Republic of the Marshall Islands

Introduction

The increasing presence of plastic marine debris in the South Pacific Ocean is focusing attention on strengthening recycling policies and systems in the region. Unique challenges associated with shipping commodities of low value over long distances to recycling markets, however, reduce the economic viability to do so. This country profile includes the current technologies, material flow, logistics, public policies, institutional framework, financial mechanisms, and initiatives that are being designed or have been implemented to strengthen recycling systems in the Republic of the Marshall Islands (RMI).

With a land area of 1,812km^2 and a combined coastline measuring 370km, RMI is located in the central Pacific Ocean in the Micronesia region. RMI consists of 29 atolls and 5 islands that are divided into the Ratak (Sunrise) Island Chain and Ralik (Sunset) Island Chain.

RMI is one of four coral atoll nations in the world, and it has a landscape with saltwater lagoons, surrounded by white beaches and small lush islands. The capital city, Majuro, is situated on Majuro Atoll, the country's most developed and urban atoll. There is evidence that Majuro has the highest per capita waste generation in the Pacific.

Socioeconomic background

Ecotourism activities, such as scuba diving and canoeing, are significant attractions. The number of visitors in 2016 reached 9,831, which represented a 56% growth from the previous year *(SPTO, 2017)*, and 2015 experienced a 29% increase over 2014.

RMI became independent in 1986, yet remains a signatory to the Compact of Free Association with the Government of the United States. Thus, it benefits from financial assistance over a 15-year period.

RMI's gross domestic product in 2015 was US$179 million/US$3,910 per capita *(OEC, 2017)*. It had a trade balance deficit of US$14 billion, with exports at US$491 million (+3.2% annualized) and imports at US$14.5 billion (+8.5% since 2010).

The primary export market destinations for 2015 were the People's Republic of China, Cyprus, Greece, the Republic of Korea and Poland. The main import origins for the same year were the People's Republic of China, Germany, Japan, the Republic of Korea and Romania. *(OEC, 2017)*.

Contributions to gross domestic product are largely derived from the services sector. The manufacturing sector contributes approximately 1.8% to the country's economy *(GlobalEDGE, 2017)*.

The population was 53,158 in 2011 *(GoRMI, 2011)*, distributed across the country's atolls and islands of the two Island Chains (table below). Approximately 14,352, or 27%, live in rural areas, with the remainder living in either Majuro or Kwajalein.

Chain	Islands and Atolls	Population
Ralik	Ailinglaplap Atoll	1,729
	Ebon Atoll	706
	Enewetak	664
	Jabat Island	84
	Jaluit Atoll	1,788
	Kili	548
	Kwajalein Atoll	11,408
	Lae Atoll	347
	Lib Island	155
	Likiep Atoll	401
	Namdrik Atoll	508
	Namu Atoll	780
	Rongelap Atoll	79
	Ujae Atoll	364
	Wotho Atoll	97
Ratak	Ailuk Toll	339
	Arno Atoll	1,794
	Aur Atoll	499
	Majuro Atoll (Capital)	27,797
	Maloelap Atoll	682
	Mejit Island	348
	Mili Atoll	738
	Utirik Atoll	435
	Wotje Atoll	859

Source: GoRMI, 2011

Solid waste management

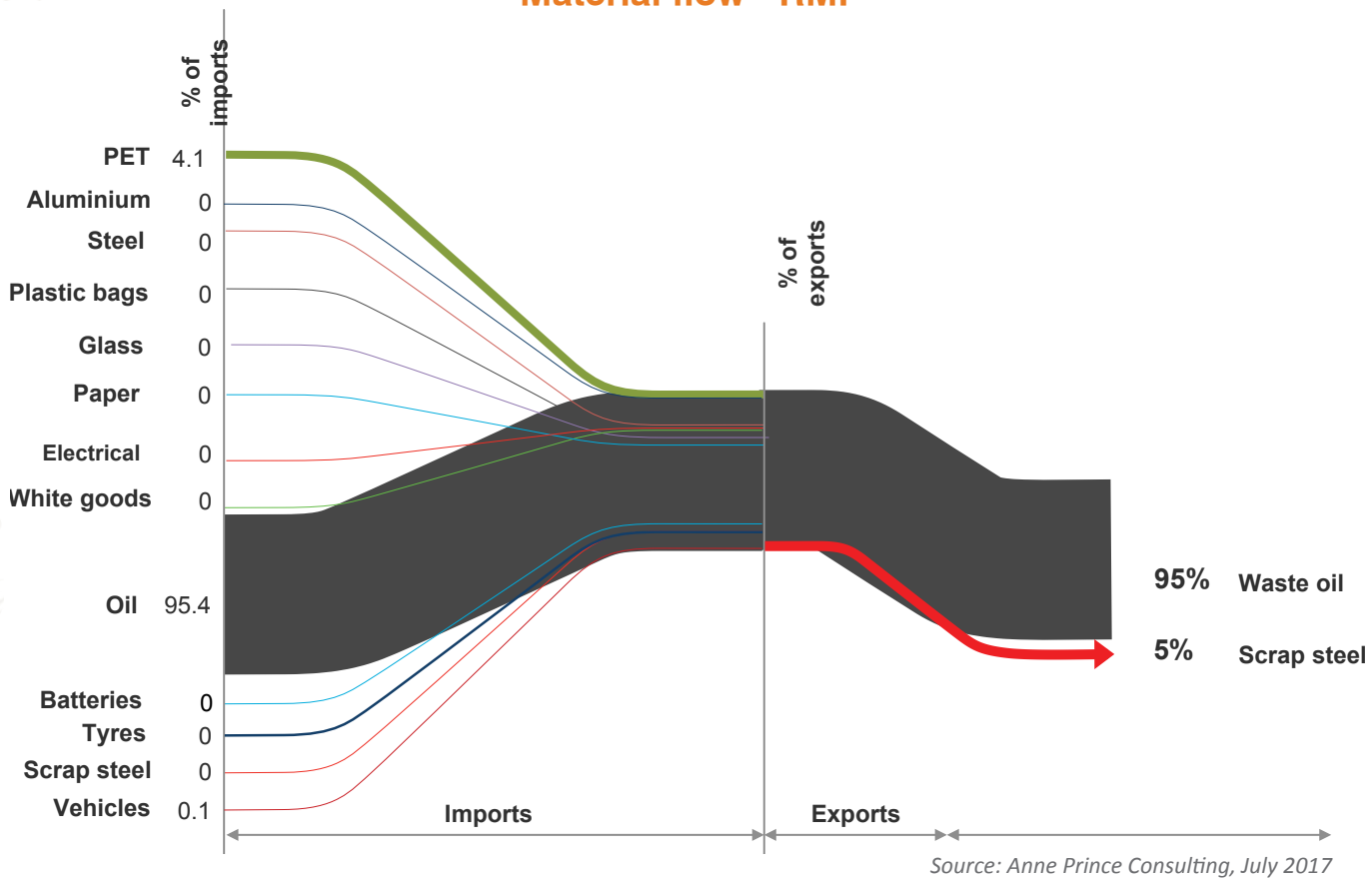
A study of the characteristics of waste was conducted in Majuro in 2014 as part of the first phase of the Promotion of Regional Initiative Solid Waste Management project, J-PRISM I, supported by the Japan International Cooperation Agency (JICA). It found, based on household sample survey data, household waste generation to be 1.1 kg per day. Organic waste represented 42.7%, followed by 16% plastic in the overall waste stream.

The regional study coordinated by PRIF models the potential recovery of 15 materials types. A defined set of recovery rates was applied to the urban, rural, and outer island population distribution to calculate RMI's potential recovery tonnage. The PRIF study compares various data to establish the context for the 15 waste materials.

The material flow chart below is based on an analysis of RMI's imports of the 15 material categories studied, averaged over a seven-year period to 2016, compared with exports of those recovered recyclable materials, averaged over a two-year period 2015-2016, presented as a percentage of the total of the 15 categories. *(UN Comtrade, 2017)*.

There is no evidence of a particular trend in the import of beverage containers, except for high-strength alcohol (>80%), peaking in 2012 and subsequently demonstrating

Material flow - RMI



Source: Anne Prince Consulting, July 2017

Note: The percentage of imports and exports displayed relate only to the proportion of the 15 materials categories studied, not total imports/exports

a strong downward trend. Plastic bag imports also peaked in 2012 and have dropped considerably since then. Paper and cardboard mostly held steady, while electronic goods are increasingly imported. Most oil imports are continuing at the same rate, except for palm oil, which peaked in 2010 and since, has experienced a sharp decline. RMI exported more than 22,000 tonnes (t) of oil, 1,100t of scrap metal, and an average of 16t of vehicles in the period 2014-16.

Modelling of potential recovery of recyclable materials, presented in the table below, is based on an estimated average daily per capita municipal solid waste generation of 1.2kg *(World Bank, 2012)*. It also applies a range of location-specific estimated recovery rates that are based on a set of assumptions of existing or introduced incentive-based policies and programs, such as container-deposit schemes and import levies. The resulting ratios were used to estimate average annual tonnages that could be recovered for recycling. *(JICA, 2013; SPREP 2016; Mobile Muster, 2013; DOEE, 2017; Jambeck et al., 2015; MFAT, 2016; UNIDO/ICSHP, 2013)*.

Republic of the Marshall Islands	
Recyclable Materials Forecast	**Estimated Metric Tonnes**
Polyethylene terephthalate (PET) beverage containers	229
Aluminium cans	322
Glass beverage containers	228
Steel cans	256
Plastic shopping bags	148
End-of-life (EOL) renewable energy equipment	1
Paper/cardboard	1,072
E-waste	3
Whitegoods	23
Used motor/cooking oil	307
Used lead-acid batteries	19
Lithium batteries	23
Scrap steel/non-ferrous metals	384
EOL tyres	19
EOL vehicles	330
Total (metric tonnes)	**3,364**

Source: World Bank, 2012.

Future waste management

RMI's National Energy Policy and Energy Action Plan aims for 20% renewable energy by 2020 to reduce its current reliance on diesel power generation. Proposed projects, funded by the Asian Development Bank, the Government of RMI, and other co-financing mechanisms include infrastructure and system improvements to increase power from solar photovoltaic and other renewable energy sources *(ADB, 2017; MFAT, 2016)*. As a result, an increase is expected in end-of-life equipment entering the waste stream (e.g., household electrical items, computers, and communication equipment).

The PacWaste (2014-17) programme, implemented by the SPREP and funded by the European Union, aims to deliver various initiatives to improve the management of e-waste and used lead-acid batteries. Activities include establishing a lead-acid battery collection system and creating an e-waste community awareness campaign *(SPREP, 2017)*. An increase in the recovery of plastics, nonferrous metals, and other materials associated with the dismantling of electrical equipment is expected as a result of these initiatives.

The second phase of the Promotion of Regional Initiative Solid Waste Management (J-PRISM II) project, implemented by JICA in early December 2016, supports capacity building in waste management. Target initiatives include improved governance and human resource development, which are expected to increase the volume of recoverable materials.

Plastic marine debris

Mismanaged waste plastic eventually enters the marine environment by way of inland rivers and waste-water outfalls or is transported by wind and tide. Rigid and lightweight, plastic materials from products that are consumed or used on a daily basis become marine debris if not managed appropriately. An estimated 16% of RMI's waste stream consists of plastic.

RMI has a combined coastline of 370km and a recent study *(Jenna et al., 2015)* indicates a daily plastic waste generation of approximately 11.1 t. An estimated 8.7t are mismanaged daily, entering the marine environment through release from uncontained disposal sites or by littering. As a result, an estimated 3,187t of waste plastic became marine debris in the waters around RMI in 2010. If not addressed, the amount is expected to rise to 5,717t by 2025. Of the 11.1t of plastic generated each day, approximately 1.2t may be PET or high-density polyethylene (HDPE) plastic, eligible for recycling under a container deposit scheme (CDS).

Based on an average reduction rate of 40% in mismanaged waste with a CDS in place, approximately 0.39t of PET and HDPE plastic could be recycled each day. This would increase to an 80% or above reduction rate, depending on access to recycling collection services and viable markets, among others. Nonetheless, a 40% reduction in mismanaged PET and HDPE would result in approximately 3,046t of plastic becoming marine debris each year.

The outcome of mismanaged plastic can be divided into three groups: plastic that remains on the surface or subsurface of the sea as floating debris, plastic that sinks to the ocean floor, and plastic that washes up on beaches. A CDS that recovers 40% of HDPE and PET plastic bottles in RMI may achieve the following reductions in marine debris each year:

- 21t in floating plastic
- 99t in sunken plastic
- 21t in beach plastic.

Further benefits attributed to a CDS are a potential reduction in annual damage costs for RMI's 114 local fishing vessels (approximately US$890). If beaches were cleaned up, over US$35,773 would be saved, of particular relevance to the amenities of coastal communities and the tourism sector.

Infrastructure and services

The Majuro Atoll Waste Company (MAWC) provides waste collection services to approximately 75% of households on the island. A development project in 2010 provided households with 360 litre bins. Commercial services are also provided, although a number of households and businesses transfer their own waste to the landfill for disposal *(ADB, 2014)*. A recent presentation at the Seventh Regional 3R Forum in Asia and the Pacific reported RMI has increased its solid waste management workforce from 12 in 2007 to 42 in 2016, as well as increased its focus on resource recovery.

The Majuro Atoll local government has a collection centre with a baler, where recovered materials are prepared for export. Aluminium, copper and used acid-lead batteries are transferred to international recycling markets - paper is processed into briquettes, green waste is now composted, and tyres are shredded on the island. These improvements have been largely driven by the need to reduce pressure on the Jable-Batkan disposal site, which is already at capacity. To prolong the life of the site, a seawall has been constructed as a temporary measure to prevent flooding.

Alternatives are extremely difficult to identify in a low-lying atoll environment, and a 2010 feasibility study funded by the Asian Development Bank, found that while a waste-to-energy facility was technically feasible, the power generated would be more expensive than is the current diesel powered system. Nonetheless, a private sector proposal for a waste-to-energy generator is understood to be under consideration and is dependent on land to be provided by the government.

The atoll waste management pilot programme, one of the four focus areas of the SPREP PacWaste project, introduced the Iokwe Bag collection system on Majura Atoll. A pre-disposal fee is charged on the sale of garbage bags to contribute to the expansion of household waste collections across the atoll.

In addition, MAWC has established a scrap steel material recovery facility that employs the use of compactors and plasma arc technology for metal recovery. A CDS for aluminium cans and PET bottles will be implemented in 2018, although MAWC has reportedly had some difficulty identifying international recycling markets *(GoRMI, 2017)*.

The outer islands, as well as RMI's tourism/accommodation facilities, do not recycle and do not have storage facilities. There are neither household recycling collection services nor community recycling centres, storage buildings, or balers to process recyclable materials.

Logistics

RMI Port Authority operates two international seaports. These have the capacity to handle international container services at Kwajalein and the Port of Majuro, the latter being the primary entry port.

Shipping Vessel Maintenance Fund Act 2011 was established as a special revenue fund under the supervision of the Ministry of Finance for maintenance, dry docking, surveying, and provision of safety equipment for shipping vessels managed by the Marshall Islands Shipping Corporation. The entity operates five vessels to transfer people and freight between the outer islands. The United States Army operates passenger ferry services to and from Kawajalein Island more or less 10 times a day over a six-day week schedule. These services are free of charge to the public.

Republic of the Marshall Islands

Source: Google Maps.
(A) Wake Island (B) Kwajalein (C) Majuro.

The Port of Majuro terminal is approximately 2.2 hectares, and is equipped with a main quay, 304 metres by approximately 12 metres deep, and a warehouse. There is no shore crane quarantine incineration infrastructure and no private stevedore services are available.

The Port of Majuro is capable of handling 20,000 twenty-foot equivalent units (TEU) per year. The port has a current throughput of approximately 4,181 import, 250 export and the return of 3,931 empty containers each year which may potentially be made available for reverse logistic arrangements. The port also loads and unloads approximately 1,400 transshipment containers each year.

The Port of Majuro is serviced by multiple international shipping lines. Estimated TEU rates, presented below, are based on the cargo of nonhazardous goods, inclusive of un/loading and a bunker adjustment factor. They do not account for customs clearance, duties, and quarantine inspection.

Republic of the Marshall Islands		
Swire Shipping; Kyowa Shipping Co. Ltd.; Polynesia Line		
Destination	**Schedule**	**Est. USD per TEU**
Australia	21-day	2,100 to 3,700
North Asia	21-day	2,600 to 3,560
Guam	21-day	TBD
Fiji	21-day	2,450 to 4,400

Source: AMSTEC Pty Ltd
Notes: USD = U.S. dollar;
TEU = twenty-foot equivalent unit.

Institutional framework

Data relating to the institutional framework of RMI have been gathered from the database of the Pacific Islands Legal Information Institute *(PacILII, 2017)*. ECOLEX is also an information service that relates to environmental law *(ECOLEX, 2017)*, from which various data also have been collected.

RMI's Environmental Protection Agency (EPA) is responsible for the administration of Environment Protection Act 1984 and Solid Waste Management Regulations 1989, which provide the legal and policy framework for waste management. Within this framework, the EPA regulates and monitors standards for the design, construction, operation, and management of solid waste storage, collection, and disposal facilities.

The EPA also administers Environmental Impact Assessment Regulations 1994, which provide for the implementation of Part 5 of National Environment Protection Act 1984, as well as Coastal Conservation Act 1988. It establishes standard procedures for the preparation and evaluation of environmental impact assessments for proposed public and private sector developments. The Ministry of Health, through the Public Health, Safety and Welfare Act 1966, is responsible for ensuring waste management activities do not present a risk to public health.

The Majuro Atoll Waste Company, a quasi- corporate entity owned jointly by the national and local Majuro Atoll governments, manages solid waste, recycling collection, and landfill operations. The Ministry of Public Works is responsible for managing the MAWC contract, overseen by a board representative each from the central government, local government, Marshall Islands Chamber of Commerce, Marshall Islands Visitors Authority, and Marshall Islands Conservation Society. This arrangement centralises the management of waste under a single authority. A national solid waste management committee was established in 2006 to develop a relevant strategic plan, which has yet to be achieved.

Local governments have a number of ordinances in place to protect marine resources and the marine environment. Included are the Civil Liability for Oil Pollution Damage Act 2012, Marine Water Quality Regulations 1991, and National Environment Protection (Amendment) Act 2006.

Recently legislated Bill 28 prohibits the importation, manufacture, sale, and distribution of Styrofoam™ and plastic cups and plates, as well as plastic shopping bags. The legislation is to be phased in and subsequently complemented with the implementation of a CDS. In addition, Import Duties (Amendment) Act 2015 waives import duties on renewable energy vehicles.

Except for the 1995 Waigani Convention, RMI is a party to various multilateral environmental agreements and conventions. These are listed in the table below.

Republic of the Marshall Islands	
Multilateral Environmental Agreements and Conventions	**Status**
Stockholm Convention on Persistent Organic Pollutants	Ratified
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	Ratified
Rotterdam Convention	Ratified
Montreal Protocol on Substances that Deplete the Ozone Layer	Ratified
MARPOL (73/78: International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 Annexes I, II, III, IV, V, and VI)	Ratified
London Convention on the Prevention of Marine Pollution by the Dumping of Wastes and Other Matter 1972	Ratified
Intervention on the High Seas in Cases of Oil Pollution Casualties (Intervention 1969)	Ratified
1973 Protocol Relating to Intervention on the High Seas in Cases of Pollution by Substances Other than Oil	Ratified
International Convention on Civil Liability for Oil Pollution Damage 1969 (renewed 1992)	Ratified
International Convention on the Protocol of 1976 to Amend the International Fund for Compensation for Oil Pollution Damage, 1971	Ratified
International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC)	Ratified
International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKER) 2001	Ratified
International Convention on the Control of Harmful Anti-fouling Systems in Ships (AFS Convention) 2001	Ratified
International Convention for the Control and Management of Ships Ballast Water and Sediments (BWM) 2004	Ratified
Nairobi International Convention on the Removal of Wrecks 2007	Ratified
Noumea Convention:	Ratified
Protocol on Dumping	Ratified
Protocol on Combatting Pollution Emergencies	Ratified
Protocol on Oil Pollution Preparedness, Response and Cooperation	Signed
Protocol on Hazardous and Noxious Substances Pollution, Preparedness, Response and Cooperation	Signed

Source: SPREP. 2016.

Financial mechanisms

Currency: United States dollar US$

While commercial premises are charged for waste management services in RMI, there are currently no user fees for household collection systems. The SPREP PacWaste programme enabled the introduction of a user-pays principle for a specially designed garbage bag, referred to as the Iokwe Bag. The money collected is earmarked for the expansion of household waste collection services across the entire Majuro Atoll. MAWC receives revenue from the export of recyclables, including aluminium cans, used lead-acid batteries, and nonferrous metals to international markets, as well as from the sale of compost and paper fuel briquettes.

A further initiative under the PacWaste programme is the introduction of a used lead-acid battery buy-back scheme, whereby the community is able to take old batteries for a redemption fee by weight. This is expected to draw additional revenue.

RMI receives financial assistance through The Compact Trust Fund for the People of the Republic of the Marshall Islands under the Compact of Free Association with the Government of the United States. Through this mechanism, MAWC receives US$325,000 a year for solid waste operations, with potential for future, periodic grants for new plants and equipment. Further financing initiatives include the previously mentioned CDS in 2018.

Despite the revenue MAWC receives from commercial waste collection services and the sale of recyclable materials, it still lacks the funds to support the efficient collection of waste and disposal services. In an effort to cover the shortfall, a 'green fee' of US$20 is levied as a departure tax.

The European Union has allocated €8 million to the RMI for renewable energy and energy efficiency initiatives *(EU, 2014)*. This may increase the level of end-of-life renewable energy equipment in the waste stream.

Conclusions

It appears that interest in the pre-paid Iokwe Bag has been minimal to date, given the lack of community awareness. In response, MAWC intends to revise its target area and users of the bag.

RMI is in a relatively isolated location within the Micronesia region. Its primary international port in Majuro is small and, while located on a reasonably cost-efficient shipping route, it has limited infrastructure. It is able, however, to handle increased cargo volume.

Abbreviations

3R	Reduce, reuse, recycle
ADB	Asian Development Bank
AFS	Anti-fouling systems
BWM	Ballast water and sediments
CDS	Container deposit scheme
DOEE	Department of Environment and Energy (Australia)
EPA	Environmental Protection Agency
EU	European Union
FY	Financial year
GoRMI	Government of Republic of Marshall Islands
HDPE	High-density polyethylene
ICSHP	International Centre on Small Hydro Power
J-PRISM	Promotion of Regional Initiative Solid Waste Management
JICA	Japan International Cooperation Agency
kg	kilogram
km	kilometre
km^2	square kilometre
MARPOL	International Convention for the Prevention of Pollution from Ships
MAWC	Majuro Atoll Waste Company
MFAT	Ministry of Foreign Affairs and Trade (New Zealand)
OPRC	International Convention on Oil Pollution Preparedness, Response and Cooperation
PET	Polyethylene terephthalate
PRIF	Pacific Region Infrastructure Facility
RMI	Republic of the Marshall Islands
RTRC	Regional Tourism Resource Centre
SPREP	Secretariat of the Pacific Regional Environment Programme
t	tonne
TEU	Twenty-foot equivalent unit
UNIDO	United Nations Industrial Development Organisation
USD	United States dollar

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