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Waste Management in Pacific Island Countries: The Problems, Challenges, and Ways Forward

Stuart Dever, Emma Every, Egis Consulting Australia

EXECUTIVE SUMMARY

The management of waste materials is a world wide problem. In the small island developing states of the Pacific (Pacific SIDS), waste management is becoming an acute problem as urban population increases, the economies of these countries develop, and the quantities of waste materials requiring management increases. The problems are particularly evident on small atoll islands where there is little land available for landfill waste disposal and such activities are impacting on potable groundwater resources.

In many Pacific SIDS waste management essentially involves the uncontrolled / semi-controlled dumping of rubbish at official and unofficial dumping sites. The sites are commonly located on low-lying unoccupied land, often mangrove areas, which is not wanted for other purposes. Often the sites are not staffed and there is no equipment to compact and cover the deposited waste. The environmental and health impacts of such operations are potentially significant, and the lack of management and monitoring of the dumps and impacts on the surrounding community, land and water is becoming a matter of concern. Other common, significant waste management problems include:

A lack of effective planning and implementation of the resultant plans;

Ineffective institutional arrangements;

A lack of sustainable funding;

Increasing quantities of waste requiring management; and

A lack of land for undertaking landfill waste disposal.

There is a wide range of options for addressing the waste management problems in Pacific SIDS, however, the situation in each country is invariably different and requires the development of a specific strategy / plan (solution) to improve the situation.

It is suggested that the most effective approach to improving the management of solid waste in Pacific SIDS in the long term is the progressive and rigorous development and implementation of a realistic and practical waste management plan for the various urban centres. Development and implementation of the waste management plans should be undertaken by the relevant Government agency responsible for managing waste, with the support of other relevant Government agencies, non-government organisations, community representatives, and technical experts from overseas, if required. Three of the most critical aspects that need to be addressed to maximise the chances of success of the plan are ownership of the plan, developing effective institutional arrangements for waste

management, and developing and implementing a mechanism for generating sustainable funding for waste management services and infrastructure.

KEY WORDS

Solid waste management, Pacific Island Countries

INTRODUCTION

The management of waste materials is a world wide problem. In the small island developing states of the Pacific (Pacific SIDS), waste management is becoming an acute problem as urban population increases, the economies of these countries develop, and the quantities of waste materials requiring management increases. The problems are particularly evident on small atoll islands where there is little land available for landfill waste disposal and such activities are impacting on potable groundwater resources.

In many Pacific SIDS waste management essentially involves the uncontrolled / semi-controlled dumping of rubbish at official and unofficial dumping sites. The sites are commonly located on low-lying unoccupied land, often mangrove areas, which is not wanted for other purposes. Often the sites are not staffed and there is no equipment to compact and cover the deposited waste. The environmental and health impacts of such operations are potentially significant, and the lack of management and monitoring of the dumps and impacts on the surrounding community, land and water is becoming a matter of concern.

This paper provides an overview of waste management in Pacific SIDS, outlines the problems, the challenges and ways to improve the current situation.

Existing Solid Waste Management situation

In response to increasing problems and concerns, there have been many recent studies and projects focused on the management of solid waste in Pacific SIDS. These include AusAID (1997), Sinclair Knight Merz (1999), Egis Consulting Australia (1998, 2001), Hassall & Associates International (2000), Opus International Consultants (1998), and Original Engineering Consultants (2000), World Health Organisation (1996) and UNEP (1999). The authors of this paper have been involved in projects addressing waste management in Tonga, Samoa, Fiji, Vanuatu, Cook Islands, Republic of Marshall Islands, Federated States of Micronesia, Vanuatu and Kiribati. Based on the information collected during these projects and from a review of other available literature, a summary of the existing situation in regard to solid waste management in Pacific SIDS has been prepared and is presented in the following paragraphs. Details for various countries are presented in Table 1.

The generation and disposal of waste in Pacific SIDS is quite low (0.2 – 1.0 kg/person/day) compared to developed nations such as Australia (2 – 2.5 kg/person/day). However, as these nations develop waste generation is increasing, and this is evident in the data available, which shows that the more developed South Pacific nations eg. Fiji, Samoa, generate more waste per capita. And currently there are few activities being undertaken to minimise waste generation and disposal eg. composting of organic waste and large scale recycling. Recycling is not generally undertaken due to the high collection and transports costs, which exceed the current value of most recyclable materials except high value metals.

Few South Pacific nations have a specific policy addressing waste generation and management. There have been numerous studies and plans prepared for solid waste management in Pacific SIDS but few were ever acted on, and it is only recently that waste management planning is being revisited and actions being taken to implement waste management plans. Earlier studies and plans were often prepared by consultants engaged by international aid organisations with little input from the pacific islanders, and often the plans did not address the real issues eg. funding and institutional issues.

Few Pacific SIDS have specific legislation, regulation or guidelines addressing waste management. Generally the management of waste is dealt with as a public health issue under the public health legislation or via anti-littering by-laws, which do not address environmental issues nor important matters such waste avoidance / minimisation.

The institutional responsibility for waste management in Pacific SIDS varies greatly from country to country. In some, it's managed by national government (Samoa, Tonga, Cook Islands). In others it's managed state government (FSM). And others it's managed by local government (Fiji, Vanuatu, Solomon Islands), and in many its shared (RMI, Kiribati). In some cases the management of waste is being undertaken by the Environment Department (Samoa, Fiji), which can introduce a conflict of interest with their regulatory role.

Most large urban South Pacific SIDS have some form of waste collection service. Exceptions include some states in FSM. The collection services are generally provided to householders, and sometimes commerce and industry, free of a direct charge. However, this is changing and direct charges for waste collection have been / are being introduced.

Typically waste materials are disposed of via landfilling. Most landfills in Pacific SIDS are uncontrolled or semi controlled landfilling operations with no environmental controls. There are few sanitary landfills. Often the landfills are located in low lying or tidal mangrove areas.

Funding of waste management is a major issue. Generally waste collection and disposal services are provided free in urban areas. The costs of providing the service are funded by national government. In some countries fees for the service are charged, however, often the fees are very low and do not cover the costs of providing the service. Generally funding is not sufficient to properly manage the services, and this is often due to the low priority given to waste management (compared to health, education etc). However, the situation is changing and fees for waste collection and disposal have recently been or are being introduced.

Summary of Problems and Issues

Considering the current situation in Pacific SIDS it is evident that there are a number of common problems in regard to the management and disposal of solid waste. These include:

Lack of effective waste management planning and implementation of plans. This is due to a number of factors including:

a lack of direction / leadership – no waste management policy;

a lack of relevant data;

a lack of necessary expertise and experience; and

a lack of funds, resources and equipment – see following paragraphs;

Ineffective and / or inappropriate institutional arrangements and limited institutional capacity to manage waste. Common problems include:

Lack of, or inadequate legislation and regulations;

Lack of enforcement of existing legislation, particularly in regard to the prevention of littering and indiscriminate dumping of waste;

Inappropriate / ineffective Government agencies managing waste, including the landfill waste disposal site – not a primary / core function eg. Department of Health;

Conflict of interest - often the Departments of health or environment, who are meant to be regulators, are undertaking waste management activities;

Lack of communication and support between relevant Government agencies eg. those with the equipment do not cooperate with those responsible for operating the waste disposal site or those with an understanding of the environmental issues are not involved;

Lack of suitable resources for undertaking waste management activities;

Lack of knowledge and (hands on) experience in avoiding and managing waste; and

Lack of equipment and support systems eg. for compacting and covering of waste materials at the landfill waste disposal site and for maintenance of equipment.

Limited financial resources and often the lack of a mechanism for generating sufficient and sustainable funding for waste management activities. This is particularly the case in regard to operating a solid waste disposal site. Typically access to waste disposal sites is free. The lack of funding includes a lack of funds for capital works, equipment, imported cover soil, other operating costs and rehabilitation costs. Often this lack of funding is associated with the institutional arrangements ie. waste management is not a core function of the Government agency responsible for such eg. Department of Health, and as a result waste management is not a priority issue and does receive the necessary funding.

The increasing quantities of waste materials requiring management / disposal. This is due to increasing urban populations, economic development, increasing disposable income, and increasing importation of goods and materials. Imported packaging and vehicles / large equipment are a particular problem that are consuming scarce landfill waste disposal space.

The limited measures undertaken to avoid waste generation and to recover resources eg. via reuse, recycling and reprocessing of waste materials. Recycling is essentially limited to aluminium cans and other valuable metals such as copper, lead and brass, and is undertaken on a small scale only. Currently it is not viable to recycle glass, PET, HDPE, paper and cardboard, steel and other common recyclable materials due to the lower value of the materials and the high costs to collect and transport the materials to recycling markets in Australia or South East Asia. To make recycling of these materials viable and sustainable would require subsidising the costs of collection and transport eg. via a levy on packaged imported goods.

Poor waste management storage, particularly at households – few households use garbage bins. Typically waste is placed in baskets or bags on the kerbside for collection,

which leads to odours, attraction of animals, vermin and insects, wind blown litter, and pollution of surface waters.

Inefficient / ineffective waste collection services. Common problems include lack of sufficient funding to operate equipment, replace ageing equipment and undertake regular equipment maintenance, inappropriate equipment, and inefficient waste collection using day labour.

The lack of land available for disposing (landfilling) of waste. This is a particular problem on small atoll islands with large / increasing urban populations eg. South Tarawa (Kiribati), Majuro (Republic of Marshall Islands), where there simply is no dry land available for landfilling. It can also be a problem on larger islands eg. Tongatapu (Tonga), Suva and Nadi (Fiji) due to:

Land ownership arrangements, which make resumption or purchase of land difficult or impossible; and NIMBY. No body wants a dump, as they know it, next door.

A consequence of the above is the development of landfill waste disposal sites in unsuitable locations eg. located immediately adjacent to residential areas, located in unsuitable geological setting (permeable soils, high groundwater table), or located in an environmentally sensitive area (mangrove, reef flats). Generally, waste disposal activities are restricted to Government owned land, which is often limited and commonly below the high tide water level.

Poor landfill waste disposal operations. Common problems include:

A lack of funding and skilled / experienced resources to develop, manage and operate an engineered sanitary landfill waste disposal site;

A lack of effective planning and design of landfill waste disposal sites. This is often due to a lack of the necessary expertise and experience to undertake such;

A lack of management and supervision of the landfill waste disposal operations, which is often due to institutional problems and / or lack of funding;

A lack of health and environmental management measures, including:

A lack of covering and compaction of the deposited waste;

A lack of soil to cover deposited waste (and maintain sanitary conditions). This is a particular problem for small atoll islands;

A lack of stormwater and leachate management measures - resulting in contamination of surface waters and groundwater;

A lack of environmental monitoring.

Unsafe / poor management of special wastes eg. medical waste, septage / sludges, highly degradable and odorous waste eg. offal, food processing wastes. Commonly these wastes are disposed of in an uncontrolled manner at the existing poor landfill waste disposal sites.

Suggested Way Forward

Waste management is a serious environmental problem in Pacific SIDS. It is not just a matter of solving the problems of litter and indiscriminate dumping of solid waste - a full solution has public health, environmental, social, economic, commercial and sometimes international relations implications eg. management of hazardous wastes.

Generally most problems associated with the existing poor waste management situation in Pacific SIDS stem from poor waste management planning, a lack of funding and effective institutional arrangements to change the situation. These problems must be addressed and overcome if waste management is to be improved in Pacific SIDS in the long term.

There is a wide range of options for addressing the waste management problems in Pacific SIDS, however, the situation in each country is invariably different and requires the development of a specific strategy / plan (solution) to improve the situation.

It is suggested that the most effective approach to improving the management of solid waste in Pacific SIDS in the long term is the progressive and rigorous development and implementation of realistic and practical waste management plans for the various urban centres. Development of the waste management plans should be undertaken by the relevant Government agency responsible for managing waste, with the support of other relevant Government agencies, non-government organisations, community representatives and technical experts from overseas, if required. It is recommended that a small working group be established to lead the development and implementation of the plan and that the group regularly consults with other stakeholders to ensure all issues are addressed. It is important that the plan be prepared by the local people to ensure ownership of the plan. Many waste management plans have been prepared for Pacific SIDS by outside (international) organisations that have never been implemented.

Development of the waste management plan should encompass the following:

A detailed review and assessment of the existing waste management situation – to identify existing problems, issues and possible barriers to improving existing waste management practices.

Identification of the goals and objectives of the waste management plan. This may require involving relevant Government ministers in the planning process to ensure the goals and objectives are consistent with Government policies. Otherwise the final waste management plan may not be approved or funded by the Government.

A review and evaluation of options to avoid / minimise waste generation (and waste disposal) and recover resources. This should include consideration of the following options:

Separation and processing (mulching, composting) of garden and food waste, which can make up to 50% of the waste stream. The resulting mulch and compost can be beneficially reused around homes (vegetable garden) and in agricultural activities undertaken on the island;

Options for reusing imported packaging and other waste materials eg. cardboard boxes, wooden crates;

Options to develop export or local recycling programs for steel (including white goods, old vehicles and other large equipment), PET, HDPE, and glass. This should include consideration of the following:

A Government subsidy or a levy on imported goods and materials (waste levy) to fund recycling activities;

How best to establish a low cost collection service eg. drop off centres, community / school collection programs;

More formal (organised) reuse and recycling centres, established in villages and at waste disposal sites;

Incineration / burning of waste paper and cardboard for energy recovery – use as a fuel in the home or in industry;

School and community education programs addressing waste avoidance and resource recovery.

A review and evaluation of options to improve on site waste handling and storage. Consideration should be given to the following options:

Provision of suitable containers (garbage bins) to all households as part of the waste collection service;

Education programs to encourage the purchase of suitable garbage bins (with secure lids);

Enforcement of waste storage requirements at institutional, commercial and industrial premises;

A review and evaluation of options to prevent / minimise littering and the indiscriminate dumping of solid waste. Consideration should be given to the following:

Community education programs to discourage littering and indiscriminate dumping of waste;

Programs to promote community ownership of the problem and community clean up activities

Provision of an affordable and reliable waste collection service;

Increased enforcement of anti-littering and waste dumping regulations;

Investigation and evaluation of options to improve waste collection, including the following:

Options to improve collection efficiency;

Privatisation of waste collection services;

Sustainable mechanisms for funding the waste collection service ie. realistic fees for waste collection that reflect the real costs of the service and the quantity of waste removed.

Investigation and evaluation of options to improve landfill waste disposal operations, including consideration of the following:

Staged upgrading of the existing landfill waste disposal operation / site (as funds become available); or

Establishment of a new, modern waste management facility that incorporates an engineered sanitary landfilling operation (and rehabilitation of the existing dump site);

Implementation of fees for waste disposal to fund the upgraded operation of the waste disposal site;

Increased management and supervision of the landfilling operation;

Improved planning of the landfilling operation including preparation and implementation of a management and operation plan for the site;

Regular covering and compaction of landfilled waste;

Implementation of measures to control stormwater and leachate;

Implementation of formal inspections and monitoring of public health and environmental aspects;

Training of all relevant personnel in the management and operation of a sanitary landfilling operation;

Incorporating resource recovery activities at the facility eg. reuse and recycling centre, mulching / composting operation

Consultation with the community to ensure that all their issues are addressed in the plan. This will be critical if developing a new sanitary landfill waste disposal site or if introducing fees or charges for waste management services.

Identification of the most effective institutional arrangements for implementation of the plan. This is critical for successful implementation of the plan. This should include defining the roles and responsibilities of the various stakeholders ie. who should manage and operate what, who should act as the regulator etc.

Development of a financial plan and sustainable funding mechanism for the provision of solid waste management infrastructure and services. This should include detailed estimates of the capital and ongoing operating and maintenance costs for waste minimisation / recycling activities, the waste collection service, waste transfer operations, and the landfill waste disposal operation.

Obtaining the commitment, approval and possibly funding of the Pacific SIDS Government for implementation of the proposed Plan.

CONCLUSIONS

Waste management is a very serious problem in Pacific SIDS and there are many common problems, which include:

A lack of effective planning and implementation of the resultant plans;

Ineffective institutional arrangements;

A lack of sustainable funding;

Increasing quantities of waste requiring management;

A lack of land for undertaking landfill waste disposal; and

Poor landfill waste disposal operations, which are having an adverse impact on the environment.

There is a wide range of options for addressing the waste management problems in Pacific SIDS, however, the situation in each country is invariably different and requires the development of a specific strategy / plan (solution) to improve the situation.

It is suggested that the most effective approach to improving the management of solid waste in Pacific SIDS in the long term is the progressive and rigorous development and implementation of a realistic and practical waste management plan for the various urban centres. Development and implementation of the waste management plans should be undertaken by the relevant Government agency responsible for managing waste, with the support of other relevant Government agencies, non-government organisations, community representatives, and technical experts from overseas, if required. Three of the most critical aspects that need to be addressed to maximise the chances of success of the plan are ownership of the plan, developing effective institutional arrangements for waste management, and developing and implementing a mechanism for generating sustainable funding for waste management services and infrastructure.

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CONTACT

Stuart Dever
Egis Consulting Australia
PO Box 201, Chatswood, NSW, 2057, Australia
02 9412 9867
02 9412 9686
devers@syd.egisconsult.com.au

TABLE 1 SUMMARY OF EXISTING WASTE MANAGEMENT SITUATION IN PACIFIC ISLAND COUNTRIES

Country	Cook Islands	Fiji	Kiribati	Federated States of Micronesia
Population (Major Population Centres)	19,600 (Rarotonga)	825,000 (Suva, Nadi, Lautoka)	76,000 (South Tarawa)	134,000(Pohnpei, Kosrae, Yap, Chuuk)
Approx. Waste Generation / Disposal Rate (kg/person/day)	0.19	0.44 (Suva) 0.92 (Lautoka)	0.33	0.38
% Organic / Biodegradable	35	68	20	20
Waste Management Planning	No specific policy or plan for waste National Environmental Mgmt Strategy	Nil	Waste mgmt policy and plan are currently being prepared as part of ADB project	Kosrae has a plan. Chuuk has a policy
Waste Management Legislation, Regulations and Guidelines	Public Health Act Others?	Public Health Act Local Government By Laws No specific waste management legislation or guidelines	No specific legislation addressing waste management. Of relevance Public Health Act & Regs, Town Council Bye Laws, Local Govt Act, Environment Act	Individual State Environmental Pollution legislation and regulations
Responsible Government Agencies	National government – Ministry of Works, Environment and Physical Planning.	Local Councils (eg. Lautoka, Nadi, Lami and Suva City Councils). The Dept. of Environment (National Govt.) is	Local Councils (eg. Tarawa Urban Council, and Betio Town Council) Ministry of Environment	Municipal (local) Government although the responsibility is soon to be taken over by the

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Country	Cook Islands	Fiji	Kiribati	Federated States of Micronesia
		the regulator and is involved in the planning and establishment of a new landfill		Department of Public Works (National Government) Individual state EPAs
Waste Avoidance and Resource Recovery Activities	Recycling of Al cans & PET Reuse of glass bottles Backyard burning of garden waste	Recycling of Paper and cardboard, Al cans, PET bottles, scrap metal. Returnable glass drink bottles	Local reuse of waste materials Al can recycling	Al can recycling
Waste Collection Arrangements	Waste collection service for households run by National Govt – free service. Use private contractor	Local Council responsible for domestic waste collection – paid for in rates. Some Councils use contractors, some use lay labour. Private sector waste management contractors	Waste collection service provided by local government – day labour & equip. Urban areas only.	No waste collection on Chuuk or Kosrae. Kolonia Town Council provide collection service for town on Pohnpei – for a fee
Landfill Waste Disposal Activities	Basic sanitary landfill. Waste depot involves the filling of a water reservoir (never used as such). Irregular waste compaction, covering. Site is reasonably well run. Plans for new, engineered sanitary landfill. Fees charged for use of landfill	Lautoka and Lami (Suva) – semi controlled landfills. Above ground landfilling, no stormwater/leachate controls, irregular covering. Lami has council owned dozer, Lautoka uses contractor. Basic waste quantification using vehicle numbers. New Suva landfill to be engineered sanitary landfill.	Wastes dumped at 10 informal dump sites along coast line. No control measures, no quantification. Free to use Uncontrolled dumping sites	Open dump sites, no control measures, no covering, some environmental monitoring undertaken, no pesticides accepted. Contract operation on Pohnpei. Operated by Dept of PW on Chuuk and Kosrae. Uncontrolled dumping sites

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Country	Cook Islands	Fiji	Kiribati	Federated States of Micronesia
	site NZ$5.00 – NZ$20.00			
Funding Arrangements	Funded through a national government budget allowance	Waste collection and disposal funded through property rates (Local Government) and fees collected at the landfill gate (FJ3.50 – FJ30.00)	Waste collection & disposal funded through waste services fees collected by Council ($17 - $600 / yr). Additional grant / subsidy received from national Government	Waste services are funded by local government and through a national government budget allowance

TABLE 1 SUMMARY OF EXISTING WASTE MANAGEMENT SITUATION IN PACIFIC ISLAND COUNTRIES (cont'd)

Country	Republic of Marshall Islands	Samoa	Tonga	Vanuatu
Population (Major)Population Centres)	51,000 (Majuro)	170,000 (Apia)	97,000 (Nuku'alofa)	175,000 (Port Vila)
Approx. Waste Generation / Disposal Rate, (kg/person/day)	0.4 – 0.6	0.52 - 1.05	0.68 - 0.82	0.65
% Organic / Biodegradable	46	60	47 - 62	71
Waste Management Planning	No formal waste mgmt policy. US EPA prepared Integrated Waste Mgmt	National Waste Management Policy No detailed plan	Waste Management Plan recently prepared (2000) as part of AusAID project	Policy/plans to be prepared under new environ. Legislation. National Waste

Country	Republic of Marshall Islands	Samoa	Tonga	Vanuatu
	Plan for Majuro			Management Committee
Waste Management Legislation, Regulations and Guidelines	Environment Protection Act Public Health Act	Public Health Act No specific waste management legislation or guidelines	Public Health Act Town Regulations Garbage Act	Public Health Act, Litter By Laws, Draft Environment Act, Water Resources Act, Draft Waste Management Act (1993),
Responsible Government Agencies	Local government (eg. Majuro Atoll Local Government), RMI EPA, Ministry of Public Works	Dept. of Environment and Conservation (National Gov.). No local government in Samoa	Ministry of Health (National Government) Department of Environment	Municipal Councils (local government) (eg.Port Vila Municipality)
Waste Avoidance and Resource Recovery Activities	Scavenging at landfill Recycling of Al cans – now ceased	Composting of garden and food waste. Small scale metal recycling. Returnable glass drink bottles	Returnable beer bottles, Al can recycling Small scale scrap metal recycling Scavenging at dump site	Returnable beers bottles, Small scale scrap metal recycling including AL cans Some mulching of garden waste
Waste Collection Arrangements	Waste collection in Majuro provided by Local Government (Council) – free service – main urban areas only	Waste collection organised by Dept of Env - free service, serves CBD. Contract operation. Plans to extend to whole of both islands	Waste collection undertaken by Ministry of Health sing own equipment & day labour. Fees T5.00 – T30.00 per month	Waste collection is undertaken by the Town Council – for fees (6000 – 360000 Vatu / yr)
Landfill Waste Disposal Activities	Waste disposal depot located on the ocean side reef flat at Rairok. Controlled / semi controlled dumping site.	Upolu serviced by the Tafaigata Landfill - controlled / semi controlled dumping site which has poor access, no stormwater or leachate	Nuku'alofa – Tukutonga dump site – area style filling operation in mangrove area, no landfilling equipment based on-site. Irregular	Port Vila Landfill (Bouffa) is a new (1995) basic sanitary landfill, designed with outside help. Approx. 15 – 20 years life. Filling

Country	Republic of Marshall Islands	Samoa	Tonga	Vanuatu
	Wastes contained by use of wire cages filled with coral. Free to use site – no fees Operated by Ministry of Public Works	controls. A LMP has been prepared for the site. Some waste records. Dedicated areas for special wastes (medical, sludges), Periodic compaction and covering of wastes. New dump site being planned for Suvai'i	waste compaction & covering, no stormwater, leachate controls. Free to use. New solid waste disposal site at Tapuhia designed with implementation in next few months. Fees proposed. Vavau - currently uncontrolled dumping to be upgraded to engineered sanitary landfill	method is by trench operation. Weekly covering of waste, burning of quarantine waste and some non-controlled burning occurs. Leachate/SW collection ponds have been used for haz. Waste disposal. GW monitoring bores have been lost. Fees (100 – 1500vatu)
Funding Arrangements	Waste collection and disposal is funded by Majuro Atoll Local Government who obtain funding / income from local sales tax and municipal fees	Costs of providing waste collection services are worn by the National government, which is derived from income tax, GST, import tariffs, corporate tax. Landfill fees are collected at the gate (WST5 – 75 / load)	Waste services funded by fees collected by Ministry of Health and Nat. Govt funding	Waste services are funded through property taxes and waste collection and tipping fees