined by the Stockholm Convention on POPs (Secretariat of the Stockholm Convention, 2008); mercury; and ozone depleting substances (ODS).

The third key component of this regional strategy is pollution control, which encompasses pollution of the terrestrial and marine environment from poor waste management as well as shipping-related activities; and marine litter prevention and management. Definitions of each waste type addressed by this regional strategy can be found in the glossary (Appendix A).

The geographical scope of *Cleaner Pacific 2025* is the SPREP region as defined by the coastlines and all marine waters within the Exclusive Economic Zone (EEZs) of the 21 PICTs, which are members of SPREP (Figure 1).

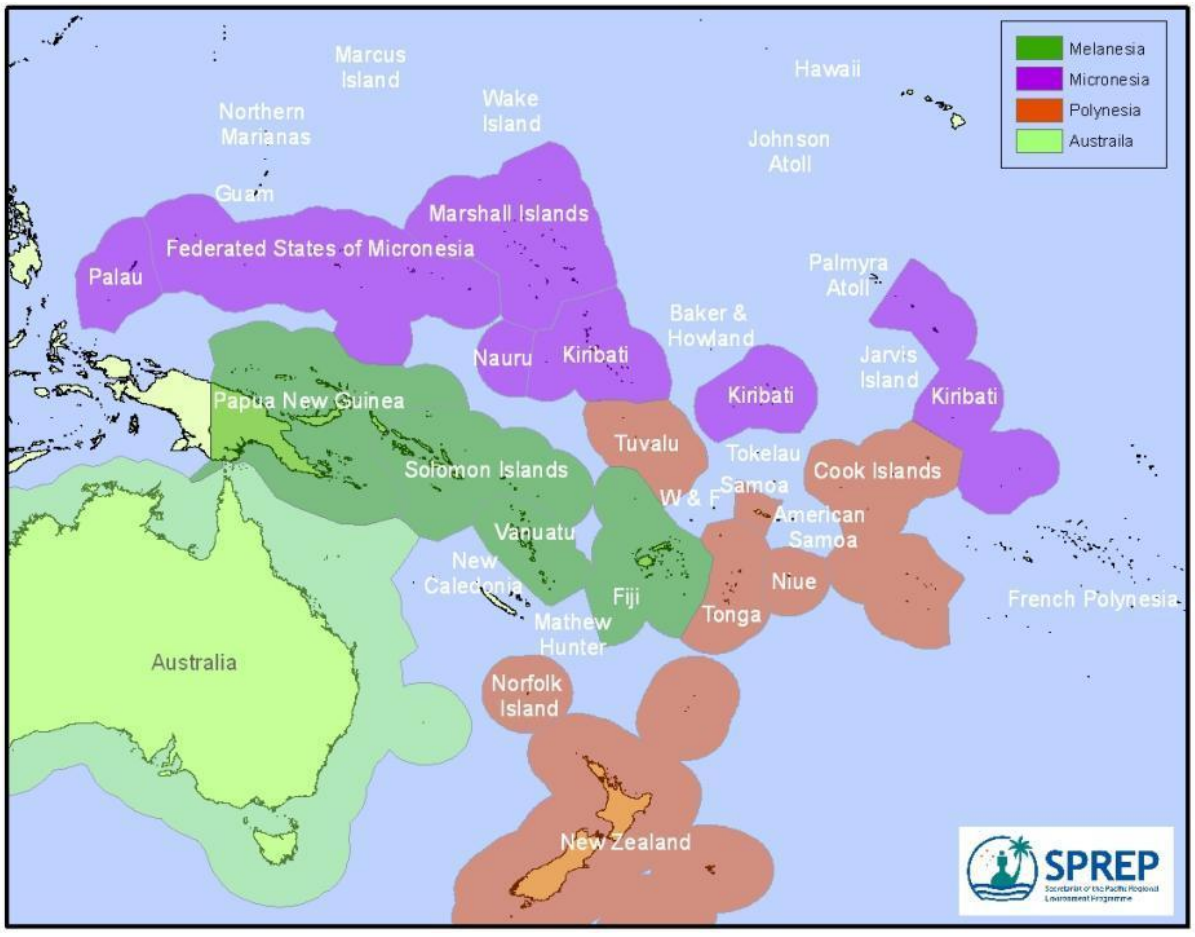

Figure 1: Map of the SPREP Region

[1] American Samoa, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Kiribati, Republic of the Marshall Islands, Nauru, New Caledonia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.

2 Background

2.1 The Pacific Islands Region

The Pacific islands region is located in the western, northern, and central Pacific Ocean and consists of 14 independent countries and eight territories delineated into three major ethnic regions: Melanesia, Micronesia, and Polynesia (Figure 1). The region has a population of around 10.57 million inhabitants that occupy just over 550,000 km^2 of land ranging from large volcanic landforms to low-lying atolls, and raised coral islands (Table 1). The land mass comprises only 2% of the region's exclusive economic zone of almost 30.55 million km^2 (SPC, 2015a). The distribution of so many small islands across a vast oceanic area contributes to the remoteness of many PICTs, which creates many constraints to economic development and to systems that rely on external inputs and supplies.

Table 1: 2013 General characteristics of the Pacific Islands

	Country/Territory	Land area (km^2)	Mid-2013 population	Density (persons / km^2)	2013-2020 Growth rate (%)	Gross Domestic Product (in current prices)		Primary Island Type(s)
						Per capita (USD)	Year	
MELANESIA	Fiji	18,333	859,200	47	0.5	3,639	2011 [p]	High islands
	New Caledonia^T	18,576	259,000	14	1.2	36,405	2010	High islands
	Papua New Guinea	462,840	7,398,500	16	2.3	18,437	2011 [p]	High islands
	Solomon Islands	28,000	610,800	22	2.4	1,676	2012	High islands
	Vanuatu	12,281	264,700	22	2.2	3,099	2011	High islands
MICRONESIA	Federated States of Micronesia	701	103,000	147	-0.2	3,031	2011 [p]	High islands
	Guam^T	541	174,900	323	1.7	25,420	2010	Raised limestone with volcanic formations
	Kiribati	811	108,800	134	2.0	1,651	2011	Atolls
	Marshall Islands	181	54,200	299	0.4	3,158	2011	Atolls
	Nauru	21	10,500	499	1.6	8,379	2010–11	Raised coral island
	Northern Mariana Islands^T	457	55,600	122	1.1	11,622	2010	High islands
	Palau	444	17,800	40	0.4	10,314	2011	High islands and coral islands
POLYNESIA	American Samoa^T	199	56,500	284	0.5	9,333	2010	High islands
	Cook Islands	237	15,200	64	0.3	17,565	2011 [p]	High islands and atolls
	French Polynesia^T	3,521	261,400	74	0.5	26,667	2011e	High islands
	Niue	259	1,500	6	-1.9	15,807	2011	Uplifted coral island
	Pitcairn^{A,T}	47	57	1	NA	NA	-	Volcanic, uplifted coral, and atolls
	Samoa	2,934	187,400	64	-0.1	3,680	2012	High islands
	Tokelau^T	12	1,200	98	-0.8	n.a.	n.a.	Atolls
	Tonga	749	103,300	138	-0.1	4,557	2011–12 [p]	High islands, coral islands
	Tuvalu	26	10,900	420	1.7	3,407	2011	Atolls
	Wallis & Futuna^T	142	12,100	85	-0.2	12,324	2005	High islands
	TOTALS	**551,265**	**10,566,500**					

Sources: SPC. (2015). 2013 Pacific islands population poster. Retrieved from http://www.spc.int/prism/.

SPC. (2015). 2013 Pocket statistical summary. Retrieved from http://www.spc.int/prism/.

Legend: A = Not a member of SPREP; T = Territory; NA = Not Available; p = provisional figure

This huge expanse of ocean supports some of the most extensive and diverse coral reefs in the world, the largest tuna fishery, and the healthiest—and in some cases, the largest—remaining populations of many globally rare and threatened species including whales, sea turtles, dugongs and saltwater crocodiles. For thousands of years, Pacific peoples have relied on these rich natural resources for their survival. The marine environment sustains islanders by providing food, transport, and economic opportunity. Equally, the lands and forests of the Pacific islands have also often nurtured their inhabitants by providing food, fuel, and shelter.

2.2 Socio-Economic Context

The Pacific PICTs have one of the highest levels of indigeneity of any part of the world, with over 90% of Pacific populations comprised of indigenous Pacific peoples. Traditional culture and societies are therefore strong and form a key part in shaping lifestyles and responses to globalisation and economic development (Koshy, Mataki & Lal, 2008).

Pacific Islanders remain highly dependent on biological resources and healthy ecosystems for survival. Fishing, agriculture, and tourism are the mainstays of the economies of most PICTs, whilst some PICTs (mostly Melanesian countries and territories) have significant mineral resources and forestry assets. Commercial agriculture (mainly sugar, copra, taro, bananas, and beef cattle production) accounts for over 85% of foreign exchange earnings in PICTs, contributes substantially to employment (40–80%), and represents 20–40% of gross domestic product (GDP) and over 50% of exports. In most PICTs, only a small fraction of land mass is suitable for agriculture, and much of the agriculture is confined along coastal plains, river deltas and valleys (Koshy, Mataki, & Lal, 2008, p. 20).

Overall, economic growth in the Pacific is highly volatile, reflecting a range of factors such as the impact of natural disasters, and the dependence on a few commodity exports (agricultural, forestry, fishing and minerals) which are sold into volatile international markets over which PICTs have no control (Russell, 2009).

More than 35 percent of the people of the Pacific islands live and work in towns, and the rate of urban population growth throughout most of the region is high (World Bank, not dated). Overall, 12 of the 21 PICTs covered by this regional strategy are predominantly urban (urban populations greater than 45%) (SPC, 2015b). Whilst urbanization has improved the economic prospects and quality of life for a large and increasing proportion of the people of the Pacific, it has also caused many problems including the proliferation of informal settlements (with inadequate access to water, sanitation facilities; and waste collection services), worsening environmental conditions, and increasing social problems associated with unemployment and underemployment (World Bank, not dated).

Public health problems in Pacific Island countries include infectious diseases, in particular respiratory diseases related to overcrowding, and gastroenteric diseases related to water pollution, poor sanitation, and inappropriate health and hygiene practices (Russell, 2009). Gastroenteritis, conjunctivitis, and infant diarrhoea are among the most commonly reported communicable diseases requiring hospitalization. Dengue fever is also common throughout the region. One of the most significant challenge facing health services is the rising prevalence of chronic non-communicable diseases, including cardiovascular diseases, diabetes and cancer, which have become the leading causes of death in PICTs (SPC, 2008).

2.2.1 Transportation

International and regional transport connectivity is important for PICTs participation in regional and global trade, however, Pacific SIDS are very remotely located from major global markets located in Asia, North America, North Europe, the Mediterranean, Western Asia, and the Indian subcontinent. The weighted average distance of Pacific SIDS from these markets is around 11,500 km (United Nations Conference on Trade and Development, 2014). Several factors combine to make shipping services to an from Pacific SIDS relatively expensive, including long

distances between ports and low trade volumes which make it difficult to take advantage of economies of scale; widely varying quality of port facilities, with a general lack of major cargo-handling infrastructure that mandates the use of relatively expensive geared container vessels (i.e. with on-board cranes); and often extreme trade imbalance (with exports far outweighed by imports), which means costly container repositioning[2] (Asian Development Bank, 2007). These challenges combine to generally raise the costs of goods, and the costs of returning recyclable commodities to foreign recycling facilities.

Coastal and interisland shipping services are also necessary to reach populated outer islands spread across vast distances. However, domestic shipping services in many PICTs are infrequent and unreliable, which has negative impacts on the production and income generation possibilities of islands, and on the ability of public agencies to deliver programmes and develop social and environmental infrastructure in the outer islands (United Nations Conference on Trade and Development, 2014).

2.3 Vulnerabilities

2.3.1 Climate Change

Climate change is considered to be one of the greatest threats to the livelihoods, security and well-being of the peoples of the Pacific. Among the most vulnerable are small island states, in particular the Marshall Islands, Kiribati, Tuvalu, Tonga, FSM, and the Cook Islands (Smith et al., 2001) which are are only a few meters above present sea level and may face serious threat of permanent inundation from sea-level rise. Recent climate change projections for the Pacific Islands region suggest that there are likely to be increases in the annual mean rainfall, the frequency of heavy rain days, the sea-surface temperature, and the intensity of tropical cyclones, whilst the frequency of tropical cyclones is likely to decrease (Australian Bureau of Meteorology and CSIRO, 2011).

The predicted effects of climate change could have significant impacts on efforts to manage waste, chemicals, and pollution in the Pacific region. Coastal inundation and floods could damage waste management infrastructure and release harmful chemicals and leachate that pollute the land and groundwater; and intensified tropical cyclones could generate increased volumes of disaster debris and waste that overwhelm existing management capacities. In the face of these impacts, it is crucial that adaptation to climate change impacts be integrated into national waste management planning.

2.3.2 Biodiversity Conservation

The Pacific island region is one of the most diverse regions in the world and home to a high proportion of endemic plant and animal species. New Caledonia, East Melanesian islands (PNG, Solomon Islands, and Vanuatu), as well as all of Micronesia and Polynesia are among the world's biodiversity hotspots— the richest and most threatened reservoirs of plant and animal life on Earth (Critical Ecosystem Partnership Fund, 2015). The region is believed to contain more than:

- 16,600 plant species, of which 51.2% are endemic;
- 110 mammal species, of which 51.4% are endemic;
- 757 bird species, of which 44.3% are endemic;
- 251 reptile species, of which 58.6% are endemic;
- 45 amphibian species, of which 91.1% are endemic; and
- 233 freshwater fish species, of which 13.7% are endemic.

Pacific island biodiversity is under intense pressure from habitat loss and degradation, invasive species introductions, climate change, overexploitation, pollution, disease, and low implementation capacity in PICTs

[2] Container repositioning refers to movement of empty containers to the nearest hub for reuse.

(Kingsford, et al., 2009). Further, the small size and isolated nature of the Pacific islands makes them extremely vulnerable to these threats.

According to Kingsford *et al*. (2009), pollution affects up to 20% of all assessed terrestrial species. Freshwater biodiversity are negatively affected by mining, cold-water dams, and increasing salinity, whilst runoff, sedimentation, and soil erosion have devastated many island coral reefs and lagoons (Kingsford, et al., 2009). For many Pacific island communities, rapid development and population growth has outpaced capacity to deal with waste. Plastics, discarded or lost fishing gear, and other marine litter pollute shorelines and marine waters and has negative impacts on ecosystems, including entanglement of marine animals, ingestion of marine litter by wildlife with potential for associated toxic chemical transfers; introduction of invasive species through use of marine litter as rafting habitats; and damage to important and fragile coastal ecosystems such as coral reefs and mangroves (Richardson, 2015).

2.3.3 Natural Disasters

Many PICTs, by virtue of their geographic location in the *Ring of Fire*[3], have high exposure to seismic hazards such as earthquakes, tsunamis and volcanic activities. The Pacific region is also subject to a range of hdyrometeorological hazards including tropical cyclones, severe storms, storm surges, floods/flash floods, landslides, droughts, and fires. Available data suggest that since 1950, extreme events have affected approximately 9.2 million people in the Pacific region, caused 9,811 reported deaths, and incurred damage of around US$3.2 billion. In the last decade alone, some PICTs have experienced natural disaster losses that have approached and in cases exceeded their GDP. Examples include the 2007 earthquake and tsunami in the Solomon Islands, which caused losses of around 90 percent of the 2006 recurrent government budget; and the 2004 Cyclone Heta on Niue, where immediate losses amounted to over five times the 2003 GDP (World Bank, 2012).

2.4 Policy Context for *Cleaner Pacific 2025*

2.4.1 International Sustainable Development Frameworks

Waste and chemicals management, and terrestrial and marine pollution control have been formally recognised as special sustainable development issues for small island developing states (SIDS) since the first global conference on sustainable development in 1992 (The Earth Summit). The importance of the issue, and the need for SIDS to be supported to tackle emerging priorities has been frequently reinforced at subsequent global conferences (Figure 2), the most recent being the third International SIDS conference in 2014, at which the SIDS Accelerated Modalities for Action (S.A.M.O.A) Pathway (2014) was adopted.

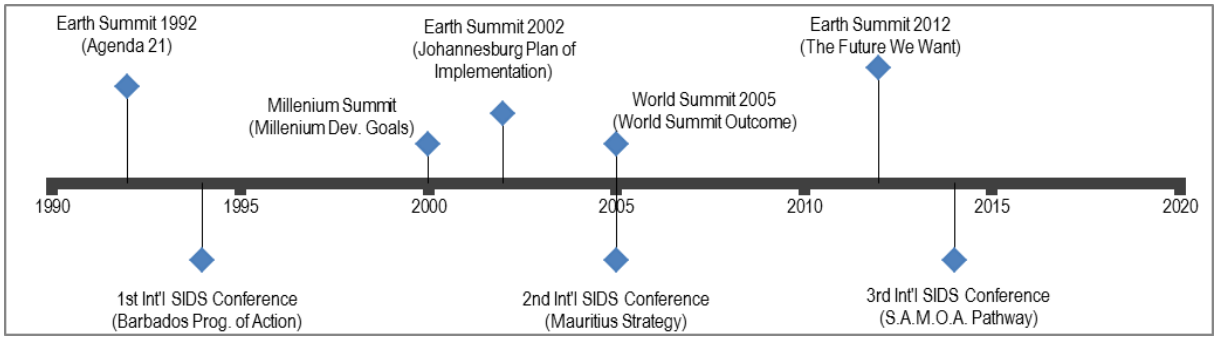

Figure 2: International sustainable development frameworks

[3] The Ring of Fire refers to a string of underwater volcanoes and earthquake sites around the edges of the Pacific Ocean (National Oceanic and Atmoshperic Administration, 2013)

The Pacific sustainable development goals have largely mirrored the eight 2015 Millennium Development Goals (MDGs). Goal 7 of the MDG speaks to ensuring environmental sustainability, and includes three targets that address integration of sustainable development principles into national development planning, reducing biodiversity loss, and improving sustainable access to safe drinking water and basic sanitation (United Nations, 2008). For all Pacific Island countries, there is a lack of comprehensive data on all the MDGs indicators, and where data is available, there are concerns about the quality of the data. Many of the MDG targets are expected to be missed in the Pacific due to a number of factors that include setbacks due to the global economic crises and natural disasters that have hit several countries in the region (UNDP, not dated).

At the time of preparing *Cleaner Pacific 2025*, the post-2015 sustainable development goals and targets were yet to be agreed to replace the MDGs, however, 17 provisional goals have been identified (United Nations, 2015), of which three specifically address waste, chemicals and pollution (WCP), which are priority issues for PICTs (Table 2).

Table 2: Post-2015 Sustainable development goals relevant to waste, chemicals, and pollution

Provisional goals (2016-2030)	Provisional targets
Goal 6: Ensure availability and sustainable management of water and sanitation for all	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling and safe reuse by x% globally. By 2030, expand international cooperation and capacity-building support to developing countries in water and sanitation related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.
Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality, municipal and other waste management.
Goal 12. Ensure sustainable consumption and production patterns	By 2030 halve per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains including post-harvest losses. By 2020 achieve environmentally sound management of chemicals and all wastes throughout their life cycle in accordance with agreed international frameworks and significantly reduce their release to air, water and soil to minimize their adverse impacts on human health and the environment. By 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse.

2.4.2 Global and Regional Multilateral Environment Agreements

PICTs have become Parties to several global and regional treaties (Appendix B) that aim to protect human health and the environment from the hazards associated with dangerous wastes, chemicals, and marine pollution (Table 3). These Conventions carry obligations for PICT Parties to enact domestic legislation and to implement a variety of other institutional measures to effectively implement provisions of the Conventions.

Territories are traditionally regarded as being under the sovereignty of their respective metropolitan country in terms of treaty-making, as outlined in Article 29 of the Vienna Convention on the Law of Treaties (United Nations, 1969). However, in practice, "when a multilateral treaty does not by its nature clearly apply to all the territory of a party, yet is silent as to its territorial scope and lacks a territorial clause, there is a well-established practice by which a State can decide to which, if any, of its overseas territories the treaty will extend. At the time of signature or ratification, the State declares either that the treaty extends only to the metropolitan territory,

or that it extends (and may later be extended further) to an overseas territory or territories" (Aust, 2010, pp. 81-82).

Table 3: PICT participation in international and regional waste, chemicals, and pollution treaties

International and Regional (Pacific) Conventions	SPREP Countries														SPREP Territories							Metropolitan Members				
	Cook Islands	FSM	Fiji	Kiribati	Marshall Islands	Nauru	Niue	Palau	PNG	Samoa	Solomon Islands	Tonga	Tuvalu	Vanuatu	American Samoa	French Polynesia	Guam	New Caledonia	CNMI	Tokelau	Wallis & Futuna	Australia	France	New Zealand	USA	United Kingdom
Stockholm Convention	X	X	X	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	S
Basel Convention	X	X		X	X	X		X	X	X		X										X	X	X	X	S
Waigani Convention	X	X	X	X		S	X	S	X	X	X	X	X	X								X		X		
Rotterdam Convention	X				X					X		X										X	X	X	X	S
Montreal Protocol	X	X	X	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	X
Minamata Convention								S		S												S	S	S	X	X
MARPOL 73/78 (Annex I/II)	X			X	X		X	X	X	X	X	X	X	X								X	X	X	X	X
MARPOL 73/78 (Annex III)				X	X		X	X	X	X	X	X	X	X								X	X	X	X	X
MARPOL 73/78 (Annex IV)				X	X		X	X	X	X	X	X	X	X								X	X		X	
MARPOL 73/78 (Annex V)				X	X		X	X	X	X	X	X	X	X								X	X	X	X	X
MARPOL Protocol 97 (Annex VI)	X			X	X		X	X		X			X	X								X	X		X	X
London Convention 72				X		X			X		X	X		X								X	X	X	X	X
London Conv. Protocol 96					X							X		X								X	X	X	X	
INTERVENTION Conv. 69			X		X				X			X		X								X	X	X	X	X
INTERVENTION Protocol 73					X							X		X								X	X	X	X	X
CLC Convention 69			X		D				D			D	D	D								D	D	D	D	
CLC Protocol 76					X								X	X								X	X		D	
CLC Protocol 92	X		X	X	X		X	X	X	X	X	X	X	X								X	X	X	X	
FUND Convention 71					D				D			D	X	D								D	D	D	D	
FUND Protocol 76					X									X								X	X		D	
FUND Protocol 92	X		X	X	X		X	X	X	X		X	X	X								X	X	X	X	
FUND Protocol 2003																						X	X		X	
OPRC Convention 90					X			X		X		X		X								X	X	X	X	X
HNS Convention 96										X		X														
HNS PROT 2010																										
OPRC/HNS 2000								X						X								X	X			
Bunkers Convention 2001	X			X	X		X	X		X		X	X	X								X	X	X	X	
Anti Fouling Convention 2001	X			X	X		X	X				X	X	X								X	X		X	X
Ballast Water 2004	X			X	X		X	X				X	X										X			
NAIROBI WRC 2007								X																	X	
Hong Kong Convention																							X			
Noumea Convention	X	X	X		X	X			X	X	X											X	X	X		X
- Dumping Protocol	X	X	X		X	X			X	X	X												X	X		X
- Emergencies Protocol		X	X		X	X			X	X	X											X	X	X		X
- Oil Pollution Protocol		S	S		S					S													S			S
- HNSP Protocol		S	S		S					S													S			

Legend:

X = Ratification, acceptance, approval or accession; S = Signature; D = Denunciation

2.4.3 Regional Frameworks and Policies

A number of key policies provide guidance for the region in achieving environmental protection and environmentally sustainable development. These include the Framework for Pacific Regionalism, the Pacific Regional Ocean Policy, the Pacific Oceanscape Framework, the Strategy for Climate and Disaster Resilient Development in the Pacific, the Pacific Wastewater Policy Statement and Framework for Action, the Pacific Regional Action Plan on Sustainable Water Management, the Pacific Framework for Action on Drinking Water Quality and Health, and the Ha Noi 3R Declaration.

The **Framework for Pacific Regionalism** succeeds the **Pacific Plan on Regional Integration and Cooperation** as the overarching regional framework that prescribes a robust process (rather than a list of regional priorities) through which regional priorities can be identified for implementation (PIFS, 2014).

The 2005 **Pacific Regional Ocean Policy** provides a framework that promotes the sustainable development, management, and conservation of marine and coastal resources in the Pacific region. It outlines five guiding principles, the third of which relates to maintaining good ocean health by—among other things—reducing the impact of all sources of pollution on the ocean environment (SPC, 2005).

The 2010 **Pacific Oceanscape Framework** seeks to further the implementation of **the Pacific Regional Ocean Policy** by setting out provisions for coordination, resourcing, and implementation. Integrated coastal resource management (which includes reduction and management of waste and pollution) is seen as a strategic action to achieve sustainable development, management, and conservation of the Pacific Ocean (Pratt & Govan, 2010).

The draft **Strategy for Climate and Disaster Resilient Development in the Pacific (SRDP)** aims to strengthen the Pacific region's resilience to climate change and disasters through improved adaptation and risk management, low carbon development, and through more effective response to and recovery from emergencies and disaster events. The SRDP recognises the contribution of good waste management to achieving low carbon development, and supports the improvement of waste management programmes through waste reduction, reuse, and recycling, and environmentally sound disposal methods in order to reduce greenhouse gas (GHG) emissions (Roadmap Technical Working Group, 2014).

The **Pacific Wastewater Policy Statement** sets out principles and policies to guide future management of wastewater in PICTs. The policy statement was adopted by PICTs in 2001 and covers five overarching themes: policies and regulations, institutions and infrastructure, funding, community participation, and capacity development (SOPAC & SPREP, 2001).

The **Pacific Wastewater Framework for Action** was adopted in 2001 and proposes a list of actions to be undertaken at national and regional levels to achieve the goals outlined in the **Pacific Wastewater Policy Statement** (SOPAC & SPREP, 2001).

The **Pacific Regional Action Plan on Sustainable Water Management** was formally endorsed by Pacific Heads of States in 2003, and specifically identifies integrated water resources management (IWRM) as a solution to managing and protecting water resources, improving governance arrangements and therefore improving water supply and sanitation provision (SOPAC & ADB, 2003).

The **Pacific Framework for Action on Drinking Water Quality and Health**, endorsed by PICTs in 2005, supports the implementation of drinking water quality actions envisioned in the **Pacific Regional Action Plan on Sustainable Water Management**. It encourages investment in appropriate wastewater technologies to reduce the impacts of wastewater on drinking water quality (WHO, 2005).

The Regional 3R Forum in Asia and Pacific Islands, launched in November 2009, is coordinated by the United Nations Centre for Regional Development with the objective of providing a knowledge-sharing platform for best

practices in the 3Rs (waste reduction, reuse, and recycling), as well as providing high-level policy advice to national government authorities to mainstream the 3Rs into national development planning. Through this forum, the **Ha Noi 3R Declaration – Sustainable 3R Goals for Asia and the Pacific for 2013-2023** (2013) was adopted. The declaration articulates a common objective to voluntarily develop and implement 3R policies and programmes to achieve specific goals.

2.5 Regional Initiatives

Several major regional projects or initiatives have been implemented since 2010 to address priority waste, chemicals, and pollution issues in the Pacific region. These initiatives, which have been detailed in Appendix C include:

- The Japanese Technical Cooperation Project for Promotion of Regional Initiative on Solid Waste Management in Pacific Island Countries (J-PRISM) funded by JICA and implemented in collaboration with SPREP;
- The European Union funded Pacific Hazardous Waste (PacWaste) Project implemented by SPREP;
- The Pacific POPs Release Reduction Through Improved Solid and Hazardous Wastes Management Project funded by the Global Environment Facility Pacific Alliance for Sustainability (GEF-PAS), implemented by UNEP and executed by SPREP;
- The Regional Solid Waste Management Initiative funded by l'Agence Française de Développement and executed by SPREP;
- The Integrated Technical Cooperation Programme (ITCP) funded by the International Maritime Organisation (IMO) and implemented by SPREP; and
- The Implementing Sustainable Water Resources and Wastewater Management in PICs Project (the GEF Pacific IWRM Project) funded by GEF, executed by the Pacific Islands Applied Geoscience Commission (SOPAC) Division of the Secretariat of the Pacific Community (SPC).

2.6 Lessons Learnt from Previous Regional Strategies

Cleaner Pacific 2025 incorporates the lessons learnt from the implementation of the previous regional waste and pollution management strategies with the aim of improving implementation into the future. The key lessons learnt include the importance of evidence-based strategic planning; the importance of a robust and flexible strategy; the challenges of PICTs absorptive capacity to implement WCP programmes; the relevance of the technical cooperation approach; the importance of regional coordination; the effectiveness of national and sub-regional training; and the importance of sustainable funding and ongoing support mechanisms.

Evidence-based strategic planning: The formulation and endorsement of regional waste and pollution management strategies provided the basis for regional interventions including the JICA-funded J-PRISM project (which implements priorities from the Regional Solid Waste Management Strategy 2010-2015), and the EU-funded PacWaste Project (which implements priorities identified in the regional E-waste, asbestos, and healthcare waste management strategies). It is therefore important for the Pacific region to strengthen its strategic planning process through clear definitions of strategic long-term goals, articulation of practical strategies and actions to progress towards these goals, and establishment of clear and measurable targets to monitor progress. To support this process, it is crucial to invest in the development of data at country and regional scales to support the measurement of key strategic indicators.

Robust and flexible strategy: For successful implementation, the regional strategy should be robust enough that it can be adapted to emerging priorities and take advantage of new (unexpected) funding opportunities and donor interest, which may not have existed at the time of its formulation.

PICTs capacity to implement WCP programmes: Many PICTs fail to incorporate agreed strategic actions into corporate planning documents, causing such actions to become extraneous work. This is compounded by the human resource capacity constraints in these PICTs. Ongoing support should be provided to PICTs to integrate

Cleaner Pacific 2025 into corporate planning documents to ensure collaborative work towards a common goal. Development and implementation of specific programmes of actions in PICTs should be accompanied by in-country human resource support to enhance implementation success.

Technical cooperation approach: The J-PRISM project funded by JICA is based on a technical cooperation approach, which provides financial and in-country technical support and guidance/coaching to Pacific islanders who are directly responsible for implementing the agreed work programmes. This learn-by-doing approach develops the technical capacity of Pacific islanders, engenders pride in accomplishments, and if replicated sufficiently, may ultimately lead to a degree of self-sufficiency in PICTs. When possible, the technical-cooperation approach to strategy implementation should be pursued.

Regional coordination: During implementation of previous regional strategies, there have been instances of duplication and wasted resources due to lack of information sharing. This is further compounded by the turnover of staff in both SPREP and PICTs, in which institutional knowledge is lost. Efforts have been made to improve regional coordination through the adoption of a basic annual reporting mechanism (described in Section 5.2); however, the participation of all PICTs and SPREP is required for this mechanism to be successful.

National and sub-regional training: Due to the geographic spread of PICTs and the complexities of travel throughout the region, national and sub-regional training and capacity development activities in PICTs are preferable to, and potentially more cost-effective than regional activities. Through a national or sub-regional approach, more trainees can be taught, and trainers can customise their instruction to better reflect the local situation. Where appropriate and available, local training institutions should also be included (train-the-trainer) in order to have a potential in-country resource for future repeat training.

Sustainable funding and ongoing support mechanisms: There is no better teacher than experience and the Pacific experience shows that the most successful examples of sustainable waste management programmes are supported by sustainable financing mechanisms (*e.g.* waste collection and tipping fees in Fiji), and mechanisms that create a value chain for waste (*e.g.,* container deposit programmes in Kiribati, FSM, and Palau). Sustainable financing measures should therefore be integrated into waste, chemicals and pollution management programmes.

3 Where are we now?

3.1 Policies and Legislation

Adoption and implementation of strong and effective policies and strategies continues to be a challenge for PICTs. In previous years, PICTs have been assisted to prepare draft national strategies and policies addressing waste, chemicals, and pollution management. However, many have yet to be endorsed at the ministerial level. Some endorsed strategies have not been effectively implemented as they have not been integrated into government and corporate planning cycles. In the absence of a policy framework which articulates nationally-agreed priorities, donors may be reluctant to support major projects, because the risks of project failure are too great. The status of relevant policies and strategies in PICTs are summarised in Table 4.

Table 4: Status of waste, chemicals and pollution policies in PICTs

National Policies, Strategies, and Plans	AS	CI	FSM	FP	FJ	GU	KI	RMI	NA	NC	NI	PA	PNG	SA	SI	TK	TO	TV	VU	WF
Waste Policy Statement		X					X													
Solid Waste		X*	X		X	X	D*	D*	D		D*	X*		D*	X*	X*	D*	O	X*	X
Healthcare Waste		X*	X*				D*	D*			D*	X*		X	D*	X*			X*	X
Other hazardous Waste		X*	X*				D*	D*			D*	X*		D*		X*	D*			X
Liquid Waste		D*	X[1]		X		X*	X*	D*			X*	X*	X	X[1]	X*	D*	X*	X*	
Chemicals		C[2]			C[2]		C[2]	C[2]	C[2]				C[2]	D	C[2]		C[2]	C[2]		
Oil Spill Contingency	X	X	D	X	D	X	D	D	D	X	D	D	D	D	D	D	X	D	D	X

KEY: C = Preparation has commenced; **D** = Document has been prepared but not yet endorsed; **O =** Endorsed document is no longer current; **X** = Document has been endorsed and is current; * = Part of an integrated policy, strategy or plan

Notes: 1 = For sanitation only; 2 = For POPs only

3.2 Technical Capacity

Developing the technical capacity of PICTs remains a regional priority if they are to achieve nationally-sustainable waste, chemicals, and pollution management. The AFD Regional Solid Waste Initiative has been instrumental in developing and delivering a regional waste management training-of-trainers programme, with additional delivery supported by the GEF-PAS POPs Release Reduction Project. Also, through J-PRISM and previous projects, Pacific islanders have been trained, developed and mentored as waste management specialists and are now utilised as resource persons in other training programmes. In an effort to increase the effectiveness of future training activities, a regional database has been developed to consolidate and evaluate data on regional training events, trainees, and trainers. Challenges to achieving a critical mass of trained islanders in the future include high staff turnover within national agencies; 'brain drain' as trained and experienced staff leave to pursue other opportunities; lack of institutional support for trainees to apply new skills; unsupportive study leave policies that do not offer job security to scholarship recipients; and insufficient numbers of staff available to work effectively and collectively on waste and pollution related issues.

3.3 Institutional Arrangements

It is widely accepted that efficient waste service delivery requires policy making, service provision, and regulation to be kept separate (World Bank, 2003). While some PICTs have achieved this level of separation, in others, service providers are self-regulating. In PICTs with decentralised administrations, urban/island councils and state governments are generally responsible for providing waste management services within their jurisdictions; while national or federal governments retain responsibility for chemicals and hazardous waste management, and

occasionally rural waste services. Although councils often bear responsibility for urban waste service delivery, these entities rarely benefit from capacity development programmes.

3.4 Municipal Solid Waste Management

3.4.1 Generation and Composition

The municipal solid waste (MSW) generation rates and composition for several PICTs are summarised in Table 5. It should be noted that most of the data is not comparable across PICTs as it represents various years and has been collected using different methodologies. Nonetheless, computing the unweighted mean daily household waste generation rate is useful and reveals an indicative average generation rate of about 0.5 kg per person, and a total daily urban MSW generation rate approaching 1.3 kg per person.

Assuming that the estimated waste generation rate increases proportionally with the gross domestic product (GDP), the indicative waste generation for the entire Pacific urban population would have totalled over 1.16 million tonnes in 2013, and is projected to be more than 1.59 million tonnes by 2025 (see Appendix E).

Table 5 also highlights the household waste stream composition in several PICTs. For the majority of PICTs, organic waste (comprising food and yard waste) is the largest component of the waste stream accounting for about 44% of the waste stream on average, whilst potentially recyclable waste (paper, plastics, metals, and glass) comprise an additional 43%. As PICTs develop economically, the proportion of packaging waste (plastics, paper, metals, and glass) will likely increase as the standard of living increases and as populations become increasingly urbanised and reliant on imported goods.

3.4.2 Reduction, Reuse, Recycling and Return (3R+Return)

Based on the available data, organic waste constitutes an average of about 44% of the waste stream, which is largely the cause of odours, pests, and noxious leachate from dumps. These impacts can largely be minimised by diverting organic waste into organic waste recycling programmes (such as composting or anaerobic digestion), as has been done under the J-PRISM project. A summary of organic waste recycling programmes in PICTs is provided in Table 6. There is now a need for further development of national organic waste recycling programmes that also integrate management of other organic waste streams such as animal waste. This is particularly important in atoll environments, where compost has a vital role to play in supporting agricultural development by improving the nutritional profile and physical properties of native soils, and where poorly managed animal (and human) waste is a major pollutant of ground water and lagoon environments.

The vast majority of recycling activities in PICTs are led by the private sector and are driven by prices in the international recycling commodity markets. Whilst recycling plants exist in Fiji for scrap metal, paper and lead acid batteries, and in Palau for converting plastics to oil, the vast majority of recycling activities are limited to the consolidation, and export (typically to East Asia, Southeast Asia, Australia, and New Zealand) of valuable commodities such as aluminium beverage cans, ferrous and non-ferrous scrap metal, and used lead acid batteries. In PICTs with successful recycling programmes (including Kiribati, FSM (Yap and Kosrae States), New Caledonia, and Palau), recycling activities are incentivised by container deposit laws and extended producer responsibility (EPR) laws which help to sustain the recycling programme in the face of fluctuating commodity prices.

In 2013, a JICA-funded study assessed the potential of implementing a reverse logistics network to support and enhance recycling activities in Fiji, Samoa, Tonga, Tuvalu, and Vanuatu (Overseas Coastal Area Development Institute of Japan, 2013). The study reported that the 2011 recycling rate was 48% for potentially recyclable goods in the five PICs studied (Table 7). Recycling data for French Polynesia is also shown in Table 7. The combined recycling rate for potentially recyclable goods in these six PICTs is estimated to be 47%.

Table 5: Waste generation and composition in selected PICTs

PICT	State or Municipality	Year	Data Source	Waste Generation Rate			Household Waste Composition (%)								Comment on 'Other Residues'
				Household Waste (kg/p/day)	Commercial Waste	Total Urban MSW (kg/p/day)[A]	Organics (food & yard waste)	Paper	Plastic	Glass & Ceramics	Metal	Textiles & Rubber	Other Residues	Total	
American Samoa	Tutuila Island	2011	(Busche et al., 2011)			1.0	19.6	26.4	12.8	3.4	7.9	4.2	25.6	100	Diapers = 5.1%
FSM	Pohnpei	2011	B	0.1			15.6	16.6	25.0	5.7	25.7	2.6	8.8	100	
	Yap	2011	B	0.5			20.0	12.8	37.2	9.2	14.8	4.2	1.8	100	
	Chuuk	2011	B	0.2			33.8	8.9	22.5	4.7	11.4	1.2	17.5	100	
	Kosrae	2011	B	0.1			25.9	14.9	20.0	8.7	15.0	6.3	9.2	100	
Fiji	Nadi	2008	(JICA, 2009)	0.4		1.9	73.3	12.1	7.1	4.0	1.3	0.9	1.3	100	
	Lautoka	2008	(JICA, 2009)	0.4		1.1	67.5	12.9	7.9	4.2	2.5	1.7	3.3	100	
French Polynesia	All	2012	(Murzilli, et al., 2012)	1.2[C]											
Marshall Islands	Majuro	2014	B	0.4		1.1	42.7	11.1	12.5	3.2	11.0	7.3	12.2	100	Diapers = 10.5%
PNG	Port Moresby[D]	2014	(NCDC, 2014)	0.36	0.09 kg/m^2/day		29.6	11.5	18.5	7.1	9.4	11.4	12.5	100	
Samoa	Vaitele	2011	B	0.4	0.01 kg/m^2/day		42.5	7.2	13.0	2.2	8.8	6.8	19.4	100	Diapers = 15.1%
Solomon Islands	Honiara[D]	2011	B	0.9	0.09 kg/p/day		53.1	6.6	19.5	1.1	9.2	3.4	7.2	100	Diapers = 5.7%
	Gizo	2011	B				32.7	6.3	25.2	12.2	17.1	6.4	0.2	100	
Tonga- Vava'u	Vava'u	2012	B	0.5			51.5	7.4	13.4	5.9	9.0	4.1	8.9	100	
Vanuatu	Port Vila[D]	2011	B	0.4			62.8	6.1	7.9	7.8	4.6	1.4	9.4	100	
	Luganville	2014	(O'Reilly, 2014)	1.2	0.18 kg/p/day	1.3	84.0	2.0	5.0	3.0	3.0	1.0	2.0	100	
Unweighted Mean				**0.5**		**1.3**	**43.6**	**10.9**	**16.5**	**5.5**	**10.0**	**4.2**	**9.3**	**100**	

A: Municipal Solid Waste (MSW) includes household, commercial and institutional waste.
B: Waste characterisation studies completed as part of the J-PRISM Project.
C: Includes green waste and special collections
D: Data represents the un-weighted average of low-, middle-, and high-income areas

Table 6: Organic waste management programmes in PICTs

PICT	Major Organic Waste Management Programmes	
	Number	Comments
American Samoa	-	No known composting programmes.
Cook Islands	1	Compost programme on Rarotonga, operated by Titikaveka Growers Association.
FSM	-	No known composting programmes.
Fiji	5	Composting programmes in several municipal areas: Ba, Lautoka, Nadi, Sigatoka, and Suva.
French Polynesia	1	Large-scale compost programme on Tahiti, operated by Technival.
Guam	-	No known composting programmes.
Kiribati	1	Pilot-scale composting programme in South Tarawa implemented through J-PRISM project.
RMI	1	Pilot-scale composting programme in Majuro implemented through J-PRISM project.
Nauru	-	No known composting programmes.
New Caledonia	5	Compost programmes in Pouembout, La Foa, Voh, Houailou, and Poya municipalities.
Niue	-	No known composting programmes.
Palau	1	State compost programme at the Koror State Recycling Centre.
PNG	-	Pilot-scale composting programme for Port Moresby market waste implemented through J-PRISM project.
Samoa	-	Small-scale composting programmes operated by Women in Business Development Inc., and the Ministry of Natural Resources and the Environment.
Solomon Islands	1	Composting programme operated in Honiara by Kastom Garden Association (local NGO); pilot-scale programmes introduced in Honiara through the J-PRISM project.
Tokelau	-	Majority of organic waste is fed to animals or placed around plants to decompose naturally.
Tonga	-	No known composting programmes.
Tuvalu	-	No known composting programmes.
Vanuatu	2	Composting programmes in Port Vila and Luganville operated by the municipal councils.
Wallis and Futuna	-	Small-scale separation and natural decomposition of organic waste at the Wallis landfill.
Total	**18**	

Table 7: Recycling rate in selected PICs

PICT	Potentially recyclable waste (tonnes)	Amount exported or recycled/reused locally		Quantity landfilled or dumped (tonnes)	Data Source	Comments
		(tonnes)	(%)			
Fiji	66,788	38,081	57%	28,707	1	End-of-life vehicles, white goods, cans, PET bottles, paper and cardboard
Samoa	13,308	4,741	36%	8,567	1	As above
Tonga	6,567	598	9%	5,969	1	As above
Tuvalu	685	103	15%	582	1	As above
Vanuatu	12,591	4,642	37%	7,949	1	As above
French Polynesia	16,300	6,300	39%	10,000	2	Cans, PET bottles, paper and cardboard, glass
Total	**116,239**	**54,465**	**47%**	**61,774**	**-**	**-**

Source: 1. JICA. 2013. Data Collection Survey on Reverse Logistics in the Pacific Islands: Final Report.
2. Completed country profile questionnaire submitted by Department of Environment (DIREN).

The study also identified some of the challenges in the Pacific recycling sector which include:

- Poor segregation system and collection network for recyclable waste goods, especially in outer islands;
- Poor working conditions at some recycling companies, with little regulation by relevant authorities;
- Little to no domestic demand for recyclable waste goods;
- Poor international demand for PET bottles, paper, and cardboard;
- High marine transportation costs accounting for as much as 30% of the cost of preparing and shipping recyclable commodities from PICs to the far east; and
- Low awareness among recycling companies of the quarantine regulations at the destination ports.

To date, little attention has been paid to waste tyre management. There is little domestic and international demand for waste tyres, and consequently they are mostly stockpiled in PICTs, where they provide breeding grounds for vermin, and present a fire risk. The generation of waste tyres is accelerated in most PICTs due to the practice of importing second hand tyres with little control over the quality of imports. Due to their bulky nature, waste tyres can quickly consume landfill space, which is already a major issue for atolls and small PICTs with little land space for landfills. Due to lack of international demand, safe recycling or disposal of tyres overseas will incur a net cost to PICTs, which can best be recovered through a tyre stewardship programme.

3.4.3 Waste Collection

Approximately 88% of the urban population (or equivalently 47% of the national population) across 18 PICTs (Fiji, CNMI, and PNG excluded) has access to a regular collection service (Appendix E). Of these, seven PICTs (American Samoa, Guam, Nauru, Niue, Samoa, Tokelau, and Wallis and Futuna) have complete national coverage (*i.e.,* 100% of the population).

Providing consistent and reliable waste collection service in rural areas and on the outer islands of many PICTs continues to be a challenge. Other issues with waste collection systems include:

- Insufficient human resources and equipment;
- Inadequate collection in rural areas and outer islands;
- Infrequent or no collection services for bulky waste, green waste, or potentially hazardous waste;
- No tracking and analysis of waste collection (and overall waste management) costs;
- Limited implementation of user-pay programmes which encourage accountability for waste generation;
- Various models of waste collection equipment resulting in difficulties and unnecessary expense in sourcing a range of different spare parts; and
- Unpaved, narrow, and otherwise inadequate roads to informal settlements and inland communities.

3.4.4 Waste Disposal

Waste disposal to land, via dumps, controlled landfills, and sanitary landfills, is the predominant method of MSW disposal in PICTs (Table 8). There are over 132 temporary dumpsites, 81 open dumps, 15 controlled dumps, and 14 sanitary landfills.

At waste disposal facilities in PICTs, general waste mixed with household hazardous waste and other hazardous wastes are often dumped together with no separation. In some PICTs without a functional healthcare waste incinerator, a specific pit for burning and/or burial of healthcare wastes is usually allocated within the disposal site. Dumpsites are also often frequented by waste pickers who subsist on the sale of salvaged items and provide a valuable recycling service, albeit in hazardous conditions. Challenges faced by waste pickers include: lack of personal protective equipment; risk of injury from heavy equipment; exposure to hazardous wastes; and involvement of children in waste picking activities.

Open burning (in backyards and public spaces) is widely practiced, especially in areas that lack access to reliable waste collection services, and this contributes to the generation of unintentional persistent organic pollutants (UPOPs), with a range of negative health and environmental impacts.

Over the last decade, many PICs (Cook Islands, FSM, Fiji, Kiribati, Palau, PNG, Tonga, Tuvalu, Samoa, Solomon Islands, and Vanuatu) have been assisted by several donors to upgrade urban dumps or construct new sanitary landfills. In most cases—with the support of JICA—the Semi-aerobic Fukuoka Landfill concept has been adopted as an appropriate landfill technology for Pacific island environments. However, despite this progress, there are still deficiencies in ongoing management of these sites, and in maintaining appropriate environmental monitoring.

Construction of cost-effective sanitary landfills on coral atolls has historically been difficult due to the porous nature of atoll soils, the low elevations (often less than 5 metres), and the limited availability of land space. Whilst atoll landfills are not a sustainable solution, they are—in the short-term—essential components of an effective waste management and pollution control strategy. In this respect, reef-fills (containment bunds) constructed on lagoon tidal flats in Kiribati using a local coral sand and cement mix, have shown some promise in limiting pollution to the surrounding marine water and warrant further investigation (Leney, Pulefou & Redfern, 2012).

Table 8: Waste disposal in PICTs

	American Samoa	Cook Isl.	FSM	French Polynesia	Fiji	Guam	Kiribati	Marshall Isl.	Nauru	New Caledonia	Niue	Palau	PNG	Samoa	Solomon Isl.	Tokelau	Tonga	Tuvalu	Vanuatu	Wallis and Futuna	**Totals**
Temporary unregulated dumps	ND	ND	20	80	ND	ND	ND	1	ND	ND	-	10	>21	ND	ND	-	ND	ND	ND	-	**>132**
Authorised open dumps	3	10	14	8	ND	-		24	1	ND	3	2		-	>3	3		9		1	**>81**
Controlled dumps	1		3	3	3	-	3	1	-	ND	-	1	1	1	-	-		-	1	-	**19**
Sanitary landfills	-	2	-	5	1	1	-	-	-	1	-			1	-	-	2	-	-	2	**14**
New sites planned or under construction (as of Apr 2015)	-	-	-	3		-	-	-	-	ND	-	1		-	-	-				-	**4**
Total number of waste disposal sites	**4**	**12**	**37**	**99**	**4**	**1**	**3**	**26**	**1**	**1**	**3**	**14**	**>22**	**2**	**>3**	**3**	**2**	**9**	**1**	**3**	**250**

Source: Completed questionnaires submitted by PICTs.

KEY: ND = No Data; H = High; M = Medium; L = Low

3.4.5 Waste-to-energy

There is a growing interest amongst Pacific island communities in exploring municipal waste-to-energy options as a means to reducing the need for landfills and dependence on diesel importation for electricity generation. This interest is being driven primarily by international companies promoting proprietary waste-to-energy technology, with little regard to long-term affordability and sustainability.

Conventional wisdom suggests that the waste-to-energy approach is unsuitable for the majority of Pacific SIDS due to relatively small municipal waste volumes and the dense, wet quality of most waste streams. This is reinforced by the lack of successful case studies of municipal waste-to-energy implementation in other SIDS. Waste-to-energy technologies that combust MSW also transform a fairly innocuous waste stream (general waste) into bottom ash, as well as fly ash and flue gas—which may contain particulate matter, heavy metals, dioxins, furans, and sulphur dioxide. Management of these hazardous waste streams requires careful handling, disposal and environmental monitoring, which are beyond the current capacity of PICTs. The experience of

Okinawa, Japan in maintaining waste-to-energy infrastructure may provide some useful lessons for PICTs (see Box 1).

Nonetheless, there is still a need to rigorously investigate the regional feasibility of waste-to-energy approaches in PICTs, including the potential impact on ongoing waste reduction and recycling initiatives, and its suitability for managing multiple waste streams including animal and human wastes, and agricultural biomass.

Box 1: Case Study: Solid waste management in the remote islands of Okinawa, Japan

Okinawa Prefecture is the southernmost prefecture of Japan with a population of about 1.4 million. The Prefecture is comprised of hundreds of small coral and limestone islands spread over a distance of more than 1,000 kilometres, with abundant coral reefs and diverse ecosystems. The islands have a subtropical climate with mild winters, hot summers and high precipitation. Natural hazards include typhoons, earthquakes, and tsunamis. Based on these physical characteristics, Okinawa Prefecture shares many similarities with PICTs.

Okinawa Prefecture is divided into 41 local government areas, of which 15 are located on 20 rural islands. Almost all of these rural islands are serviced by municipal solid waste incinerators installed between 1977 and 2012, with capacities ranging from 0.4 tonnes/day to 80 tonnes/day. The average initial installation cost was approximately US$1.3 million (¥ 155 million) per tonne of treatment capacity. Since the initial installation, six of the 20 waste incinerators have been refurbished at an average cost of US$ 495,000 (¥ 59 million) per tonne of treatment capacity.

For one Okinawa council located on a remote island without a waste incinerator, the average annual cost of waste management operations in 2013 was approximately US$ 360 (¥ 44,000) per tonne, which was also the 2013 national average cost for all of Japan. However, for councils with incinerators, the cost in 2013 was 42% higher at about US$ 510 (¥ 63,000) per tonne. It is therefore quite expensive for remote islands to operate and maintain waste incinerators.

As a result, some councils have now suspended operation of state-of-the-art incinerators, whilst others have been bearing the severe financial burden of operating oversized incinerators, with average capacities that are four times larger than the amount of waste generated.

It is also apparent that recycling is more difficult in remote islands than in other local governments. The average waste recycling rate in the Okinawa remote islands was 9.9 %, compared to 15.3 % for all of Okinawa, and 20.6 % Japan overall.

Table 9: Waste management system in 20 remote islands of Okinawa

Waste Management System Features	Minimum	Maximum	Average
Waste incineration capacity (tonnes/day)	0.4	80	10
Incinerator installation cost (US$ per tonne of treatment capacity)	$70,000	$3.5 million	$1.3 million
Incinerator operational cost (US$ per tonne of waste treated)	$170	$1,050	$510
Incinerator refurbishment cost for 6 incinerators (US$ per tonne of treatment capacity)	$26,000	$845,000	$495,000
Number of years after initial installation when refurbishment performed	8	25	14
Waste recycling rate	2	26	9.5

Sources:

Okinawa Prefectural Government. (2014). Haikibutsu taisaku no gaiyō (Heisei 26-nen 3 gatsu-ban) [*Overview of waste management (March 2014 edition) – Section 2: general waste*]. Retrieved from http://www.pref.okinawa.jp/site/kankyo/seibi/documents/03iltupanhaikibutu.pdf.

Okinawa Prefectural Government. (2010). Heisei 22-nen kokuseichōsa (Okinawa-ken) [*Okinawa population census 2010*]. Retrieved from http://www.pref.okinawa.jp/site/kikaku/chiikirito/ritoshinko/documents/chapter1h26.pdf.

Ministry of the Environment of Japan. (2013). Heisei 25-nendo chōsa kekka [*2013 Fiscal survey results. (MOE waste treatment technology information)]*. Retrieved from http://www.env.go.jp/recycle/waste_tech/ippan/h25/index.html.

3.5 Healthcare Waste

Healthcare waste (HCW) is an unavoidable consequence of community healthcare and includes general waste (comparable to domestic waste), and hazardous waste, which includes syringes, infectious waste, body parts and fluids, chemical waste, and expired pharmaceuticals. According to the World Health Organisation (WHO, 2014a), general waste comprises approximately 75-90% of the waste produced by healthcare activities, whilst 10-25% of HCW is regarded as hazardous waste. Improper management of hazardous HCW can introduce damaging substances into the environment, and poses occupational and public health risks to patients, health workers, waste handlers, waste transporters, and communities. Dioxins and furans (UPOPs), arsenic, heavy metals, and other pollutants can also be released through inadequate incineration of healthcare waste, or inappropriate disposal of incinerator ash.

Depending on the services provided at the healthcare facility, a facility's wastewater might contain chemicals, heavy metals, pharmaceuticals and contagious biological agents, and might potentially contain radioisotopes. Improper management, collection, treatment and disposal of wastewater and sludge will result in the pollution of local water sources with parasites and pathogens (*e.g.,* roundworms) and toxins that cause harm to human health and the environment.

According to a regional baseline assessment of HCW in 14 PICs completed during the PacWaste Project, the indicative average hazardous HCW generation rate for PICs is approximately 0.8 kg per occupied bed as shown in **Error! Reference source not found.** (ENVIRON Australia Pty Ltd, 2014). The regional assessment also evaluated CW management practices in 42 hospitals spread across the 14 PICs, and noted the following regional inadequacies:

- Lack of documented waste management planning system or significant gaps present in 37 hospitals (88%);
- Sub-standard HCW segregation and containment practices and auditing programs in 33 hospitals (79%);
- Inadequate facilities for storage of HCW before treatment in 32 hospitals (77%);
- Treatment infrastructure incapable of definitively destroying the HCW infection risk in 18 hospitals (43%);
- Inappropriate PPE, and irregular use of PPE by HCW handlers in 14 hospitals (33%); and
- No structured training programs for HCW management stakeholders in 30 hospitals (71%).

Table 10: Hazardous HCW generation in PICs

	Pacific Island Countries (PICs)															Territories				
	Cook Islands	Fiji	FSM	Kiribati	RMI	Nauru	Niue	Palau	PNG	Samoa	Solomon Islands	Tonga	Tuvalu	Vanuatu	**PICs**	American Samoa	Guam	French Polynesia	New Caledonia	Wallis & Futuna
Average Daily HCW (kg/occupied bed)	0.5	0.8	0.9	0.2	2.8	1.4	1.2	1.4	0.7	0.6	1.1	1.0	0.3	1.0	**0.8**	ND	ND	360 T/yr	ND	ND
Stockpiles (tonnes)	0	0	0	0.75	76	0	0.02	ND	ND	0.2	ND	0	0	0	**~76**	ND	ND	0	ND	ND

Source: PICs: Environ Australia Pty Ltd. (2014). *Baseline study for the Pacific hazardous waste management project - healthcare waste*. Report prepared for the SPREP/EU PacWaste Project.

Acronyms: ND = No data; T/yr = Tonnes per year

Other issues of concern identified by the baseline assessment include:

- Poor record-keeping of waste volume data by hospitals;
- Poor maintenance of existing incinerators due to insufficient funding provisions and lack of appropriate maintenance expertise;
- Insufficient allocation of resources for general management of HCW;
- Little understanding of HCW treatment costs; and

- Breakdown in communication between national regulatory bodies (Ministries of Health) and principal HCW generators (hospitals);

The regional PacWaste project funded by the European Union and implemented by SPREP (Appendix C) will address many of these issues for priority hospitals, within the available budget. However, there will continue to be a need for additional interventions (*e.g.*, hospitals not covered by PacWaste, or healthcare wastewater) to further reduce the public health risks.

3.6 Electrical and Electronic Waste

E-waste refers to discarded electrical and electronic equipment that no longer serves its original purpose. E-waste may contain a range of hazardous substances including heavy metals (*e.g.,* mercury, cadmium, lead), flame retardants (pentabromophenol, polybrominated diphenyl ethers (PBDEs), tetrabromobisphenol-A) and other substances, which may pose significant environmental and human health risks if released to soil, water, and air through inappropriate practices such as burning and dumping.

The precise scale of the regional E-waste problem is difficult to quantify due primarily to the limited availability of importation, recycling, and disposal data in individual PICTs. Nonetheless, conventional wisdom dictates that the importation of electrical and electronic equipment will increase and E-waste will grow with the economic development of PICTs. Expansion in the provision of power, telecommunication, health, and educational services in PICTs will also contribute to the growth of E-waste from unwanted domestic appliances, mobile phones, electrical and electronic medical equipment, and computers.

From a resource recovery point-of-view, the value of E-waste stems from the presence of a range of precious metals (*e.g.,* gold, silver, platinum, palladium), scarce materials (*e.g.,* indium, gallium), and other recyclable materials (*e.g.,* aluminium, iron, copper), in sufficient quantities to potentially make return-for-recycling an economically-viable prospect. Dismantling the E-waste—to separate the valuable components—could potentially enhance the recovered value. This practice would also yield low-value residuals such as chemically-treated plastics, liquid crystal displays, and cathode ray tubes (CRT) with lead glass, which would require safe disposal to avoid the release of lead, mercury, and other toxic chemicals.

Baseline E-waste assessments in 9 PICTs were completed in 2013 (Leney, 2013) and 2014 (Leney, 2014), with funding support from the PacWaste Project, and the small scale E-waste project carried out in the Cook Islands, Kiribati, and Samoa utilising funding from the Strategic Approach to international Chemicals Management (SAICM). The remainder of this section discusses the key findings.

Current E-waste management practices in PICTs include repair and cannibalisation of spare parts by privately-run service shops; acceptance, dismantling, and export by private recyclers; and disposal in dumps and landfills with domestic rubbish. There are no known regular collection programs for E-waste in PICs, and most E-waste that is recovered is brought in by the public (private individuals, institutions, commercial entities), or separated at the disposal site tipping face by waste pickers, and sold to recyclers. Whilst E-waste stockpiles exist (typically in government institutions and some commercial establishments), the specific quantities have not been measured.

In December 2010, the Cook Islands implemented an E-day resulting in the collection and export of 5,154 items of E-waste (without dismantling) to New Zealand for safe recycling and disposal at a total cost of US$ 78,987, not including the cost of significant local business sponsorship, and raffle prizes to encourage E-waste drop-offs (Leney, 2013). The Cook Islands E-day proved to be an expensive exercise not likely to be replicable in other PICTs, however, it yielded data that could be used to inform the development of sustainable E-waste recycling programmes, and also helped to publicise the importance of the issue in the region.

General E-waste management is deemed a priority for Cook Islands, Fiji, Kiribati, Palau, Samoa, Solomon Islands, and Tonga, while addressing the management of mobile phones is a priority for the Solomon Islands and Vanuatu. Priorities for the development of sustainable E-waste management programmes in the region include the introduction of extended producer responsibility schemes supported with an advance recycling fee that creates a value chain for E-waste; and capacity development of the private waste recycling sector to execute safe and cost-effective E-waste recycling operations. As of 2015, New Caledonia is the only PICT implementing an EPR scheme for E-waste, with potentially useful lessons for the rest of the region.

3.7 Asbestos

Asbestos refers to a group of naturally-occurring fibrous minerals, which were used globally to manufacture construction, insulation, and fire-resistant products. The most common types of asbestos are chrysotile (white asbestos), crocidolite (blue asbestos) and amosite (brown asbestos).

Asbestos-containing materials (ACM) such as cement water pipes, corrugated roof sheets, floor tiles, wall claddings, and insulation (e.g. boiler insulation), were widely used in the construction sector in PICTs, prior to being phased-out due to health concerns. Exposure to asbestos fibres causes human cancer of the lung, larynx, and ovaries, and other diseases such as mesothelioma, asbestosis, and plaques (WHO, 2014b). Pacific islanders may unknowingly become exposed to asbestos fibres when working with ACM (e.g., during roof repairs, or boiler repairs), or during the aftermath of a natural disaster involving disturbance and dispersal of ACM.

Based on a regional assessment of 13 PICs (PNG excepted) completed as part of the PacWaste Project, more than 285,784 m^2 and 267 m^3 of ACM are estimated to be distributed across PICs in stockpiles, abandoned infrastructure, and occupied buildings. Of the total amount, 87% is considered high risk with significant potential for release of asbestos fibres if disturbed and significant health risk to occupants of affected buildings (Table 11). ACM in Nauru accounts for 74% of the total regional ACM, and all of it is considered high risk.

Asbestos waste is a hazardous waste stream, with no economic value. Minimising public exposure to asbestos fibres will entail urgent and environmentally-appropriate disposal of stockpiles and stabilisation of asbestos in occupied buildings, where appropriate, prior to its eventual removal and disposal.

Table 11: Confirmed asbestos-containing materials in PICTs

PICT	Estimated quantities of confirmed ACM (m^2)				
	High Risk	Moderate Risk	Low Risk	Very Low Risk	Total
American Samoa	No data	No data	No data	No data	No data
Cook Islands	1,450	5,070	0	0	6,520
FSM		823	584	2,150	3,557
Fiji	100	1,720	220	260	2,305
French Polynesia	No data	No data	No data	No data	No data
Kiribati	4,336	5,160	11,196	9,000	39,992
Marshall Islands	0	160	400	300	860
Nauru	21,677	29,492	1,705	0	52,874
New Caledonia	No data	No data	No data	No data	No data
Niue	1,250	45,1753	0	0	46,428
Palau	0	0	513	2001	2,514
PNG	No data	No data	No data	No data	No data
Samoa	520	3955	785	0	5,260
Solomon Islands	0	1,600	1,550	0	3,150
Tokelau	No data	No data	No data	No data	No data
Tonga	2,550	2,020	280	0	4,850
Tuvalu	0	120	130	1	251
Vanuatu	2,000	17,000	300	30	19,330

PICT	Estimated quantities of confirmed ACM (m^2)				
	High Risk	Moderate Risk	Low Risk	Very Low Risk	Total
Wallis and Futuna	0	0	0	0	0
Regional	**33,883**	**112,295**	**17,666**	**13,742**	**187,891**

SOURCE: (Contract Environmental Ltd, Geoscience, 2015)

Note: High risk = significant potential to release asbestos fibres if disturbed and significant health risk to occupants of affected buildings.

Additional findings from the PacWaste regional asbestos assessment are summarised below:

- Asbestos removed from buildings are typically buried on-site or taken to waste disposal sites.
- There is a good contractor base in most PICTs to support ACM clean-up operations, however, the level and appropriateness of ACM-remediation training and expertise is uncertain, but likely to poor.
- Only a few PICTs have enacted legislation to ban the importation of new asbestos materials.
- Awareness of the negative health effects of asbestos exposure is low among those with high exposure risks.

The PacWaste project will support removal and disposal of stockpiles, and in-situ remediation of ACM in the highest-risk PICs within the available budget. There is likely to be a need for continued ongoing support to address lower-risk ACM, particularly in the face of increased climate change impacts, such as cyclones, which could increase infrastructure damage and dispersal of ACM.

3.8 Used Oil

For the purpose of *Cleaner Pacific 2025*, used oil is any semi-solid or liquid used product consisting totally or partially of petroleum-based or synthetic oil, oily residues from tanks, and oil-water mixtures (Technical Working Group of the Basel Convention, 1997). Used oil includes—but is not restricted to—used engine oils, transmission fluids, refrigeration oils, compressor oils, metalworking fluids and oils, electrical insulating oil, and hydraulic fluids. Environmental contamination occurs when used oil is dumped in drains, on the ground, in aquatic environments; used as a dust suppressant or to mark sports fields; applied to wood as a preservative; or burnt in ill-equipped facilities causing the release of UPOPs such as dioxins and furans.

Used oil may contain several compounds which are harmful to human health and the environment, including polycyclic aromatic hydrocarbons (PAHs) absorbed into the oil from incomplete combustion in engines; heavy metal particles introduced through machinery wear; and additives such as polychlorinated biphenyls (PCBs), and other chemicals used to boost the performance of the oil. Many of these compounds can induce various types of cancer; affect the immune, reproductive, nervous and endocrine systems; and cause other diseases in humans and other mammals through inhalation, ingestion or skin contact (Vazquex-Duhalt, 1989).

National used oil audits were completed for 13 PICs during 2013 and 2014 as part of the AFD Regional Solid Waste Initiative and the GEF-PAS POPs Release Reduction Project. Based on the assumption that up to 50% of the oil in use can theoretically be recovered as used oil, it is projected that more than 8 million litres of used oil are generated annually in PICTs (Table 12). Of this amount, approximately 45% (or 3.92 million litres) are currently exported, or reused domestically to supplement fuel sources for boilers and diesel generators, with the remainder either going to stockpiles, or to unacceptable disposal methods. Existing used oil stockpiles total over 2.96 million litres or equivalently about 3 months' worth of theoretical generation.

Table 12: Used oil statistics for PICTs

PICT	Theoretical Annual Generation (A)	Amount reused or returned overseas on a continual basis (B)		Total Recycling/ Return Rate	Stockpiles (estimated as of 2013/2014)	Data Sources
Units	Litres/year	Litres/year	Management Method(s)	%	Litres	
American Samoa	>265,000	38,000	Used as generator fuel	< 14%	No data	1
Cook Islands	55,000	12,540	Exported to Fiji's steel mill	30%	0	2
FSM	331,648	7,500		2%	1,026,682	2
- Chuuk	*35,600*	*0*		*0*	*21,650*	2
- Kosrae	*11,168*	*0*		*0*	*47,682*	2
- Pohnpei	*252,400*	*7,500*	*Used as generator fuel*	*3%*	*891,600*	2
- Yap	*32,480*	*0*		*0*	*65,750*	2
Fiji	2,868,917	1,555,000	Used as fuel in several industries	54%	100,000	2
French Polynesia[1]	3,077,000	2,000,000		65%	No data	3
Guam	No data	No data	No data	No data	No data	
Kiribati	85,000	21,333	Exported to India	25%	8,000	2
Marshall Islands	185,800	132,000	Used as power plant fuel	71%	1,108,350	2
Nauru	70,000	20,000	Used as phosphate burner fuel	29%	30,000	2
Niue	4,187	0	Historically exported	0	4,000	2
New Caledonia	No data	No data	No data	No data	No data	
Palau	188,352	No data	Consumed in power plant	-	550,780	2
Papua New Guinea	No data	No data	No data	No data	No data	
Samoa	270,975	0	-	0	8,400	2
Solomon Islands	803,500	0	-	0	no data	2
Tokelau	> 600	No data		0	6,200	4
Tonga	225,000	0		0	no data	2
Tuvalu	5,000	4,000	Exported to Fiji's steel mill	80%	14,500	2
Vanuatu	247,500	125,000	Exported to India	51%	0	2
Wallis and Futuna	No data	No data	Stockpiled	0	100,000	5
Regional	**> 8,683,478**	**3,919,333**		**45%**	**2,956,912**	

SOURCE: [1] Estimates based on interviews during a 2013 SPREP mission to American Samoa. **[2]** National used oil audits completed for SPREP during implementation of the SPREP/AFD Regional Solid Waste Management Initiative, and the SPREP/EU Pacific Hazardous Waste Management Project. **[3]** Data submitted to SPREP by Environment Directorate of French Polynesia. **[4]** 2010 Estimates based on interviews during SPREP mission to Tokelau. **[5]** Data submitted to SPREP by Environment Service of Wallis and Futuna.

NOTES: (A): Assumes that only 50% of oil can be recovered as used oil; **(B)**: Includes domestic energy recovery (through burning), but excludes public distribution, sports field marking and other inappropriate uses.

Other used oil management issues in PICTs identified through national audits include:

- Unsafe used oil disposal practices such as line marking of sporting fields, use as a wood preservative, disposal to storm water drains and water bodies, and disposal on the ground;
- Inadequate and unsafe storage sites (exposed to the elements, not contained/bunded);
- Lack of proper collection systems (including on outer islands) for small generators of used oil;
- Little attention paid to management of oil contaminated waste such as used filters, and containers;
- Instances of non-compliance with Basel and Waigani Convention requirements;
- Limited capacity to monitor and report on environmental performance of used oil reuse facilities;
- Inconsistencies in recording oil importation information at Customs departments; and
- Poor socio-economic conditions in some PICs that limit implementation of user-pay systems.

A cost benefit study of environmentally-sound disposal options for used oil in Samoa (Haynes & Vanderburg, 2013), determined that there were three potentially suitable options: shipping oil offshore for recycling; adding it to diesel fuel used to run diesel generators; or adding it to the diesel fuel used in motor vehicles. The study concluded that using used oil as a supplementary fuel for electrical generation is the most practical, cost-effective and environmentally sustainable solution in the short to medium term. This used oil management solution is also likely to be relevant for many other PICTs in the short term. In the long term, as PICTs increasingly

realise their renewable energy targets and reduce reliance on diesel-fuelled electricity generation, used oil will have to be eventually exported to environmentally sound recycling facilities.

Irrespective of the disposal option for used oil, it must be understood that the true cost of using oil includes the environmental management cost of the used oil. That is, the costs of collection, storage and transport of used oil for recycling or reuse will always have to be recovered if the system is to be sustainable. This can be done by placing an environmental fee on the imported oil and ensuring the collected fees are set aside to support the ongoing collection, storage and transport of used oil.

3.9 Batteries

There are two main types of batteries:

1. Primary cell batteries, which are intended for single use and include two sub-types:
    a. Alkaline and zinc-carbon batteries (everyday household batteries).
    b. Button-cell batteries containing mercury, silver, cadmium, lithium, or other heavy metals.
2. Secondary batteries, which can be recharged by an electric current, and include three sub-types:
    a. Wet cell batteries, which contain lead and sulphuric acid (a corrosive liquid) and are typically used in motor vehicles, and photo-voltaic systems.
    b. Gel-type batteries, in which the sulphuric acid is in gel-form. These are used to power industrial equipment, emergency lighting, alarm systems, and photo-voltaic systems.
    c. Rechargeable batteries such as nickel-cadmium, nickel metal hydride, and lithium ion used in consumer goods such as laptops, cameras, cellular phones, and cordless power tools.

Recycling rates for used lead acid batteries (ULABs) of the wet-cell variety varies greatly, but can be as high as 80-90% high due to the relatively high market value for lead (Leney, 2015). Destructive local recycling practices still exist including draining acid to the ground, and crude recovery of lead to make fishing sinkers and weights for diving belts.

With the increased emphasis on renewable energy systems (particularly in remote areas) that rely on rechargeable batteries to store electrical power, consumption of lead-acid batteries is likely to increase. It would be critical to ensure that product stewardship programmes are in place to support the return, consolidation and export of these (and other) batteries to environmentally sound recycling facilities. There is a lead acid battery manufacturing plant in Fiji (Pacific Batteries) that also recycles ULABs from other PICTs—the only one of its kind in the Pacific islands region.

Product stewardship programmes exist in Kiribati, FSM (Yap), and New Caledonia for ULABs, and in New Caledonia for primary batteries. Primary cell batteries and rechargeable batteries have low market value and return for recycling overseas would likely incur a net financial cost to Pacific countries, which could be recovered through a product stewardship programme.

3.10 Persistent Organic Pollutants

Persistent Organic Pollutants (POPs) are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment. Exposure to POPs can lead to serious health effects including certain cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease and damage to the central and peripheral nervous systems (Secretariat of the Stockholm Convention, 2008). The reduction and elimination of POPs are regulated under the 2004 Stockholm Convention on POPs, which is operationalised at the national level through the preparation of a National Implementation Plan (NIP).

On entry into force, the Stockholm Convention identified a list of 12 priority POPs, which was subsequently expanded to 23 POPs through amendments passed in 2009, 2011, and 2013. Consequently, all Parties that ratified the amendments are required to update their NIPs to include actions to reduce or eliminate the new POPs. All PICs, with the exception of FSM and Vanuatu, have ratified the amendments, and Niue and Palau have yet to initiate the update of their NIPs to include the new POPs (Table 13).

Significant quantities (140 tonnes) of legacy POPs stockpiles were removed from 13 PICs (PNG excepted) under a POPs in PICs Project funded by the Australian Government and implemented over 9-years (1997-2006). With the exception of PNG, no PICs are believed to have significant POPs stockpiles, however, it is expected that the preparation of the updated NIPs, which has commenced in 10 PICs (Table 13) will include assessments of POPs stockpiles, as well as unintentional POPs (UPOPs) production. UPOPs include dioxins and furans, which are produced from burning of solid waste (*e.g.*, backyard burning, landfill fires, low-temperature healthcare waste incineration) and biomass (*e.g.,* sugarcane and vegetation).

Ongoing initiatives to address POPs in the Pacific region include the UNEP/GEF-PAS POPs Release Reduction Project, and the UNEP Capacity Building in POPs Management project, for which further details can be found in Appendix C.

Table 13: Pacific Island Parties to the Stockholm Convention

	Cook Isl	FSM	Fiji	Kiribati	Marshall Isl	Nauru	Niue	Palau	PNG	Samoa	Solomon Isl	Tonga	Tuvalu	Vanuatu	Australia	France	United Kingdom	New Zealand	USA
Party to Stockholm Convention	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	S
2009 Amendments ratified	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		
2011 Amendments ratified	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	
2013 Amendments ratified	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		
Year that first NIP was submitted to the Convention Secretariat	2011		2006		2009	2012	2005	2014	2013	2007			2009		2006	2007	2007	2007	n/a
Updated NIP (for new POPs) prepared and submitted to Secretariat	C	n/a	C	C	C	C			C	C	C	C	C	n/a	Yes	Yes	Yes	Yes	n/a

KEY: S = Signature, or succession to signature; **C** = Preparation of updated NIP commenced; **n/a** = Not Applicable

3.11 Mercury

Mercury is a heavy metal that is widespread and persistent in the environment. It is a naturally occurring element and can be released into the air and water. Mercury exposure can affect foetal neurological development, and has been linked to lowered fertility, brain and nerve damage, and heart disease in adults who have high levels of mercury in their blood. In liquid form mercury readily vaporises and is released into the air, remaining in the atmosphere for up to a year, where it is transported and deposited globally. It can bioaccumulate in, and biomagnify up the food chain, especially in the aquatic food chain where it constitutes a major threat to global food security. Even at low concentrations, mercury poses a risk of causing adverse effects to human health and the environment (Department of the Environment, 2014).

In response to the global threat of Mercury, the Minamata Convention on Mercury was adopted in 2013 to protect human health and the environment from the adverse effects of mercury. The major highlights of the Minamata Convention include a ban on mercury-containing products and new mercury mines, the phase-out of existing mines, control measures on air emissions, and the international regulation of the informal sector for

artisanal and small-scale gold mining (UNEP, 2015). Signing the Convention before 9th October 2014 was a pre-condition for developing countries to access funding for enabling activities and pre-ratification projects from GEF (UNEP, 2014). Two PICTs (Palau and Samoa) have met this condition and are the only two PICTs to have signed the Convention as of April 2015 (Table 1). The Minamata Convention will enter into force 90 days after it is ratified by 50 nations.

Potential sources in PICTs include artisanal and small scale gold mining, batteries, paints, electrical and electronic equipment, thermometers, blood-pressure gauges, fluorescent and energy-saving lamps, pesticides, fungicides, medicines, and cosmetics. The mercury contained in these products is mobilised if the waste is burnt without proper controls (thus releasing mercury into the air), or sent to dumps and improperly managed landfills where the mercury can leach into soil and water (UNEP, 2013).

There is a lack of data on mercury emissions in PICTs. However, in 2010, the average emission of mercury to air from all of Oceania (including Australia, New Zealand, and PICTs) was estimated at 22.3 tonnes or 1.1% of the global emissions (UNEP, 2013).

Ratifying the Minamata Convention comes with legal obligations to, among other things, ban the manufacture, import or export of mercury-added products (including batteries, switches, relays, compact fluorescent lamps, high pressure mercury vapour lamps, cold cathode fluorescent lamps, and cosmetics) by 2020, and formalise or regulate the artisanal and small-scale gold mining sector; the latter being of particular relevance to PICTs with gold mining industries (Fiji, PNG, Solomon Islands, and Vanuatu). A detailed regional assessment of the costs and benefits of ratifying the Minamata Convention should be completed to provide guidance to Pacific nations.

Given the hazardous nature of mercury containing waste, environmentally-sound management must be encouraged for the sake of public and environmental health protection. Such management will come at a cost, which will not be recoverable through on-selling of the waste to recyclers. All available mechanisms (including potential mechanisms under the Minamata Convention) to finance the recycling or safe disposal of mercury containing waste would therefore need to be explored.

3.12 Ozone Depleting Substances

Ozone depleting substances (ODS) refer to substances which are able to rise to the upper layers of the earth's atmosphere and—through chemical reactions—destroy the ozone layer that absorbs most of the sun's ultraviolet radiation. ODS are widely used in refrigerators, air-conditioners, fire extinguishers, in dry cleaning, as solvents for cleaning, electronic equipment and as agricultural fumigants.

The Montreal Protocol on Substances that Deplete the Ozone Layer is an international treaty designed to protect the ozone layer by phasing out the production of potent ODS such as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and methyl bromide. The Montreal Protocol entered into force in 1989 and has been amended six times. It is widely considered to be successful at halting and reversing the damage to the ozone layer.

All PICs have ratified or acceded to the Montreal Protocol, and most have established institutional and regulatory systems to support ongoing efforts to reduce the consumption of ODS. All PICs have successfully phased out the use of CFCs, and currently face the challenge of completely phasing-out consumption of HCFCs, which are the main ODS used in the Pacific region primarily as a refrigerant in refrigeration and air-conditioning servicing. To meet Montreal Protocol obligations, HCFC consumption in PICTs needs to be frozen in 2013, and then reduced to 90% of the average consumption in 2009-2010 by 2015, to 65% of consumption by 2020, and to 32.5% of consumption by 2025.

Some of the challenges faced by the region to manage ODSs include:

- Communication of the importance of ozone layer protection and linkages with climate change impacts to the broader Pacific community;
- Adoption of ODS Acts and Regulation in some PICs;
- Enforcement of licensing systems for the import and control of ODS; and
- Ongoing capacity development of National Ozone Offices, refrigeration servicing technicians and customs and enforcement officers to support the phase out of HCFCs;

To address the above challenges, national HCFC Phase-out Management Plans (HPMPs) as well as a regional HPMP have been developed with assistance from SPREP and UNEP; financial support (US$ 1.696 million) has also been secured from the Multilateral Fund to support ODS activities in the Pacific region until 2020; and Pacific island refrigeration mechanics were trained in best practice ODS management in a regional programme funded by SPREP.

3.13 Marine Pollution

Marine pollution results from entry into the ocean of harmful chemicals, polluted wastewaters, industrial, agricultural and residential waste, garbage from ships, and the spread of invasive organisms. A significant source of marine pollution is related to the various categories of shipping, which is the mode of transport for 90% of global trade (IMO, 2015). Shipping is anticipated to increase in the future, as millions of people are lifted out of poverty through improved access to basic materials, goods and products. Maritime transport will also be indispensable to the future sustainability of the global economy as it is the most environmentally sound mode of mass transport, both in terms of energy efficiency and the prevention of pollution. The total amount of shipping traffic (number of movements) in the Pacific islands region in 2013 was 92,963 (Figure 3) (SPREP, 2015a).

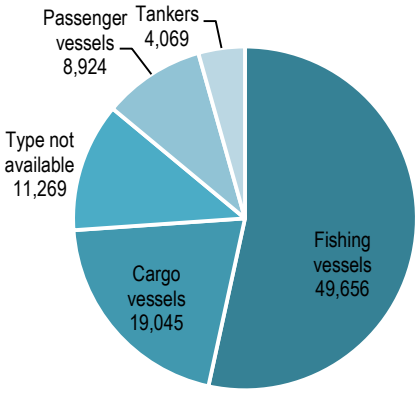

Figure 3: Shipping traffic in PICTs

The Pacific islands are particularly susceptible to shipping impacts, due to the special value and sensitivity of their coastal environments and the current inadequacy of regional and national capacity to address marine pollution. The issues related to ship-sourced marine pollution in the Pacific region include:

- Severe pollution of water and sediments in many ports in the region;
- The leaching into the sea of toxic chemicals from anti-fouling paints on ships' hulls;
- The disposal at sea of ships' wastes (including waste oil, sewage, plastics, and other garbage) and other wastes (as defined by the London, MARPOL, and Noumea Conventions);
- Marine litter including plastics, general garbage, and abandoned, lost and/or otherwise discarded fishing gear (SPREP, 2014);
- Inadequate facilities to receive ships' waste in regional ports (SPREP, 2015b);
- Potential major source of oil pollution from the sunken wrecks from the Second World War;
- Vessel grounding and sinking, which may result in physical damage to fringing coral reefs, in addition to shipping accidents sometimes resulting in catastrophic releases of oil and other contaminants;
- The potential inaccuracy of navigation charts, the poor standards of navigation aids, and the relatively low standards of maritime training compared to other regions of the world;
- The translocation and introduction of marine species attached to ships' hulls and within ships' ballast tanks across environmental barriers (SPREP, 2006); and
- Coastal and marine environmental impacts from the development and operation of ports which serve the shipping industry.

The capacity of PICTs to prevent and respond to shipping impacts is currently limited, and most countries do not have adequate pollution prevention and response plans (PACPLANs). In addition, several PICs have not become Party to the various conventions and protocols relating to the protection of the marine environment, including the MARPOL, London, and Noumea Conventions (Table 3).

To address these inadequacies, SPREP has been implementing the Pacific Ocean Pollution Prevention Programme (PACPOL) in partnership with the IMO since 1998. The first and second PACPOL strategies were approved in 1998 and 2009 respectively, and the third and current PACPOL strategy (SPREP, 2015a) was approved by SPREP Member governments in 2014 to cover the 2015-2020 strategic period.

The 2015-2020 PACPOL strategy was approved as a stand-alone document prior to the development of this integrated waste and pollution strategy; consequently, the key elements of PACPOL have been adapted and incorporated into this integrated strategy.

3.14 Marine Litter

Marine plastic and microplastic pollution from land- and sea-based sources are increasingly being identified as priority concerns by the global environmental community due to their persistent natures, and their impacts that include: high financial costs of cleaning up coastal communities; negative impacts to local tourism and fishing-dependent economies; costs incurred to small-scale fishing and transport vessels along with hazards to navigation and safety at sea through fouling of propellers and collisions with debris; damage to important and fragile coastal ecosystems such as coral reefs and mangroves; entanglement of marine wildlife such as turtles and whales from abandoned, lost and/or otherwise discarded fishing gear (ALDFG); ingestion of marine litter by wildlife with potential for associated toxic chemical transfers; and introduction of invasive species, which use marine litter as rafting habitats (Richardson, 2015).

In June 2014 at the inaugural United Nations Environment Assembly (UNEA) over 150 countries came together to adopt the Marine Plastic Debris and Microplastics Resolution. This resolution recognized the significant risks of and serious impacts from marine litter and called upon the global community, including governments and inter-governmental organizations, to take urgent actions to minimize sources and mitigate impacts of marine litter.

With 98% of the SPREP region covered by ocean, marine litter impacts to ecosystems and coastal communities are heightened by the reliance of island countries upon healthy ocean ecosystems and services. PICTs can be particularly vulnerable to marine litter impacts due to financial and institutional challenges in properly managing waste before it is transferred to the marine environment and from the negative socioeconomic impacts of marine litter, especially on poorer coastal communities (Richardson, 2015).

The extent of the marine litter problem (quantities of litter, dispersal pathways, and fate) in the Pacific region has not been comprehensively documented, however, the limited information that is available strongly suggests that marine litter is not appropriately managed in most Pacific island communities. Additionally, many PICTs have no current systematic management plan or system for marine litter prevention, management, and clean up/recovery (Richardson, 2015).

While marine litter can be found everywhere in the Pacific region, there is often very little awareness of this problem as an environmental and socioeconomic issue or about its impacts upon local communities. Raising awareness of the marine litter issue among Pacific islanders can create incentives for greater investment in, and prioritization of this issue among a variety of stakeholders including governments, industry, academia, NGOs and citizens (Richardson, 2015).

Very little research has been done on land- and sea-based sources, fate and impacts of marine litter in the Pacific region, which can be used to inform regional and national strategies and policy making. Of particular relevance is the need for modelling and monitoring; investigations into ALDFG including Fish Aggregating Devices; and identification of major marine litter accumulation and hot spot areas in the region to allow for targeted recovery and clean-up efforts (Richardson, 2015).

Marine litter minimization and management programmes and projects require financing for appropriate coverage and success. This is especially the case for projects that target extensions of plastic waste management infrastructure to decrease sources of marine plastic litter. There are currently no national budgets allocated for marine litter management in the Pacific islands region (Richardson, 2015).

3.15 Liquid Waste

Wastewater discharges including sewage, grey water, landfill leachate, stormwater runoff, wastewater from industrial and mining activities, and wastewater from husbandry and agricultural processing activities are the main sources of land-based pollution to freshwater, coastal and marine resources in PICTs. However, the extent of the issue is difficult to quantify due to the lack of contemporary data on coastal water quality and on the quantity and quality of wastewater discharged from various sources (see historical data in Appendix F).

According to the Pacific Water and Wastes Association (and additional sources), approximately 4% of the Pacific population is served by sewer connections (Table 14). Average sewage production is reported to be about 405 litres/capita/day (over the entire population) or equivalently about 154 Ml per day for the PICTs shown in Table 14. Of this amount, 88% (or 135 Ml) is treated to primary standards[4] and 65% (100 Ml) to secondary standards[5] (Pacific Water and Wastes Association, 2013).

Table 14: Sanitation and sewerage in PICTs

Pacific Island Country or Territory	National improved sanitation [A]		Sewer Connections [B]			Volume of Sewage collected (Megalitres/year) [B]
	% population	Year	Number of Connections	Population served	% Population served	
American Samoa	83.6	2010	5,000	23,000	41	2,304
Cook Islands	100	2010	250	1,000	7	37
Federated States of Micronesia	56.5	2010	2,376	12,405	12	1,367
Fiji	83	2010	28,204	132,559	15	18,401
French Polynesia	96.3	2012	ND	52,280	20	ND
Kiribati	31.2	2009	2,282	15,974	15	383
Marshall Islands	75	2010	2,620	22,608	40	194
Nauru	65	2010	0	0	0	NA
New Caledonia	ND	-	ND	ND	ND	ND
Niue	100	2010	0	0	0	NA
Palau	100	2010	2,240	11,200	54	4,150
PNG	83.5	2010	17,618	154,177	2	28,724
Samoa	98	2010	75	120	0	8
Solomon Islands	17.6	2007	916	6,412	1	574
Tokelau	93	2010	0	0	0	NA
Tonga	99	2010	0	0	0	NA
Tuvalu	85	2010	0	0	0	NA
Vanuatu	57	2010	0	0	0	NA

[4] Primary standards include grease removal, or solid-liquid separation with or without chemical treatment.
[5] Secondary standards include sand filtration, disinfection, polishing steps, activated sludge processes, anaerobic and aerobic processes, biological filters, and treatment lagoons.

Pacific Island Country or Territory	National improved sanitation [A]		Sewer Connections [B]			Volume of Sewage collected (Megalitres/year) [B]
	% population	Year	Number of Connections	Population served	% Population served	
Wallis and Futuna	97.8	2013	ND	ND	ND	NA
Regional	**-**	**-**	**61,581**	**431,735**	**4%**	**56,142**

Sources:[A] = (SPC, not dated); [B] = (Pacific Water and Wastes Association, 2013)
Source for French Polynesia: (National Institute of Statistics and Economic Studies, not dated)
NA = Not Applicable (no sewerage system in place); **ND** = No data

Wastewater management in the Pacific region is currently addressed within a broader Integrated Water Resources Management (IWRM) approach. Within this approach, the wastewater agenda is driven by several policies coordinated by SPC: the Pacific Wastewater Policy Statement (SOPAC & SPREP, 2001); the Pacific Wastewater Framework for Action (SOPAC & SPREP, 2001); the Pacific Regional Action Plan on Sustainable Water Management (SOPAC & ADB, 2003); and the Pacific Framework for Action on Drinking Water Quality and Health (WHO, 2005) (these policies are discussed in Section 1.4.3). These strategic documents are more than 10 years old, and have not been reviewed or evaluated since their endorsement.

As of 2015, several regional projects have been implemented and at least one project is currently ongoing to improve wastewater management in PICTs, including: the GEF Pacific Islands Ridge-to-Reef National Priorities Program (ongoing); the GEF Pacific IWRM Project (completed); and the UNDP/GEF International Waters Program (completed).

Challenges to Pacific wastewater management going forward include:

- Comprehensive regional understanding of the status of liquid waste management, and water quality status in the Pacific region;
- Development of effective water quality monitoring programmes, including utilisation of water quality results to inform appropriate interventions;
- Development of climate-resilient wastewater infrastructure, which can cope with the expected increase in frequency and severity of tropical cyclones and associated flooding and landslides;
- Adoption of national policies that reduce pollution from land-based sources;
- Implementation of integrated, cost-effective, technically-appropriate, and culturally-acceptable practices and technologies that minimise and manage water pollution from various sources (e.g., domestic sewage, animal waste, organic waste, and landfill leachate);
- Development of institutional and human capacity to implement pollution-reduction programmes and water quality monitoring programmes; and
- Raising community awareness of the importance of reducing and managing pollution.

3.16 Disaster Waste

Natural disasters such as cyclones, floods, and tsunamis can generate large quantities of solid and liquid wastes which can pose risks to public health through direct or vector-induced exposure to uncollected hazardous waste. Waterways, agricultural areas, and communities are also at risk of contamination.

The likelihood of waste management facilities being damaged and waste services being disrupted are also potential disaster impacts which should not be underestimated. Apart from public health and environmental issues associated with the collapse of waste services, the accumulation of excessive wastes can hinder post-event recovery efforts by limiting and blocking access to affected communities. Uncoordinated collection and disposal of disaster waste can also overwhelm local waste disposal facilities and exacerbate the impacts of inadequate disposal practices. In some instances, waste disposal sites may be directly affected by the disaster,

becoming inaccessible, unusable (*e.g,.* due to flooding), and they may also pollute the surrounding environment due to the release of waste and pollutants.

Despite the challenges of managing disaster waste, it should be recognised that short-term recovery efforts could be assisted by recovering valuable resources from disaster waste such as concrete, steel, and timber for rebuilding; and organic materials for composting to aid in replenishing subsistence gardens.

Within the last five years, the Pacific region has been affected by several natural disasters that resulted in disaster waste (Table 15). While considerable efforts have been focused on predicting, and building resilience to, climate change related disaster impacts in the Pacific, the national management of debris and waste after each disaster event is still often ad hoc and uncoordinated.

Table 15: Disaster waste-generating events in PICTs

Date	Data Source	PICT	Natural Disaster/Event	Est. Quantity of Disaster Waste	Comments
Sept 2009	(Sagapolutele, 2008)	Samoa	Earthquake and tsunami	2,270 m^3	Waste management assistance provided by JICA and SPREP
Jan 2012	(Sagapolutele, 2012)	Fiji	Flood event in Ba Town	4,091 tonnes	Waste management assistance provided by JICA
Dec 2013	(MNRE, 2013)	Samoa	Cyclone Evan	5,403 m^3	Waste management assistance provided by JICA and SPREP
Jan 2014	(World Bank, 2014)	Tonga (Ha'apai)	Cyclone Ian	>300 tonnes	Assistance provided by World Bank. Waste included asbestos.

There is a need to strengthen planning within national and local governments to ensure the best possible management of disaster waste. Waste management facilities also need to be upgraded to better adapt to natural disasters.

The pilot AdaptWaste Project funded by the Australian Department of Foreign Affairs and Trade (DFAT) and implemented by SPREP, sought to integrate climate change considerations into the waste management sector in Fiji, and resulted in the preparation of a national disaster waste management plan; and the improvement of a town dump (Labasa Town) to better cope with disasters and disaster waste. This pilot project could potentially provide useful insights into the development of regional guidance on disaster waste management planning and response, as well as the development of design guidelines to make waste disposal sites more resilient to climate change impacts.

4 Where do we want to get to?

4.1 Vision and Mission

VISION: A cleaner Pacific environment

MISSION: To implement practical and sustainable solutions for the prevention and management of waste and pollution in the Pacific.

4.2 Guiding Principles

To achieve our vision and goals, the Secretariat and SPREP Members will adhere to the following guiding principles (values), in no specific order of priority:

PRINCIPLE 1: **Reduce, Reuse, Recycle, Return (3R + Return)**
In prescribing waste management interventions, the preference shall be to reduce the generation of waste and pollutants; to reuse if appropriate and safe to do so; to recycle domestically when technically and economically feasible; and finally to return waste resources to appropriate recycling facilities in other countries. Residual waste that cannot be reused, recycled, or returned for recycling, shall be disposed of in an environmentally-sound manner.

PRINCIPLE 2: **Product stewardship**
Those involved in producing, importing, selling, using and disposing of products have a shared responsibility to ensure that those products or materials are managed throughout their lifecycle in a way that reduces their impact on the environment and on human health and safety.

PRINCIPLE 3: **Polluter pays principle**
Waste producers and polluters should pay the cost of managing their waste, or cleaning up the pollution and remediating associated environmental damage.

PRINCIPLE 4: **Proximity principle**
The treatment and disposal of waste and pollutants should take place at the closest possible location to the source, in order to minimise the risks involved in its transport.

PRINCIPLE 5: **Transparency**
All waste management activities shall be conducted in an open and transparent manner.

PRINCIPLE 6: **Public consultation and participation**
Public consultation shall be integrated into the planning of national and regional waste management and pollution control activities, and participants shall be given the opportunity to provide informed input, which shall be considered as advice by relevant decision makers. Participants shall also be informed of the results of the consultation process.

PRINCIPLE 7: **Multi-sectoral approach**

Waste management and pollution control approaches shall involve multiple sectors (such as climate change, biodiversity conservation, health, tourism, and agriculture) in order to improve the success and effectiveness of interventions.

PRINCIPLE 8 **Regionalism**

Regional cooperation and collaboration through genuine partnerships shall be undertaken where appropriate, to complement national efforts, overcome common constraints, share resources, and harness shared strengths.

PRINCIPLE 9: **Sound decision-making**

Decision-making shall be based on scientific information and risk analysis from national, regional and/or international sources and shall promote the optimum utilisation of resources.

PRINCIPLE 10: **Precautionary approach**

When an activity may lead to unacceptable but scientifically-uncertain harm to human health or the environment, actions shall be taken to avoid or diminish that harm without having to await the completion of further scientific research.

PRINCIPLE 11 **Adherence to regional and international conventions**

PICTs shall abide by their obligations to regional and international treaties related to waste, chemicals, hazardous waste, and marine pollution.

PRINCIPLE 12 **Public-private partnership**

The comparative and competitive advantages of the private sector shall be harnessed to improve the delivery of waste management and pollution control services through a contractual relationship between private and public entities.

PRINCIPLE 13: **Selection of appropriate and affordable technology**

Selection (development and/or transfer) of environmentally sound technologies for waste management and pollution control shall fully consider the prevailing socio-economic conditions and capacity of PICTs, and where deemed necessary, shall be part of an overall management strategy that prioritises public health and environmental protection, sustainability, and compliance with international and regional treaties (such as reduction in greenhouse gas and ODS emissions and UPOPs generation).

4.3 Strategic Goals

STRATEGIC GOAL 1: **Prevent generation of wastes and pollution**

Prevention of the generation of wastes, chemicals and pollution eliminates risks to human health and the environment, and reduces overall management costs.

STRATEGIC GOAL 2: **Recover resources from waste and pollutants**

Value can be recovered from waste and pollutants through composting (nutrient recovery), recycling (material recovery), energy recovery and other measures, in order to reduce residual waste, and to contribute to national economic and social development.

STRATEGIC GOAL 3: **Improve management of residuals**

Wastes, chemicals and pollutants from which resources cannot be recovered require appropriate storage, collection, treatment and disposal to minimise the risks to human health and the environment.

STRATEGIC GOAL 4: **Improve monitoring of the receiving environment**

This goal speaks to furthering our understanding of the health and quality of the receiving environment for waste and pollution, and ultimately supports informed decision-making on appropriate measures to protect public health and the environment, and remediate associated environmental damage.

4.4 Performance Indicators and Targets

Table 16 summarises the key performance indicators (linked to each of the four strategic goals), which will be used to measure performance of Cleaner Pacific 2025. Additionally, the targets to be achieved by 2020 and 2025 are shown. The targets will contribute to achieving the post-2015 global sustainable development goals and targets provisionally identified in Table 2.

Table 16: Performance indicators and targets for *Cleaner Pacific 2025*

Strategic Goals	Performance Indicators	2014 (Baseline)	Targets	
			By 2020	By 2025
1. Prevent generation of wastes and pollution	Per capita generation of municipal solid waste (kg/person/day)	1.3	1.3	1.3
	No. of marine pollution incidents	6 (2 PICTs)	0	0
	No. of port waste reception facilities	5	10	20
2. Recover resources from waste and pollutants	Waste recycling rate (=amount recycled, reused, returned/amount recyclable) (%)	47%	60%	75%
	No. of national or municipal composting programmes	18	30	40
	No. of national or state container deposit programmes	4 (KI, PA, Kosrae, Yap)	7	10
	No. of national EPR programmes for used oil	2 (NC, FP)	3	10
	No. of national EPR programmes for E-waste	1 (NC)	5	8
3. Improve management of residuals	No. of national or state user pays systems for waste collection	9	14	21
	Waste collection coverage (% of population)	88% (urban) (= 35% nationally)	100% (urban) (= 40% nationally)	60% (nationally)
	Waste capture rate (= amount collected/amount generated) (%)	Insufficient data	Establish baseline & targets	
	No. of temporary, unregulated, and open dumps	Over 250	237	225
	Quantity of asbestos stockpiles (m^3)	> 187,891 m^2	159,700 m^2	131,500 m^2
	Quantity of healthcare waste stockpiles (tonnes)	> 76 tonnes	< 20 tonnes	0 tonnes
	Quantity of E-waste stockpiles (tonnes)	Insufficient data	Establish baseline & targets	
	Quantity of used oil stockpiles (m^3)	2,960 m^3	1,480 m^3	0 m^3
	Quantity of pharmaceutical and chemical stockpiles (tonnes)	Insufficient data	Establish baseline & targets	
	Urban sewage treated to secondary standards (%)	65%	Establish after regional assessment	
4. Improve monitoring of the receiving environment	No. of water and environmental quality monitoring programmes	~ 3 (AS, CI, GU)	5	7
	No. of national chemicals and pollution inventories	2 (SA, PA)	3	6

5 How will we get there?

5.1 Strategic Actions

The goals *of Cleaner Pacific 2025* will be achieved through 15 strategic actions that (a) strengthen institutional capacity; (b) promote public private partnerships; (c) promote sustainable best practices in waste, chemicals, and pollution (WCP) management; (d) develop human capacity; (e) improve dissemination of outcomes and experiences; and (f) promote regional and national cooperation. These strategic actions are described in Table 17.

Multi-disciplinary approaches to reducing and managing waste, chemicals and pollution must be pursued during implementation of *Cleaner Pacific 2025* to maximise the potential environmental benefits, and enhance the sustainability of outcomes. For example, approaches such as integrating climate change considerations into waste infrastructure planning can offer significant benefits for disaster risk reduction, biodiversity conservation, and waste management.

Table 17: Strategic actions for *Cleaner Pacific 2025*

Strategic Actions	Relevance to Goals			
	1	2	3	4
A. Strengthen institutional capacity				
1. SPREP, PICTs, and partners shall undertake regular WCP data collection and management (including storage, interpretation, dissemination, and sharing). *Data sets should include UPOPs releases; inventories of hazardous substances and wastes; WCP facility locations; climate change impact on WCP facilities; estimation, measurement and tracking of GHG and ODS emissions from WCP activities; and fate and impacts of marine litter on the marine ecosystem.*	X	X	X	X
2. PICTs, supported by SPREP and partners shall develop and enforce national policies, strategies, plans and legislation and strengthen institutional arrangements to support and promote best practice WCP management. *Policies should also address UPOPs emission reduction, climate change adaptation in WCP management, and GHG emission reduction through improved WCP management.*	X	X	X	X
B. Promote public private partnerships				
3. SPREP, PICTs, and partners shall strengthen existing and develop new public private partnerships including through strengthened PPP frameworks.	X	X	X	X
C. Implement sustainable best practices in WCP management				
4. SPREP, PICTs, and partners shall implement best practice occupational health and safety measures for formal and informal workers in the WCP management sectors. *Occupational health and safety should encompass awareness of the health impacts of UPOPs.*		X	X	X

Strategic Actions	Relevance to Goals			
	1	2	3	4
5. PICTs, supported by SPREP and partners, shall implement WCP prevention and reduction programmes. *Programmes should target waste streams such as single-use plastic bags, Styrofoam containers, tyres, and products containing hazardous substances. WCP prevention and reduction are also cost-effective climate adaptation and GHG mitigation strategies, since less waste means reduced pressure on landfills, and fewer management steps that produce GHG emissions (such as collection, treatment, and disposal).*	X			X
6. PICTs, supported by SPREP and partners, shall implement resource recovery programmes. *Resource recovery programmes should be implemented in partnership with the private sector (and informal sector where appropriate) and should be supported by appropriate sustainable financing mechanism. Resource recovery programmes should include organic waste recycling activities that reduce back-yard burning and disposal of organic waste at dumps and landfills, which in turn reduces emissions of UPOPs and GHG.*		X	X	X
7. PICTs, supported by SPREP and partners, shall remediate contaminated sites and WCP stockpiles in accordance with best practices. *Removal and environmentally-safe disposal of poorly managed WCP stockpiles such as chemicals, used oil, asbestos, healthcare waste, and tyres reduces the associated environmental contamination and public health hazard; and reduces the likelihood of dispersal and further damage and pollution that can occur during severe weather events.*		X	X	X
8. PICTs, supported by SPREP and partners, will expand user-pay WCP collection services. *Improved coverage of, and access to WCP collection services will increase the amount of WCP captured and contribute to reducing backyard burning (and UPOPs generation, illegal dumping, and pollution to natural ecosystems.*		X	X	
9. PICTs, supported by SPREP and partners, shall improve WCP management infrastructure and support sustainable operation and maintenance. *Improvement and environmentally-sound operation of infrastructure and equipment such as waste incinerators, waste dumps and landfills, hazardous waste storage facilities; collection vehicles, port waste reception facilities; and sewage treatment facilities will reduce releases of UPOPs, reduce risk from climate change impacts, reduce GHG emissions, and reduce pollution to natural ecosystems.*		X	X	
10. PICTs, supported by SPREP and partners, shall implement best practice environmental monitoring and reporting programmes.			X	X

Strategic Actions	Relevance to Goals			
	1	2	3	4
D. Develop human capacity				
11. SPREP, PICTs, and partners shall implement sustainable human capacity development programmes for WCP management stakeholders. *Human capacity development activities should be implemented in partnership with key national strategic partners who are able to sustain training delivery or provide support for future training (e.g., regional and national colleges and training institutions). Capacity development programmes should strive for gender balance and should include technical as well as managerial aspects such as project/programme planning, financial management, and monitoring and evaluation.*	X	X	X	X
E. Improve dissemination of outcomes and experiences in WCP management				
12. SPREP, PICTs, and partners shall utilise project outcomes to implement regional and national WCP education and behavioural change programmes. *Programmes should incorporate appropriate behavioural change techniques and target all levels including communities, practitioners, and politician, using the wide array of social media tools (e.g. Facebook, Skype, etc.). Among other things, programmes should be implemented to address back-yard burning, waste recycling; and hazardous waste management and to highlight the community, climate, and ecological benefits of operating and maintaining environmentally-sound WCP facilities.*	X	X	X	X
F. Promote regional and national cooperation				
13. SPREP, PICTs, and partners shall establish a regional Clean Pacific Roundtable to coordinate and facilitate waste management and pollution control dialogue and networking in the region.	X	X	X	X
14. SPREP, PICTs, and partners shall strengthen national and regional cooperation and coordination on waste and pollution management activities. *Improved coordination is needed with agricultural entities to promote better utilisation and recycling of organic waste; with disaster risk reduction entities to reduce risks associated with landfills and waste disposal sites; with climate change entities to promote GHG emission reductions through organic waste diversion from dumps and landfills; and with conservation groups to promote improved ecological monitoring around WCP facilities.*	X	X	X	X
15. SPREP, PICTs, and partners shall cooperate to ensure timely monitoring of the Integrated Regional Waste Management and Pollution Control Strategy 2016-2025.	X	X	X	X

5.2 Monitoring and Evaluation

5.2.1 Monitoring and Measuring Performance

A performance monitoring mechanism for the *Pacific Regional Solid Waste Management Strategy 2010-2015* was agreed by SPREP and PICTs at the 24th SPREP Meeting held in Apia, Samoa during September 2013. The approved mechanism—which is now adopted for *Cleaner Pacific 2025*—requires:

- PICTs to submit annual reports to SPREP of national waste management projects and programmes in advance of each SPREP Meeting using an agreed template;
- SPREP to prepare a regional synthesis of national reports; and
- SPREP to coordinate face-to-face discussions with development partners in the Pacific.

PICTs' annual national reports should catalogue national changes in the performance indicators shown in Table 16, and also record and report on the activities, projects and programmes implemented against the agreed *Cleaner Pacific 2025* implementation plan, using the template that will be provided by the Secretariat. SPREP shall prepare a regional synthesis of the data received and update regional key performance indicators as necessary.

To improve uptake of *Cleaner Pacific 2025* at the national level, PICTs shall be urged to table the regional strategy through appropriate national processes in order to obtain national endorsement at the highest level. This is expected to improve the mainstreaming of PICT-level activities from Cleaner Pacific 2025 into national and corporate work programmes and budgets, thereby improving implementation.

5.2.2 Mid-term Evaluation

Cleaner Pacific 2025 shall undergo a participative mid-term review in 2020 coordinated by SPREP, with the active involvement of PICTs and other stakeholders. The main purpose of the mid-term review is to verify and evaluate the relevance of Cleaner Pacific 2025 strategic actions to the waste, chemicals and pollution agenda in the Pacific. The mid-term review shall also identify necessary corrective actions and strategic recommendations for the second half of the strategy period (2021-2025).

5.3 Financial Considerations

The successful implementation of *Cleaner Pacific 2025* will require significant financial and technical resources at both national and regional levels, mobilisation of which will require collaboration between PICTs and the Secretariat. The proposed Clean Pacific Roundtable (Strategic Action 13) is expected to enhance resource mobilisation efforts by providing a forum that facilitates dialogue on waste and pollution management needs and priorities; promotes networking between PICTs, donors, development partners, civil society, regional organisations, and private sector; and disseminates information on new and existing funding opportunities.

Some of the suggested resource mobilisation strategies for *Cleaner Pacific 2025* include:

- Mainstreaming waste and pollution management considerations into other priority development areas such as climate change, biodiversity conservation, agricultural development, and tourism development. Not only will this open up new funding avenues, it will improve cross-sectoral and multi-stakeholder engagement in waste and pollution management, and enhance the sustainability of outcomes.
- Building awareness of the importance of improving waste and pollution management with politicians, decision makers, and communities. Informed politicians and decision makers are more likely to prioritise funding for waste and pollution management, whilst an informed populace is more likely to support relevant initiatives.
- Formal adoption of *Cleaner Pacific 2025* at the national level and incorporation of relevant strategic actions and activities into national waste and pollution management strategies, and national and corporate work programmes and budgets. This will ensure alignment between the agreed priorities and the work that gets done.
- Leveraging available national funding allocations for waste and pollution management. The capacity of national governments to implement incremental improvements to waste and pollution management through national funding allocations should not be underestimated. Every effort should be made to

leverage such national project funding allocations to secure additional external co-financing to expand the scale and extent of planned projects.

In addition to the foregoing strategies, it is vitally important that national waste and pollution management projects, and regional projects and programmes such as J-PRISM, PacWaste, the GEF-PAS POPs Release Reduction Project, and the IMO Integrated Technical Cooperation Programme are successfully implemented and produce tangible results to demonstrate to donors and development partners that investing in waste and pollution management in the Pacific bears results.

6 Bibliography

Aust, A. (2010). *Handbook of international law* (2nd ed.). Cambridge: Cambridge University Press.

Australian Bureau of Meteorology and CSIRO. (2011). *Climate Change in the Pacific: Scientific Assessment and New Research. Volume 1: Regional Overview.*

Busche, S., Conrad, M., Funk, K., Kandt, A., & McNutt, P. (2011). *American Samoa initial technical assessment report. Technical report NREL/TP-7A40-50905.* Colorado, USA: National Renewable Energy Laboratory.

City of Noumea. (2013). *Diagnostic Territorial: Programme Local de Prévention des Déchets [Territorial diagnostics: Local waste prevention programme].* Retrieved from http://www.nouvelle-caledonie.ademe.fr/sites/default/files/files/domaines-intervention/dechets/diagnosticeterritorial-plan-action-ville-noumea.pdf

Contract Environmental Ltd, Geoscience. (2015). *Survey of the regional distribution and status of asbestos-contaminated construction material and best practice options for its management in Pacific island countries. Report prepared for SPREP.* Contract Environmental Ltd.

Critical Ecosystem Partnership Fund. (2015). *The biodiversity hotspots*. Retrieved from http://www.cepf.net/resources/hotspots/Pages/default.aspx

Department of the Environment. (2014). *Minamata Convention on mercury*. Retrieved from http://www.environment.gov.au/protection/chemicals-management/mercury

D'Este, G., Clause, A., Hamilton, D., Moala, P., & and Tupou, K. (2012). *Tonga National Infrastructure Investment Plan 2013-2023.* Kingdom of Tonga.

ENVIRON Australia Pty Ltd. (2014). *Baseline study for the Pacific hazardous waste management project - healthcare waste. Report submitted to SPREP.* Apia: SPREP.

FSM Office of Statistics, Budget, Overseas Development Assistance and Compact (SBOC). (2011). *Summary analysis of key indicators from the FSM 2010 census of population and housing.* Pohnpei: SBOC.

Ha Noi 3R declaration: sustainable 3R goals for Asia and the Pacific for 2013-2023. (2013). Retrieved from United Nations Centre for Regional Development: http://www.uncrd.or.jp/content/documents/659Hanoi-Declaration_Eng.pdf

Haynes, D., & Vanderburg, E. (2013). *Cost-benefit analysis of used oil management options for Samoa.* Apia: SPREP.

IMO. (2015). *IMO: marine environment*. Retrieved from http://www.imo.org/OurWork/Environment/Pages/Default.aspx

JICA. (2009). *Waste minimisation and recycling promotion project in the Republic of the Fiji Islands.* JICA.

Kingsford, R. T., Watson, J. E., Lundquist, C. J., Venter, O., Hughes, L., Johnston, E. L., . . . Wilson, K. A. (2009). Major conservation policy issues for biodiversity in Oceania. *Conservation Biology*, 834-839.

Koshy, K., Mataki, M., & Lal, M. (2008). *Sustainable development - a Pacific islands perspective: a report on follow up to the Mauritius 2005 review of the Barbados Programme of Action.* Apia: UNESCO Cluster Office for the Pacific States.

Leney, A. (2013). *Review of regional e-waste recycling including a model product stewardship approach for Pacific island nations.* Report prepared for SPREP. Apia: Samoa.

Leney, A. (2014). *E-waste country assessments: e-waste generation and recycling, and the potential for interventions by PacWaste.* Report prepared for SPREP. Report prepared for SPREP. Apia: Samoa.

Leney, A. (2015). *Improvements to management of used lead acid batteries in four Pacific island countries: draft report prepared for SPREP.* Unpublished.

Leney, A., Pulefou, T., & Redfern, F. (2012). Landfill Construction and Leachate Management for Low-lying Coral Atolls. *7th Asian Pacific Landfill (APLAS) Symposium 2012.* Bali.

McIntyre, A., Bell, B., & Uta, S. (2012). *Tuvalu Infrastructure Strategy and Investment Plan.* Funafuti: Government of Tuvalu.

Ministry of Environment, Lands and Agricultural Development. (2012). *The Real Rubbish News, June 2012.* Retrieved from http://www.solutionexchange-un.net/repository/pc/ccd/cr14-res1.pdf

MNRE. (2013). *JICA/MNRE pilot project: disaster waste management after Cyclone Evan, Report 2013.* Apia: MNRE.

Murzilli, S., Almodovar, N., Deschamps, L., Flenet, L., Egretaud, C., Jouvin, B., & Laplane, L. (2012). *Evaluation of waste disposal and analysis of the waste management system in French Polynesia (in French).* Tahiti, French Polynesia: Ministère de l'environnement, de l'énergie et des mines.

National Institute of Statistics and Economic Studies. (not dated). *Légère croissance de la population en Polynésie française malgré un déficit migratoire sans précédent. [Slight growth of the population in French Polynesia despite an unprecedented migration deficit]*. Retrieved from http://www.insee.fr/fr/themes/document.asp?reg_id=0&ref_id=ip1474

National Oceanic and Atmoshperic Administration. (2013). *What is the ring of fire?* Retrieved from http://oceanexplorer.noaa.gov/facts/rof.html

NCDC. (2014). *How much solid waste are Port Moresby citizens generating?* Retrieved from http://www.jica.go.jp/png/english/activities/c8h0vm00008t3uoe-att/activity13_04.pdf

O'Reilly, M. (2014). *Luganville waste characterisation report.* Luganville, Vanuatu: Luganville Municipal Council.

Overseas Coastal Area Development Institute of Japan. (2013). *Data collection survey on reverse logistics in the Pacific islands: final report. Report prepared for JICA.* Tokyo: JICA.

Pacific Regional Infrastructure Facility (PRIF). (2011). *Pacific Infrastructure Performance Indicators.* Sydney: PRIF.

Pacific Water and Wastes Association. (2013). *Pacific Water and Wastewater Utilities Benchmarking Report.* Apia: Pacific Water and Wastes Association.

PIFS. (2014). *Framework for Pacific regionalism.* Suva: PIFS.

Pratt, C., & Govan, H. (2010). *Framework for a Pacific oceanscape: a catalyst for implementation of ocean policy.* Retrieved from http://www.forumsec.org.fj/resources/uploads/embeds/file/Oceanscape.pdf

Raj, S. (2000). *Solid waste education and awareness in Pacific island countries.* Apia: SPREP.

Richardson, K. (2015). *The need for a regional approach for marine litter minimization and management.* Unpublished report prepared for SPREP.

Roadmap Technical Working Group. (2014). *Strategy for Climate and Disaster Resilient Development in the Pacific.* Retrieved from http://www.pacificdisaster.net:8080/Plone/roadmap

Russell, L. (2009). *Poverty, climate change, and health in Pacific island countries: Issues to consider in discussion, debate and policy development.* Sydney: University of Sydney.

Sagapolutele, F. (2008). *Samoa tsunami: preliminary survey report on bulky wastes and sewage conditions.* Apia: JICA.

Sagapolutele, F. (2012). *The preliminary findings report of the disaster waste generation assessment during the flooding event (23-25 January 2012) in Fiji.* Apia: J-PRISM.

Secretariat of the Stockholm Convention. (2008). *The Stockholm Convention: Overview*. Retrieved from http://chm.pops.int/TheConvention/Overview/tabid/3351/Default.aspx

SIDS Aaccelerated Modalities of Action (S.A.M.O.A) Pathway. (2014). Retrieved from http://www.sids2014.org/index.php?menu=1537

Smith, J. B., Schellnhuber, H.-J., Mirza, M. Q., Fankhauser, S., Leemans, R., Erda, L., . . . Yohe, G. (2001). *Vulnerability to climate change and reasons for concern: A synthesis. In: Climate change 2001: Impacts, adaptation, and vulnerability. Contribution of working group II to the third assessment report of the Intergovernmental Panel on Climate.* Cambridge, UK: Cambridge University Press.

SOPAC, & ADB. (2003). *Pacific regional action plan on sustainable water management.* Retrieved from http://www.pacificwater.org/userfiles/file/Pacific%20RAP%20on%20SWM.pdf

SOPAC, & SPREP. (2001). *Pacific wastewater framework for action.* Retrieved from http://iwlearn.net/iw-projects/3181/reports/pacific-wastewater-framework-for-action

SOPAC, & SPREP. (2001). *Pacific wastewater policy statement.* Retrieved from http://pacificwater.org/userfiles/file/water%20publication/WastewaterPolicy.pdf

SPC. (2005). *Pacific islands regional ocean policy and framework for integrated strategic action.* Suva: SPC.

SPC. (2008). *Tackling non-communicable diseases – the Pacific Framework for NCD Prevention and Control.* Retrieved from http://www.spc.int/php/index.php?option=com_content&task=view&id=50&Itemid=57

SPC. (2015a). *Member Countries*. Retrieved from http://gsd.spc.int/member-countries

SPC. (2015b). *2013 Pacific islands population poster.* Retrieved from http://www.spc.int/prism/

SPC. (not dated). *Pacific National Minimum Development Indicators*. Retrieved from http://www.spc.int/nmdi/environmental_health

SPREP. (2006). *Shipping-related introduced marine pests in the Pacific islands: a regional strategy.* Retrieved from https://www.sprep.org/Waste-Management-and-Pollution-Control/Marine-Terrestrial-Pollution/

SPREP. (2010). *Pacific regional solid waste management strategy 2010-2015.* Apia: SPREP.

SPREP. (2011). *An asbestos-free Pacific: A regional strategy and action plan.* Apia: SPREP.

SPREP. (2012). *Pacific e-waste: a regional strategy and action plan 2012.* Apia: SPREP.

SPREP. (2013). *Pacific health care waste: a regional management strategy and action plan 2013-2015-draft.* Apia: SPREP.

SPREP. (2014). *Marine debris pollution in the Pacific.* Retrieved from https://www.sprep.org/Waste-Management-and-Pollution-Control/Marine-Terrestrial-Pollution/

SPREP. (2015a). *Pacific ocean pollution prevention programme (PACPOL) 2015-2020: strategy and work plans.* Apia: SPREP.

SPREP. (2015b). *SPREP region regional reception facilities plan: draft.* Retrieved from https://www.sprep.org/Waste-Management-and-Pollution-Control/Marine-Terrestrial-Pollution/

Stockholm Convention on Persistent Organic Pollutants (May 22, 2001). Retrieved from http://chm.pops.int/TheConvention/Overview/TextoftheConvention/tabid/2232/Default.aspx

Technical Working Group of the Basel Convention. (1997). *Technical guidelines on used oil re-refining or other re-uses of previously used oil.* Geneva: Secretariat of the Basel Convention .

UNDP. (not dated). *Millenium Development Goal 7*. Retrieved from http://www.fj.undp.org/content/fiji/en/home/mdgoverview/overview/mdg7/

UNEP. (2013). *Global mercury assessment 2013: sources, emissions, releases and environmental transport.* Geneva: UNEP Chemicals Branch.

UNEP. (2014). *The Minamata Convention on mercury: towards its early entry into force and effective implementation*. Retrieved from http://www.unep.org/newscentre/Default.aspx?DocumentID=2796&ArticleID

UNEP. (2015). *The Minamata Convention on mercury*. Retrieved from http://www.mercuryconvention.org/Convention

United Nations. (1969, May 23). *Vienna Convention on the law of treaties 1969.* Retrieved from https://treaties.un.org/doc/Publication/UNTS/Volume%201155/volume-1155-I-18232-English.pdf

United Nations. (2008). *United Nations Millenium Development Goals*. Retrieved from http://www.un.org/millenniumgoals

United Nations. (2015). *Sustainable Development Goals*. Retrieved from http://www.un.org/sustainabledevelopment/sustainable-development-goals/

Vazquex-Duhalt, R. (1989). Environmental impact of used motor oil. *The Science of the Total Environment, 79*(1), 1-23.

WHO. (2005). *Pacific framework for action on drinking water quality and health.* Retrieved from http://www.pacificwater.org/userfiles/file/DWQ%20and%20Health.pdf

WHO. (2014a). *Safe management of wastes from health-care activities, Second edition.* (Y. Chartier, E. Jorge, U. Pieper, A. Pruss, P. Rushbrook, R. Stringer, . . . R. Zghondi, Eds.) Geneva: World Health Organization.

WHO. (2014b). *Asbestos: elimination of asbestos-related diseases, Fact sheet No 343*. Retrieved from http://www.who.int/mediacentre/factsheets/fs343/en/

World Bank. (2003). *World development report 2004: making services work for poor people.* Washington D.C.: World Bank and Oxford University Press.

World Bank. (2012). *Policy and practice note for climate- and disaster-resilient development in the pacific islands region.* Washington DC: World Bank.

World Bank. (2014). *Environmental management plan: Tonga Cyclone Ian reconstruction and climate resilience project.* Washington: World Bank.

World Bank. (not dated). *Effects of population growth and urbanization in the Pacific islands.* Retrieved from http://siteresources.worldbank.org/INTPACIFICISLANDS/Resources/Chapter+1.pdf

Appendix A: Glossary

3R+Return	The 3R+Return model of waste management for PICTs promotes the return of recyclable commodities to environmentally sound recycling facilities located overseas in recognition of the fact that physically establishing such recycling facilities may not be technically nor economically feasible for the majority PICTs.
Advance recycling fee	A fee which is usually applied on imported products to pay for the recycling or disposal of the product when it becomes a waste.
Anaerobic digestion	A collection of processes by which microorganisms break down biodegradable material in the absence of oxygen.
Bioaccumulate	The process by which a substance (such as a toxic chemical) accumulates in the tissues of a living organism.
Biomagnify	The increasing concentration of a substance (such as a toxic chemical) in the tissues of organisms at progressively higher levels.
Biomass	Organic matter, especially plant matter, that can be converted to fuel.
Composting	The controlled biological degradation of organic wastes including kitchen and yard waste.
Controlled landfill	A landfill that
Dioxins	Highly toxic and persistent compounds of chlorinated hydrocarbons, which are the by-products of industrial processes (e.g., herbicide manufacture) and combustion processes that occur in the presence of carbon, oxygen and chlorine (e.g., burning waste that contains polyvinyl chloride (PVC)).
E-day	A day designated for the collection and reception of waste electrical and electronic equipment from the general public.
E-waste	Discarded or waste electrical and electronic equipment that no longer serves its original purpose.
Furans	Highly toxic and persistent compounds of chlorinated hydrocarbons, which are the by-products of industrial processes (e.g., herbicide manufacture) and combustion processes that occur in the presence of carbon, oxygen and chlorine (*e.g.,* burning waste that contains polyvinyl chloride (PVC)).
Extended producer responsibility	A policy approach under which producers/importers/consumers (*i.e.,* polluters) are made responsible for the financial costs and management functions associated with products throughout the product's life cycle.
Healthcare waste	The by-product of healthcare provision that includes sharps (needles, scalpels, etc.), blood, body parts, chemicals, pharmaceuticals, medical devices and radioactive materials.
Integrated Water Resources Management	A process that promotes the coordinated development and management of water, land and related resources without compromising the sustainability of vital ecosystems.

Leachate	The liquid that drains or leaches from a landfill, which can contain a variety of compounds such as toxic heavy metals, and compounds from the decomposition of waste in the landfill.
Marine Litter	Any persistent, manufactured or processed solid material that enters the ocean from any source. May also be referred to as Marine Debris.
Microplastics	Plastic pieces or fibres measuring less than 5mm in size. Sources of microplastics include the degradation of larger pieces of plastics, microbeads from cosmetic products, synthetic clothing, and virgin plastic pellets.
Multilateral Fund	A fund established to assist developing countries to comply with obligations under the Montreal Protocol.
Municipal Solid Waste	All solid waste, except industrial and agricultural wastes, generated from residential households, commercial and business establishments, institutional facilities and municipal services. Municipal solid waste may include construction and demolition debris and other special wastes that may enter the municipal waste stream. Generally excludes hazardous wastes.
Sanitary landfill	A method of disposing of solid waste on land that isolates the waste from the environment until it is safe.
Semi-aerobic Fukuoka Landfill	A particular type of semi-aerobic landfill system developed as a joint effort by Fukuoka City and Fukuoka University. It utilises natural decomposition processes under aerobic conditions so that greater microbial activity is promoted and therefore faster stabilization of waste is obtained.
Synthetic oil	A lubricant consisting of artificially-manufactured chemical compounds.
Waste-to-energy	The process of creating energy, in the form of electricity or heat, from the incineration of a waste source.
Wastewater	Any combination of domestic effluent consisting of blackwater (excreta, urine and faecal sludge) and greywater (kitchen and bathing wastewater); water from commercial establishments and institutions, including hospitals; industrial effluent, stormwater and other urban run-off; agricultural, horticultural and aquaculture effluent, either dissolved or as suspended matter.

Appendix B: Multilateral Environmental Treaties

Treaty (short name)	Entry into Force	Main Provisions
Treaties related to waste and chemicals management		
Basel Convention	24 February 2004	**Basel Convention on Control of Transboundary Movements of Hazardous Wastes and their Disposal** ▪ The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. Its scope of application covers a wide range of wastes defined as "hazardous wastes" based on their origin and/or composition and their characteristics, as well as two types of wastes defined as "other wastes" - household waste and incinerator ash.
Minamata Convention on Mercury	Not yet in force (adopted on 19 January 2013)	**Minamata Convention on Mercury** ▪ A global treaty to protect human health and the environment from the adverse effects of mercury. Highlights of the Convention include a ban on new mercury mines, the phase-out of existing ones, control measures on air emissions, and the international regulation of the informal sector for artisanal and small-scale gold mining.
Montreal Protocol	1 January1989	**Montreal Protocol on Substances That Deplete the Ozone Layer** ▪ Protects the ozone layer by phasing out the production and consumption of a number of substances responsible for ozone depletion. The current emphasis (for Pacific Parties) is to phase out the import and use of HCFCs, which are primarily used in refrigeration and air-conditioning servicing.
Rotterdam Convention (2004)	24 February 2004	**Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade** ▪ Provides an early warning system on hazardous chemicals, and enables monitoring and controlling trade of chemicals, giving parties power to decide which they wish to import and exclude those they cannot manage safely. There are 47 chemicals, out of which 33 are pesticides, and four are severely restricted hazardous substances.
Stockholm Convention (2001)	17 May 2004	**Stockholm Convention on Persistent Organic Pollutants** ▪ Aims to protect human health and environment from the adverse effects of 23 identified toxic chemicals (POPs) that, when released, persist in the environment and can lead to serious health effects including certain cancers, birth defects, neurological effects, and greater susceptibility to disease.
Waigani Convention	21 October 2001	**The Waigani Convention to Ban the importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement of Hazardous wastes within the South Pacific Region** ▪ Constitutes the regional implementation of the Basel Convention in the Pacific, however, coverage extends to radioactive waste, and to the EEZ (200 nautical miles) of Parties.
Treaties related to marine pollution		
MARPOL 73/78	2 October 1983	**International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto** ▪ This is the main international Convention covering prevention of pollution of the marine environment by ships from operational or accidental causes.
- Annex I	2 October 1983	▪ Regulates the prevention of pollution by oil, and governs the discharges, except for clean or segregated ballast, from all ships. Requires ships to be fitted with pollution prevention equipment to comply with the stringent discharge regulations.

Treaty (short name)	Entry into Force	Main Provisions
- Annex II	6 April 1987	▪ Regulates the control of pollution by noxious liquid substances in bulk and sets out a pollution categorization system for noxious and liquid substances.
- Annex III	1 July 1992	▪ Sets out regulations for the prevention of pollution by harmful substances in packaged form and includes general requirements for the issuing of detailed standards on packing, marking, labelling, documentation, stowage, quantity limitations, exceptions and notifications for preventing pollution by harmful substances.
- Annex IV	27 September 2003	▪ Regulates the discharge of sewage into the sea from ships, including ships' equipment and systems for the control of sewage discharge, the provision of port reception facilities for sewage, and requirements for survey and certification.
- Annex V	31 December 1988	▪ Prohibits the discharge of all garbage into the sea, except as provided for food waste, cargo residues, cleaning agents and additives and animal carcasses.
MARPOL PROT 1997 (Annex VI)	19 May 2005	**Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto** ▪ Limits the main air pollutants contained in ships' exhaust gas, including sulphur oxides and nitrous oxides, and prohibits deliberate emissions of ODS. Also regulates shipboard incineration, and the emissions of volatile organic compounds from tankers.
London Convention 1972	30 August 1975	**Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972** ▪ Its purpose is to control all sources of marine pollution and prevent pollution of the sea through regulation of dumping into the sea of waste materials. It prohibits the disposal at sea of specific "black-list" items, and prescribes the conditions for dumping at sea of permitted "grey-listed" items.
London Convention Protocol 1996	24 March 2006	**1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972** ▪ The purpose of this protocol is similar to the **London Convention**, but it is more restrictive and adopts a "reverse list" approach, which implies that all dumping is prohibited unless explicitly permitted. Incineration of wastes at sea, and export of wastes for the purpose of dumping or incineration at sea are prohibited.
INTERVENTION Convention 1969	6 May 1975	**International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969** ▪ Affirms the right of a coastal State to take such measures on the high seas as may be necessary to prevent, mitigate or eliminate danger to its coastline or related interests from pollution by oil or the threat thereof, resulting from a maritime casualty.
INTERVENTION Protocol 1973	30 March 1983	**Protocol relating to Intervention on the High Seas in Cases of Pollution by Substances other than Oil, 1973** ▪ Extends the regime of the **1969 INTERVENTION Convention** to specific substances or substances with substantially similar characteristics.
CLC Convention 1969	19 June 1975	**International Convention on Civil Liability for Oil Pollution Damage, 1969** ▪ Ensures that adequate compensation is available to persons who suffer oil pollution damage resulting from maritime casualties involving oil-carrying ships. It applies to all seagoing vessels actually carrying oil in bulk as cargo (*i.e.,* laden ships), but only ships carrying more than 2,000 tons of oil are required to maintain insurance in respect of oil pollution damage. It places the liability for such damage on the owner of the ship from which the polluting oil escaped or was discharged.
CLC Protocol 1976	8 April 1981	**Protocol to the International Convention on Civil Liability for Oil Pollution Damage, 1969** ▪ Provides for the applicable unit of account used under the convention to be based on the Special Drawing Rights (SDR) as used by the International Monetary Fund (IMF).

Treaty (short name)	Entry into Force	Main Provisions
CLC Protocol 1992	30 May 1996	**Protocol of 1992 to amend the International Convention on Civil Liability for Oil Pollution Damage, 1969** ▪ Widens the scope of the **CLC Convention** to cover pollution damage caused in the exclusive economic zone or equivalent area of a State Party, and to cover spills from laden and unladen tankers. It limits environmental damage compensation to costs incurred for reasonable measures to reinstate the contaminated environment. ▪ From 16 May 1998, Parties to the **1992 Protocol** ceased to be Parties to the **1969 CLC** due to a mechanism for compulsory denunciation of the "old" regime established in the **1992 Protocol**. However, there are a number of States which are Party to the **1969 CLC** and have not yet ratified the 1992 regime - which is intended to eventually replace the **1969 CLC**.
FUND Convention 1971	16 October 1978 Ceased to be in force on 24 May 2002	**International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971** ▪ Established an international Fund that provided compensation to States and persons who suffered pollution damage, if such persons were unable to obtain compensation from the owner of the ship from which the oil escaped or if the compensation due from such owner is not sufficient to cover the damage suffered.
FUND Protocol 1976	22 November 1994	**Protocol to the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971** ▪ Superseded by the FUND Protocol 1992.
FUND Protocol 1992	30 May 1996	**Protocol of 1992 to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971** ▪ Establishes an international fund to cover claims for oil pollution damage that exceed compensation available under the **CLC Protocol 1992**. Compensation is available up to SDR 135 million. To be a party to this Protocol, a country must first be a party to the **CLC Protocol 1992**.
FUND Protocol 2003	3 March 2005	**Protocol of 2003 to the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1992** ▪ Establishes an International Oil Pollution Compensation Supplementary Fund to supplement the compensation available under the **1992 CLC and 1992 FUND Conventions** with an additional, third tier of compensation.
OPRC Convention 1990	13 May 1995	**The International Convention on Oil Pollution Preparedness, Response and Co-operation 1990** ▪ Provides a framework designed to facilitate international co-operation and mutual assistance in preparing for and responding to major oil pollution incidents and requires States to plan and prepare by developing national systems for pollution response in their respective countries, and by maintaining adequate capacity and resources to address oil pollution emergencies.
HNS Convention 1996	Not yet in force	**International Convention on Liability and Compensation for Damage in connection with the Carriage of Hazardous and Noxious Substances by Sea, 1996** ▪ Provides for compensation to victims of shipping accidents involving hazardous and noxious substances (HNS), depending on the tonnage of the ship. Ship-owners are liable for up to 100 million SDR in damage, with an additional 150 million available under an HNS Fund in cases where full compensation is not available under the first tier. The Convention covers pollution damage as well as the risks of fire and explosion; loss of life or personal injury; and loss of, or damage to property.
HNS PROT 2010	Not yet in force	**Protocol of 2010 to the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 1996** ▪ Addresses practical problems that hinder the entry into force of the HNS Convention.

Treaty (short name)	Entry into Force	Main Provisions
OPRC/HNS 2000	14 June 2007	**2000 Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances** ▪ Establishes national systems for preparedness and response and provides a global framework for international co-operation in combating major incidents or threats of marine pollution. Parties are required to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries. Ships are required to carry a shipboard pollution emergency plan to deal specifically with incidents involving hazardous and noxious substances.
BUNKERS Convention 2001	21 November 2008	**International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001** ▪ Ensures that adequate, prompt, and effective compensation is available to persons who suffer damage caused by spills of oil, when carried as fuel in ships' bunkers. The Convention applies to damage caused in the territory, including the territorial sea, and in EEZ of States Parties, and requires ships over 1,000 gross tonnage to maintain insurance or other financial security.
Anti-Fouling Substances Convention 2001	17 September 2008	**International Convention on the Control of Harmful Anti-Fouling Substances on Ships, 2001** ▪ Prohibits the use of harmful organotin compounds in anti-fouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems. Parties are required to prohibit and/or restrict the use of harmful anti-fouling systems on ships flying their flag, as well as ships not entitled to fly their flag but which operate under their authority and all ships that enter a port, shipyard or offshore terminal of a Party.
BWM Convention 2004	Not yet in force	**International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM 2004)** ▪ Once in force, it will regulate the introduction of invasive species via ballast water ballast water and sediments. It will require ships to implement a ballast water management plan; carry a Ballast Water Record Book; and to carry out ballast water management procedures to a given standard.
Nairobi WRC 2007	14 April 2015	**Nairobi International Convention on the Removal of Wrecks, 2007** ▪ The Convention provides a legal basis for States Parties to remove, or have removed, wrecks that pose a danger or impediment to navigation or that may be expected to result in major harmful consequences to the marine environment, or damage to the coastline or related interests of one or more States. The Convention also applies to a ship that is about, or may reasonably be expected, to sink or to strand, where effective measures to assist the ship or any property in danger are not already being taken.
Hong Kong Convention (2009)	Not yet in force	**Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009** ▪ The purpose of this Convention is to ensure that ships being recycled after reaching the end of their operational lives, do not pose any unnecessary risks to human health, safety and to the environment. It addresses concerns about hazardous substances (asbestos, heavy metals, hydrocarbons, ODS, and others) that may be present on ships sent for recycling, and also addresses concerns with the working and environmental conditions at many of the world's ship recycling locations.
Noumea Convention (1990)	22 August 1990	**The Convention for the Protection of Natural Resources and Environment of the South Pacific Region** ▪ Obliges Parties to endeavour to take all appropriate measures to prevent, reduce and control pollution from any source and to ensure sound environmental management and development of natural resources, using the best practicable means at their disposal and in accordance with their capabilities.
- Dumping Protocol		**Protocol for the Prevention of Pollution of the South Pacific Region by Dumping** ▪ Promotes a coordinated regional approach to the issue of dumping consistent with the **1972 London Dumping Convention**.

Treaty (short name)	Entry into Force	Main Provisions
- Emergencies Protocol		**Protocol Concerning Co-operation in Combating Pollution Emergencies in the South Pacific Region** ▪ Establishes a framework for cooperation to protect the marine and coastal environment from the threat of pollution resulting from the presence of oil or other harmful substances in the marine environment as a result of maritime emergencies.
- Oil Pollution Protocol (2006)	Not yet in force	**Protocol on oil pollution preparedness, response and cooperation in the pacific region** ▪ Establishes a framework for regional co-operation in responding to pollution emergencies. It supports the establishment of oil pollution emergency plans for ships, ports, and oil handling facilities, as well as national and regional contingency plans. The Convention encourages all States to develop and maintain adequate capability to deal with oil pollution emergencies
- HNSP Protocol	Not yet in force	**Protocol on hazardous and noxious substances pollution, Preparedness, response and cooperation in the pacific region.** ▪ Constitutes the regional implementation of the **OPRC/HNS 2000** in the Pacific region.

Appendix C: Regional Waste Management and Pollution Initiatives

Table 18: Pacific regional projects and initiatives

Project or Initiative	Purpose	Implementing Agency	Donor, Budget and Duration	Beneficiaries
Japan Technical Cooperation Project for the Promotion of Regional Initiative on Solid Waste Management in Pacific Island Countries (J-PRISM)	To strengthen the human and institutional capacity base in the Pacific region through implementation of initiatives that address solid waste collection, landfill management, 3Rs, and capacity building. http://www.sprep.org/j-prism.	JICA in collaboration with SPREP	JICA JPY 1.1 billion (USD 9.19 million) 2011 – 2016	11 PICs (Cook Islands, Nauru, and Niue excepted)
Pacific Hazardous Waste (PacWaste) Project	To improve management of asbestos, healthcare waste, and E-waste, and to demonstrate best integrated waste management practices for an atoll environment (Marshall Islands). Implemented by SPREP.	SPREP	European Union EUR 7.85 million (USD 8.4 million) 2013 – 2017	14 PICs (and Timor Leste)
Pacific POPs Release Reduction Through Improved Solid and Hazardous Wastes Management Project	To reduce unintentional releases of POPs arising from poor waste management practices. Includes provision of training, and development of a regional waste oil export and reuse scheme. Implemented by SPREP.	SPREP	GEF USD 3.275 million 2013 – 2018	14 PICs
Regional Solid Waste Management Initiative	To develop human capacity through a structured technical capacity building programme for Pacific islanders and through the development of pilot programmes for used oil management in Fiji, Samoa, Vanuatu. Implemented by SPREP.	SPREP	AFD EUR 1.0 million (USD 1.07 million) 2011 – 2015	14 PICs
IMO Integrated Technical Cooperation Programme (ITCP)	This is a biennial programme that supports capacity building in Pacific marine pollution priorities. The 2014-2015 programme covers oil spill management, ballast water management, and compensation and liability training.	SPREP	IMO USD 200,000 2014 – 2015 (biennially)	14 PICs (IMO Pacific Parties)
AMSA Secondment to SPREP supported by DFAT's Pacific Public Sector Linkages Programme	This is a 2-year secondment of an officer from the Australian Maritime Safety Authority to SPREP to assist SPREP to implement marine pollution prevention priorities in the region.	-	DFAT 2013-2015	21 PICTs
Strategic Approach to International Chemicals Management E-waste Management Project	To strengthen country institutional capacity for E-waste management through development and implementation of components of a model Pacific E-waste management strategy.	SPREP	SAICM USD 187,300 2012-2014	Cook Islands, Kiribati, Samoa
Continuing regional support for the POPs global monitoring plan under the Stockholm Convention in the Pacific region	To strengthen the capacity for implementation of the updated POPs Global Monitoring Plan and to create the conditions for sustainable monitoring of POPs in the Pacific Islands Region.	UNEP	GEF USD 1,995,000 2015-2019	Fiji, Kiribati, RMI, Niue, Palau, Samoa, Solomon Islands, Tuvalu, and Vanuatu

The Pacific Islands Ridge-to-Reef National Priorities Program (R2R Program)	To maintain and enhance PICs' ecosystem goods and services through integrated approaches to land, water, forest, biodiversity and coastal resource management that contribute to poverty reduction, sustainable livelihoods and climate resilience. This goal will be achieved through a series of national multi-focal area ridge-to-reef demonstration projects, which will include pollution reduction initiatives in several PICs.	UNDP, SPC (SOPAC)	GEF USD 10.12 million 2013-2018	14 PICs
Implementing Sustainable Water Resources and Wastewater Management in PICs (the GEF Pacific IWRM Project)	To improve water resource and wastewater management and water use efficiency in Pacific Island Countries in order to balance overuse and conflicting uses of scarce freshwater resources through policy and legislative reform and implementation of applicable and effective IWRM and water use efficiency plans.	UNDP, UNEP, SPC(SOPAC)	GEF USD 9 million 2009-2014	Cook Islands, FSM, Niue, Nauru, Palau, RMI, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu
Global project on the updating of National Implementation Plan for POPs	To assist countries to update and/or develop their national implementation plans and to facilitate information exchange.	UNEP	GEF USD 4,965,753 2015-2017	Kiribati, Samoa, Solomon Islands, Tuvalu

KEY: ADB = Asian Development Bank; **AFD** = Agence Française de Développement; **GEF** = Global Environment Facility; **IMO** = International Maritime Organisation; **JICA** = Japan International Cooperation Agency; **POPs** = Persistent Organic Pollutants; **SAICM** = Strategic Approach to International Chemicals Management; **SOPAC** = Applied Geoscience and Technology Division of the Secretariat of the Pacific Community.

Appendix D: Summary of Previous Regional Strategy Implementation

D.1 Pacific Regional Solid Waste Management Strategy 2010-2015

Background

The Pacific Regional Solid Waste Management Strategy 2010-2015 required PICTs to submit bi-annual progress reports of national activities against the 41 agreed strategic actions. Unfortunately, the required reports were not submitted to the Secretariat leading to significant knowledge gaps in the status of national solid waste management activities. Efforts have been made to collect and evaluate publicly available information in order to provide a qualitative review of the implementation of activities. Due to the data gaps, the review (below) is restricted to the expected outcomes of the nine thematic areas that were stated in the 2010-2015 Regional Strategy.

Findings

Expected Outcomes	Findings
Sustainable Financing	
Solid waste management systems and programmes in PICTs are financially self-sustaining	▪ At the regional level, sustainable financing approaches have been integrated into the implementation of regional projects (PacWaste and GEF-PAS POPs Release Reduction Project) that address used oil, E-waste, and healthcare waste management. Regional guidance on sustainable financing initiatives (published in 2009) is available, but requires updating to reflect new approaches. ▪ At the national level, the Cook Islands completed an investigation of sustainable financing options in 2012 (although recommendations have not yet been implemented; whilst Samoa, with the support of the International Finance Corporation (IFC), commenced a study in 2013 to explore solid waste management financing options involving public-private partnership arrangements. Tuvalu is also undertaking a feasibility study into the establishment of a waste levy on imports.
Integrated Solid Waste Management	
Reduce the amount of waste generated and landfilled through involvement of all sectors and local initiatives Solid waste that cannot be avoided, reduced, recycled or composted are disposed of using acceptable methods that have no negative impacts on human health and the environment Well-managed, efficient, and self-sustaining waste collection systems introduced or upgraded in PICTs.	There has been significant regional progress in this area with the implementation of regional projects, namely the J-PRISM Project (2011-2016), the EU PacWaste Project, and the AFD Regional Solid Waste Initiative (see Appendix C for details). Key achievements in this area include: ▪ Regional E-waste, and asbestos management programmes in progress for 14 PICs funded by the EU PacWaste project and the AFD Regional Solid Waste Initiative. ▪ Regional used oil audits completed for 13 PICs (PNG excluded) and improved management programmes being implemented supported by the AFD Regional Solid Waste Initiative (2011-2014), and the GEF-PAS POPs Release Reduction Project (2013-2018). ▪ Container deposit programmes commenced in Palau, and FSM (Pohnpei and Yap States); Fiji also completed the design of a national container deposit programme, but it has been put on hold. ▪ Pilot project to convert waste plastic into oil implemented by Palau. Improvements to organic waste management implemented through J-PRISM in Fiji, Kiribati, RMI, and PNG, and general 3R promotion implemented in FSM, Fiji, Kiribati, RMI, Samoa, Solomon Islands, and Vanuatu. ▪ JICA-funded pre-feasibility assessment of regional bulky waste recycling in Fiji, Samoa, Tonga, Tuvalu, and Vanuatu completed. ▪ Waste collection and disposal services improved in several PICTs (Fiji, FSM, Palau) with equipment secured through donations and grants from the Embassy of Japan Grassroots Grants programme. Waste collection services in FSM, RMI, PNG, and Tonga are also under improvement through J-PRISM. Tuvalu has also benefited from waste management equipment through assistance from the EU, under the 10th EDF with further assistance planned under the 11th EDF. ▪ Regional guide to semi-aerobic landfill construction and monitoring published and disseminated.

	▪ Urban waste disposal sites improved in FSM, RMI, Palau, PNG, Samoa, Solomon Islands, Tonga, and Vanuatu through J-PRISM; in Cook Islands and Kiribati through NZ Aid Programme; in Tonga through DFAT; and in Fiji through SPREP, DFAT, and J-PRISM. ▪ Potential disposal technique for atolls identified in Kiribati. Efforts going forward will focus on assessment and possible replication in other atolls.
Legislation	
Solid waste management activities in PICTs are supported by practical, effective, enforceable, and culturally-sensitive legislation.	▪ Waste management legislation (act or regulations) were developed and enacted by Fiji (2010), Samoa (2010), Tonga (2010), Tuvalu (2009, 2013), and Vanuatu (2014).
Awareness, Communication & Education	
An informed and aware population who support and participate in waste management activities	▪ The Pacific 2012 Campaign was implemented during 2012 and 2013 with the aim of mobilising actions at all levels for waste management and pollution control. NGOs were trained on basic waste management techniques, and small grants were provided to six PICTs to implement community-based projects. Awareness activities are also integrated into ongoing SPREP projects (PacWaste and GEF-PAS POPs Release Reduction). ▪ National Clean Pacific awareness campaigns were also implemented in the Cook Islands, Fiji, Nauru, New Caledonia, Palau, Solomon Islands, and Vanuatu.
Capacity Building	
Skilled and trained people available in-country, who effectively manage solid waste management systems.	▪ Capacity building has been an ongoing priority for the Secretariat and SPREP Members. Capacity building is an integral component of the J-PRISM project, which has trained more than 260 persons from 12 PICs in several key aspects of solid waste management through national, sub-regional, regional and extra-regional (*e.g.*, Japan) training workshops, as well as through attachment programmes. ▪ The AFD Regional Solid Waste Initiative resulted in the development and delivery of a regional train-the-trainer waste management course which has trained over 56 Pacific Islanders. ▪ Regional training has also been delivered in the implementation of the waste and chemical conventions. ▪ SPREP and PICs have also strengthened their role and involvement in the Regional 3R Forum in Asia and Pacific Islands, which has advanced capacity in, and understanding of 3R policy options. ▪ A database of capacity building in PICTs has been developed at SPREP to monitor and report on progress in regional capacity development, and at the time of writing, it was being populated with data on recent capacity building activities.
Environmental Monitoring	
The environmental impact of solid waste is assessed to provide accurate data on performance and provide information for planning and decision-making.	▪ SPREP's partnership with the Korean Institute of Ocean Science and Technology (KIOST) resulted in the collection of water quality data at waste management sites in FSM (Chuuk State) and Tonga.
Policy, Planning, Performance	
PICTs implement national waste management policies and strategies, which are based on accurate data, with monitoring systems established to report on performance.	▪ Regional strategies were developed for asbestos (2010), E-waste (2011), and healthcare waste (2012). ▪ In collaboration with JICA (J-PRISM), the Secretariat assisted the Cook Islands, FSM, Fiji, RMI, Nauru, Niue, and Vanuatu to develop National Waste Management Strategies. Tokelau has also been assisted to develop an integrated waste management, water and sanitation plan, with support from the New Zealand government. As of July 2015, Kiribati, RMI, Nauru, Niue, PNG, and Tonga had draft strategies, Tuvalu's strategy was outdated, and the other PICTs have current strategies. ▪ Fiji developed a draft national 3R policy with assistance from JICA and SPREP, which was expected to be finalised in 2015. ▪ Tuvalu revised institutional arrangements and established the Solid Waste Agency of Tuvalu.
Solid Waste Industry	
Solid waste management in PICTs is supported by a thriving and competitive solid waste industry involved in reuse, recycling, collection, and disposal activities.	▪ The capacities of private waste recyclers in Tonga, Samoa, Fiji, and FSM were developed through participation in an Eco-island Symposium in Okinawa, Japan in 2012 as part of the J-PRISM project. As a consequence of this exposure, recyclers in Tonga and Samoa commenced or improved E-waste dismantling activities.

	▪ The PacWaste project has commenced investigations into roles for private sector engagement in used oil and E-waste management stewardship programmes in PICs, and aims to develop a network of recyclers to promote and enhance recycling activities. ▪ Samoa with the support of the International Finance Corporation (IFC) commenced a feasibility study to modernise solid waste management through a public-private partnership. ▪ Private-sector operated recycling facilities for paper, and used lead acid batteries were established in Fiji.
Medical Waste	
Medical wastes are managed in an environmentally-sound manner without adverse impact on human health and the environment.	▪ A draft regional healthcare waste management strategy was developed in 2012, which provided the basis for the EU-funded PacWaste project. Forty-two healthcare facilities in 14 PICs were assessed in 2014, and priority interventions have been identified. PacWaste funding will support the improvement of healthcare waste incinerators and practices in 14 PICs within the available budget. However, further funding support will likely be needed to undertake additional assessments and improvements in other healthcare facilities that were not able to be assessed under PacWaste.

D.2 Pacific Ocean Pollution Prevention Programme (PACPOL) Strategy 2010-2014

Background

A review of the implementation of activities completed as part of the 2010-2014 PACPOL Strategy was undertaken at SPREP headquarters, Apia, Samoa on 9 September 2014. The review was carried out in accordance with the terms of reference for the Consultancy to Facilitate the Regional Strategy and Work Plan for the Pacific Oceans Pollution Prevention Programme (PACPOL) Workshop, and was undertaken by the consultant with information and documentation provided by SPREP officers Anthony Talouli (Pollution Adviser) and Scott Willson (Marine Pollution Adviser).

Findings

The review found that of the 24 action items in the 2010-2014 PACPOL Strategy:

- 16 have been completed;
- 7 are ongoing, with several of these to be continued with a slightly revised scope or terms of reference to reflect recent developments; and
- 1 is no longer required due to external developments.

Eleven of the 24 items will be discussed under specific agenda items at the PACPOL Workshop to be held in Brisbane, Australia in October 2014.

It is particularly important to recognise the significant effort that has been put into training over the past 5 years. Training has been conducted with regards to PSSAs, Coastal Resource Mapping, and MARPOL Enforcement, as well as sixteen pollution response courses (OPRC level 1, OPRC level 2/3 and HNS), with a total of 589 personnel trained. Assistance and/or funding for this extensive training task has been significant and has been provided by IMO, Australia, Republic of Taiwan/China, New Zealand and individual SPREP members. The need for an ongoing training programme reflects the turnover of personnel and the need to maintain currency of, for example, new IMO instruments as they enter into force internationally.

Details on progress with each of the current PACPOL action items are set out in the attachment. Input in the "Comments" column is provided by SPREP, with comments by the consultant in italics. Financial details have been provided by SPREP. The attachment also includes a cross reference to the applicable thematic priority of the IMO Integrated Technical Cooperation Programme, as set out in paragraph 15.3 of IMO document MEPC 67/20/.

The items that have been completed and the work undertaken to date as part of the "ongoing" items means there has been considerable progress on a wide range of issues of concern to the SPREP members, and there is no doubt that, in accordance with the PACPOL vision, the people of the Pacific Islands are better able to prevent, minimise and mitigate ship sourced and related marine pollution. However, it is considered that PACPOL should in future aim to include a smaller number of high priority and targeted action items, closely linked to the IMO Integrated Technical Cooperation Programme, rather than a larger number of action items where many can lose focus as higher priority issues arise during the five-year period of each PACPOL document. The updated PACPOL should also provide for a mid-term review to be undertaken by the Secretariat, as from 2016 there will be a new Strategic Plan for SPREP as well as the possibility of revised IMO thematic priorities following the 2016-2017 biennium. PACPOL may need slight revision to align with any changes to these documents.
It will also be important for all SPREP members to ensure that Country Maritime Profiles (CMPs) are updated or provided to IMO as soon as possible to facilitate the identification of capacity-building needs of Member States

(see also paragraph 15.3 of MEPC 67/20). It should be noted that SPREP has been requested by the Asia Pacific Heads of Maritime Safety Agencies forum to assist countries with this work where necessary.

Paul Nelson
Maritime Environmental Consultant
10 September 2014

Appendix E: MSW Data

Table E1: Urban waste generation in PICTs

	Endnotes	1999	2013	2025
Average GDP per capita (constant 2005 US$) for 10 PICs	1, 2	2 450	2 660	-
Growth in GDP per capita (%)		-	9%	
Total PICT population (number of people)	3	7 712 749	10 236 327	12 545 542
Urban population (number of people)	3	1 686 226	2 199 777	2 795 985
Estimated mean urban waste generation rate (kg/person/day)	4, 5	1.3	1.5	1.6
Total urban waste generation (tonnes/year)		822 271	1 164 645	1 589 057

Endnotes:

1. PICs: Fiji, Kiribati, RMI, FSM, Palau, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu
2. Source: World Bank. 2014. *GDP per capita (constant 2005 US$)*. Retrieved from http://data.worldbank.org/indicator/NY.GDP.PCAP.KD?display=graph
3. Source: UNDESA Population Division. 2014. World Urbanization Prospects: The 2014 Revision, CD-ROM Edition.
4. Source for 1999 data: Raj, S.C. 2000. Solid waste education and awareness in Pacific island countries. Apia: SPREP
5. Estimates for 2013 and 2025 are based on the waste generation rate increasing at the same rate as GDP growth for the 1999-2013 period (i.e., 0.6% annually)

Table E2: Key features of PICTs waste collection services

PICT (Urban centre)	Data source	2014 Urban Population	2014 Total population	Estimated access to collection service		Collection frequency (times/week)		Household waste collection fee (US$)	Unit
				% of urban population	% of national population	General household waste	Bulky or special waste		
Group A: PICTs with 100% national coverage									
Am. Samoa	1	28,250	56,500	100%	100%	3		$8.64	Monthly
Guam		164,406	174,900	100%	100%			$30	Monthly
Nauru	1, 2	10,500	10,500	100%	100%	1		$0	-
Niue	1, 2	-	1,500	100%	100%	1-3		$0	-
Samoa	1	37,480	187,400	100%	100%	1-2		$0	-
Tokelau	1	-	1,200	100%	100%	2-5		$0	-
Wallis and Futuna	1	-	12,100	100%	100%	1-2		$0	-
Group B: PICTs with less than 100% national coverage									
Cook Isl. (Rarotonga)	2	11,248	15,200	100%	74%	2		$0	-
FSM	2, 3, 4	22,660	103,000	35%	8%	0-2		$0 - $5	Monthly
Fr. Polynesia (Papeete)	1	133,314	261,400	100%	51%	1		$15 - $19.50	Monthly
Kiribati (South Tarawa)	5	58,752	108,800	100%	54%	1		$0.31	15kg bag
Marshall Isl. (Majuro)	1, 2	40,108	54,200	66%	49%	1		$0	-
New Caledonia	6	173,530	259,000	100%	67%	3-6		$7 - $79	Monthly
Palau (Koror)	4	13,706	17,800	100%	77%	1		-	
Solomon Isl. (Honiara)	4	122,160	610,800	60%	12%	1		In property tax	
Tonga (Tongatapu)	1, 7	23,759	103,300	100%	71%	1		$5.40	Monthly
Tuvalu (Funafuti)	8	5,123	10,900	100%	47%	1-2		$0	-
Vanuatu (Port Vila)	4	63,528	264,700	50%	12%	3		$12.00	Monthly
Group C: PICTs with insufficient data available									
Fiji	*2*	*438,192*	*859,200*	*Insufficient data*		*Insufficient data*		*$0.99 - $3.51*	*Monthly*
CNMI		*50,040*	*55,600*	*Insufficient data*		*Insufficient data*		*Insufficient data*	-
PNG (Port Moresby)		*961,805*	*7,398,500*	*Insufficient data*		*2*			
Regional Summary (Groups A & B only)	**-**	**908,494**	**2,253,200**	**88%**	**47%**	**-**	**-**	**-**	**-**

Sources:
[1] SPREP internal mission reports; [2] National waste management strategies; [3] (FSM Office of Statistics, Budget, Overseas Development Assistance and Compact (SBOC), 2011); [4] (Pacific Regional Infrastructure Facility (PRIF), 2011); [5] (Ministry of Environment, Lands and Agricultural Development, 2012); [6] (City of Noumea, 2013); [7] (D'Este, Clause, Hamilton, Moala, & and Tupou, 2012); [8] (McIntyre, Bell, & Uta, 2012).

Appendix F: Historical Pollution Data

PICT	Pollutant loadings (tonnes/year)							
	Domestic wastewater				Industrial discharges			
	BOD	SS	N	P	BOD	SS	N	P
American Samoa	217.41	259.47	89.48	7.99	4.53	179.18	255.00	167.30
Cook Islands	831.02	15.28	53.27	6.46	No data	No data	No data	No data
FSM	1,010.93	1,314.26	53.27	6.46	No data	No data	No data	No data
Fiji	3,270.31	1,390.78	2,043.26	240.98	510.63	431.92	25.63	0.91
French Polynesia	1,251.51	0.00	812.32	98.46	No data	No data	No data	No data
Guam	2,565.44	1,013.54	781.70	80.27	No data	No data	No data	No data
Kiribati	409.07	405.96	174.57	21.16	No data	No data	No data	No data
Marshall Islands	419.05	579.70	150.54	18.11	No data	No data	No data	No data
Nauru	102.13	160.84	26.54	3.22	No data	No data	No data	No data
New Caledonia	948.27	1,344.30	410.17	49.10	37.40	6.10	No data	No data
Niue	9.78	0.00	6.35	0.77	No data	No data	No data	No data
CNMI	99.36	155.07	110.60	6.27	No data	No data	No data	No data
Palau	73.29	73.33	38.63	3.78	No data	No data	No data	No data
PNG	5,665.54	2,424.70	3,106.91	374.49	508.94	1,083.40	No data	No data
Samoa	1,170.04	584.53	739.50	83.04	63.70	10.42	No data	No data
Solomon Islands	2,136.96	1,762.56	979.15	139.21	513.60	494.81	18.70	0.10
Tokelau	12.42	28.80	55.94	0.72	No data	No data	No data	No data
Tonga	563.82	161.62	344.72	43.28	No data	No data	No data	No data
Tuvalu	36.48	16.92	23.00	2.79	No data	No data	No data	No data
Vanuatu	817.74	560.04	457.01	58.35	548.09	241.42	117.21	42.72
Wallis and Futuna	64.57	0.00	41.91	5.08	No data	No data	No data	No data
Totals	**21,675.14**	**12,251.70**	**10,498.84**	**1,249.99**	**2,186.89**	**2,447.25**	**416.54**	**211.03**

Source: UNEP's Regional Seas Programme., United Nations Environment Programme., & South Pacific Regional Environment Programme. (2000). Overview on land-based pollutant sources and activities affecting the marine, coastal, and freshwater environment in the Pacific Islands Region. Nairobi, Kenya: United Nations Environment Programme.