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Vanuatu – Waste management training report

**Overview and outcomes of training developed and
delivered 2018–2019**

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Executive Summary

The Commonwealth Litter Programme (CLiP) is an initiative delivered by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) and funded by the United Kingdom's Department for Environment, Food and Rural Affairs. The initiative supports developing countries across the Commonwealth in advancing national litter action plans focused on preventing litter entering the oceans.

In 2018, CLiP contracted Asia Pacific Waste Consultants (APWC) to study waste management practices in Vanuatu and offer best-practice solutions and training to staff engaged in the design and delivery of waste services. A number of problem waste streams were identified during the waste audit process carried out in 2018. In response, APWC developed a programme to share knowledge and ideas relevant to the Pacific context. The objective of the programme was to build collaborative relationships by sharing solutions and lessons learned in the Australian context to help tackle marine litter and broader waste issues.

This report presents the training delivered in Vanuatu over a three-month period from November 2018 to February 2019.

In November 2018, extensive waste-audit and data-collection training was provided to staff from Port Vila Municipal Council (PVMC) and Luganville Municipal Council (LMC). In February 2019, delegates from PVMC, the Ministry of Environment and provincial government attended a three-day training workshop that included site visits and presentations from their colleagues at LMC. The workshop demonstrated a number of waste management initiatives being trialled by LMC or those currently operating. The workshop also covered policy instruments such as container deposit legislation (CDL) and the extension of the plastic ban.

These seminars provide a strong foundation for future, ongoing collaboration between the two municipalities, the Ministry of Environment and provincial governments.

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Acronyms

ACRONYMS	
ADB	Asia Development Bank
APWC	Asia Pacific Waste Consultants
CCOA	Commonwealth Clean Oceans Alliance
CDL	Container deposit legislation
CDS	Container deposit scheme
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CLiP	Commonwealth Litter Programme
CHOGM	Commonwealth Heads of Government Meeting
Defra	The UK Department for Environment, Food and Rural Affairs
ED	Environment Division of Department of Environment
EHD	Environmental Health Division of Honiara City Council
EHO	Environment Health Officer
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EU	European Union
FFA/SPC	Pacific Islands Forum Fisheries Agency
GEF	Global Environment Facility
GIS	Geographic Information System
GMP-POPs II	Global Monitoring Plan on Persistent Organic Pollutant Phase II
GPS	Global positioning system
HCC	Honiara City Council
HDPE	High-density polyethylene
IMO	International Maritime Organisation
IUCN	International Union for the Conservation of Nature
JICA	Japanese International Co-operation Agency
J-PRISM	Japanese Technical Co-operation Project for Promotion of Regional Initiative on Solid Waste Management
J-PRISM II	Japanese Technical Co-operation Project for Promotion of Regional Initiative on Solid Waste Management in Pacific Island Countries Phase II
KG	Kilogram
LEAF	Earning and Ecological Activities Foundation for Children (LEAF) Project
LDN	Least Developed Nation
LDPE	Low-density polyethylene
LGA	Local Government Act
LGNZ	Local Government New Zealand
MARPOL 73/78	The International Convention for the Prevention of Pollution from Ships (Marine Pollution), 1973 as modified by the Protocol of 1978
MEA	Multi-lateral environmental agreements
MECDM	Ministry of Environment, Climate Change, Disaster Management and Meteorology

MID	Ministry of Industry and Development
MGB	Mobile garbage bin
MHMS	Ministry of Health and Medical Services
MSW	Municipal solid waste
NAPA	National Adaptation Programme of Action
NCCP	National Climate Change Policy
NDS	National Development Strategy
NGO	Non-government organisation
NZ	New Zealand
NZMFAT	New Zealand Ministry of Foreign Affairs and Trade
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PICS	Pacific Island countries
PRIF	Pacific Region Infrastructure Facility
PV	Photo voltaic
SAMOA	SIDS Accelerated Modalities of Action Pathway
SBD	Solomon Islands Dollar
SI	Solomon Islands
SID	Small Island Developing States
SIMSA	Solomon Islands Maritime Safety Administration
SIPA	Solomon Islands Ports Authority
SIWA	Solomon Islands Water Authority
SPC	Secretariat of Pacific Country
SPREP	Secretariat of the Pacific Regional Environment Programme
SWM	Solid Waste Management
TCPA	<i>Town and Country Planning Act</i>
UNEP	United Nations Environment Program
UNICEF	United Nations International Children's Emergency Fund
USD	United States dollars
VHF	Very high frequency
WCRA	Waste Contractors and Recyclers Association of NSW
WHO	World Health Organization
WMAA	Waste Management Association of Australia
WMPC	Waste Management and Pollution Control
WPA	Western Provincial Authority
WRIA	Waste Recycling Industry Association

1 Introduction

1.1 Project need

Capacity building within Pacific Island communities (PICs) is a key priority to help deal with the growing problem of waste management and the prevention of land- and marine-based litter. The implications of pollution on marine ecosystems have been widely studied, however the impact on human health remains poorly characterised. Human health impacts are perceived to be an emerging problem requiring increased scrutiny and attention (Seltenrich, 2015; Ocean Conservancy and International Coastal Cleanup, 2014). There is increasing urgency among industry, government, non-governmental organisations and environmental groups to develop tools and policies to track, capture and recycle waste (particularly plastics) before it reaches the oceans.

PICs face unique and significant obstacles in the development and implementation of sustainable waste management solutions to address and combat litter in terrestrial and marine environments. Organic waste, waste oils and waste from shipping and cruise liners also produce a unique challenge for the area. Globalisation, including increased affluence and consumer-based lifestyles with a heavy reliance on imported goods, has had a substantial impact on the amount of waste generated within communities. The waste challenges for island communities are considerable, due in large part to geographic location and physical size coupled with lack of suitable land availability for waste management solutions such as transfer stations, waste treatment and disposal sites, and recycling and reuse facilities. Other obstacles, including the topography and location of some communities, as well as resourcing and infrastructure limitations, means that many communities, especially those in remote locations, have limited or no access to sustainable waste management. As a result, waste is often dumped, burned or buried, leaving it susceptible to dispersal into the environment.

Transboundary marine litter is another issue facing PICs, with many livelihoods dependent on the continuing health of the ocean. Creating a balance between satisfying the economic aspirations of increasing populations while maintaining healthy marine and terrestrial environments is of major importance in reducing risks to human health, as well as the land- and marine-based life. Major waterways are capable of transporting a substantial amount of waste and litter. Up to 90 per cent of marine litter consists of plastics originating from both land- and sea-based sources (UNEP and GRID-Arendal, 2016). Plastic debris from the land comes primarily from two sources: first, ordinary litter; and second, waste disposed of at open dumps, landfills or illegally dumped waste which then becomes airborne or washes into the ocean from inland waterways and wastewater outflows (Jambeck, J.R. et al., 2015). Marine sources of plastic debris are more nuanced but arise from shipping activities related to transport of goods, services, tourism and fishing.

It is estimated that in the Asia–Pacific region the cost of marine litter to marine industries is a minimum of €1.26 billion per year, including losses from tourism, entangled ship propellers and time lost for fishing (McIlgorm, A., et al., 2008). In the EU, it has been suggested that the cost for coastal and beach cleaning is about €630 million annually (Acoleyen, M., et al., 2013; Werner, S., et al., 2016).

Preventing pollution, especially plastics from entering the environment, requires focused efforts on behaviour change (for example, reducing reliance on single-use plastics), improvements in waste

management and developing a more sustainable life cycle for wastes such plastics. The steps to improve poor systems of waste management or mismanagement of waste rely on quantifying the scale of the problem and the sources of plastics leakage and other wastes into the system. To date, this quantification has not happened. Gaps in local capacity, as well as details of infrastructure and management systems, must be quantified and linked to the leaked waste in order to adequately deal with the issues.

1.2 The Commonwealth Litter Programme (CLiP)

The Commonwealth Litter Programme (CLiP) will support developing countries across the Commonwealth to advance national litter action plans, focusing on preventing litter (including plastics) entering the oceans. The programme is starting in the South Pacific Region, working with Vanuatu and Solomon Islands, and this project forms a part of the programme.

Error! Reference source not found. Figure 1 shows the organisations delivering the project.

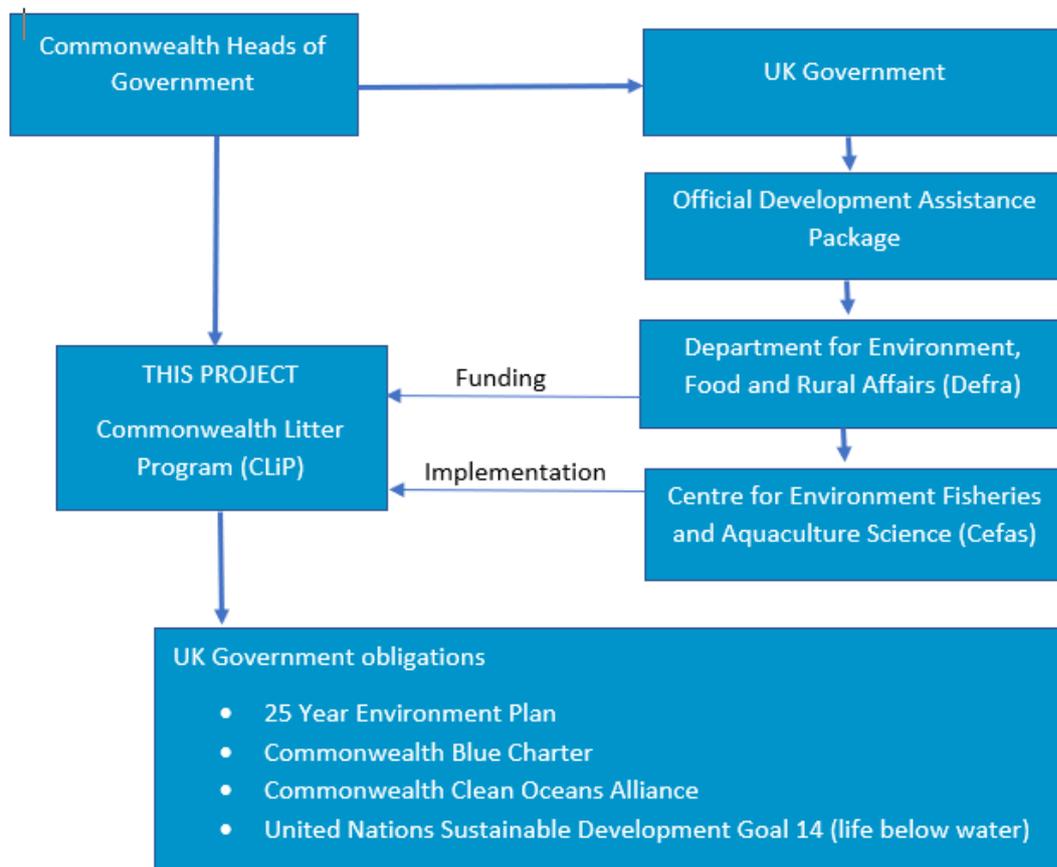


Figure 1: Project delivery organisations

The programme contributes to the UK meeting its responsibilities under the Commonwealth Blue Charter, which calls for Commonwealth countries to drive action and share expertise on issues affecting the world’s oceans, including marine litter. CLiP will contribute delivering the objectives under the UK- and Vanuatu-led Commonwealth Clean Oceans Alliance (CCOA), which calls on other

countries to pledge action on plastics to eliminate avoidable plastic waste. CCOA also promotes actions in line with the United Nations Sustainable Development Goal 14 (life below water) to conserve and sustainably use the oceans.

1.3 This report

Asia Pacific Waste Consultants (APWC) has been engaged by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) to study waste management practices in Vanuatu and offer best-practice solutions and training to staff who are engaged in the design and delivery of waste services in the country (including provinces). This is a deliverable under CLiP.

The delivery pathways for the project are listed in [Error! Reference source not found.](#) Figure 2.

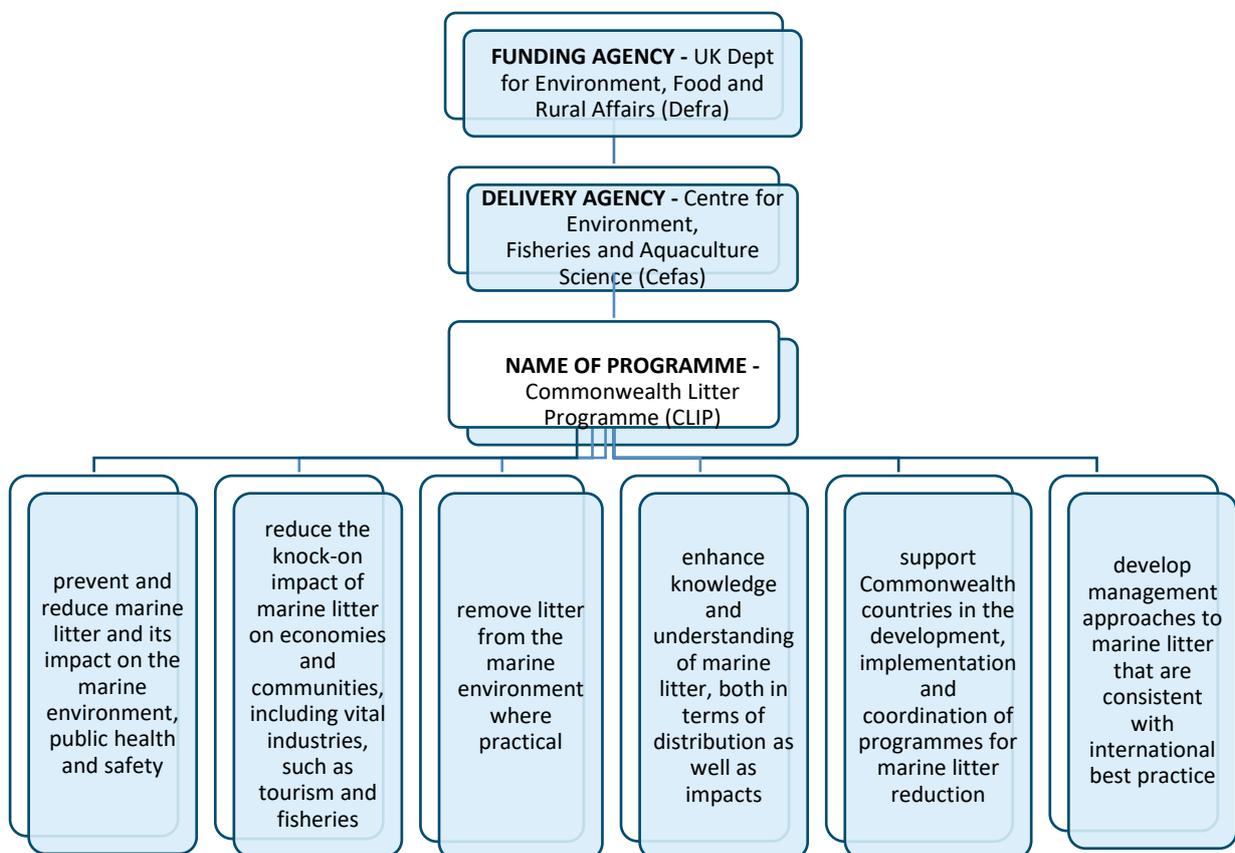


Figure 2: CLiP sponsors and objectives

APWC deliverables have three focus areas, listed below:

- Data collection on waste collection and disposal services, and disposal behaviour
- Best-practice solutions to the current situation
- Provision of training for in-country staff.

This report deals with the third focus area of training and should be read in conjunction with the Waste Data report and the Best Practice report.



The report begins with a recap of the key findings of the Waste Data report, the gaps identified in services and infrastructure and recommendations for best-practice approaches. An overview of the training undertaken follows, with the design of the training responding to the gaps.

2 Situation Analysis: Training

2.1 Background

As part of the CLiP project implementation in Vanuatu, APWC was also awarded a project to deliver an international-standard national training programme for all organisations and departments involved in waste management to help improve monitoring, compliance and reporting.



Figure 3: List of topics covered by APWC gap analysis

The first stage of undertaking this work was to review gaps in waste management, recycling, enforcement, monitoring and prosecution of legislation to ensure that training could be tailored to requirements. To this end, APWC undertook an assessment of the current capacity of different stakeholders in Vanuatu in the areas noted above.

APWC also undertook a review of the amount of training delivered by other service providers in this area to ensure any training program delivered would not overlap with the existing or planned training programs provided through Japanese International Co-operation Agency (JICA) and Secretariat of the Pacific Regional Environment Programme (SPREP).

This section highlights the gaps in service provision identified by the APWC team and the training required to bridge these gaps. Further best-practice demonstrations were organised in both Sydney and Vanuatu to help counterparts understand what is achievable.

3 Recap: Waste data and service gaps

The APWC team worked in Vanuatu for three weeks, covering the islands of Efate and Espiritu Santo and the respective provincial governments for Shefa and Sanma province and the municipalities of Port Vila Municipal Council (PVMC) and Luganville Municipal Council (LMCC). Household and commercial waste samples were collected from the main island communities of Port Vila and Luganville and the rural community of Black Sands as well as from the island of Lelepa in Shefa Province. Black Sands is a highly affected village where communities have relocated from outer islands because of the devastating effects of tropical cyclone Pam in 2015. Four outer islands were also visited: Lelepa (Efate), Ifira (Efate), Tutuba (Espiritu Santo) and Mavea (Espiritu Santo).

In total, 205 household waste samples were collected, with 105 from Shefa province and 50 urban samples collected from five different communities in Port Vila and 50 from Luganville. In addition to the household samples, a total of 45 commercial premises were sampled, of which 30 were shops in Port Vila and 15 in Luganville. APWC's team collected and sorted 1,546 kilograms of waste from five locations and 246 premises in Vanuatu. A further 7 tonnes of green waste was weighed and assessed in Luganville.

Interviews were conducted with all households where waste was collected to cross-reference socio-economic and waste behaviour data with the waste disposal data. APWC was able to draw upon JICA's previous work analysing waste generation rates. JICA studies are estimating the total amount of waste generated at source rather than the amount people are willing to place in a bag. The comparison of the two studies shows that although the introduction of the prepaid bags is largely helping with the visible waste issues, there are matters that can be further addressed.

In summary, the key outcomes of the waste disposal research and analysis are:

- The amount of waste generated between urban and rural areas differed with urban areas generating substantially more waste;
- A correlation between waste generation and the average grocery bill for an area was identified, however this did not translate down to the household level;
- 30–70% of waste generated in urban areas is being captured through waste management systems currently in place;
- All waste generated in rural areas with no collection services in place is being disposed of through burning, burying and dumping;
- Very small numbers of people are dumping rubbish in waterways and most reported instances came from areas with no collection systems in place. Port Vila reported absolutely no dumping in waterways, which indicates a high level of awareness among residents regarding the impact of waste on waterways. Although anecdotally waste continues to be dumped in waterways, residents are aware that this is not the right thing to do.

Based on the disposal data, APWC draws the following proposed improvement actions:

- Increase participation rate in the use of the yellow bag system through community education;
- Improve the use of the yellow bag to ensure that all waste is being disposed of correctly;
- Review the yellow bag pricing to make it more affordable for people of all income levels.

Figure 4 lists the top ten individual items disposed of in Vanuatu and the suggested best-practice actions to manage these items. Best-practice actions are proposed based on both qualitative and quantitative data included in the Waste Data report.

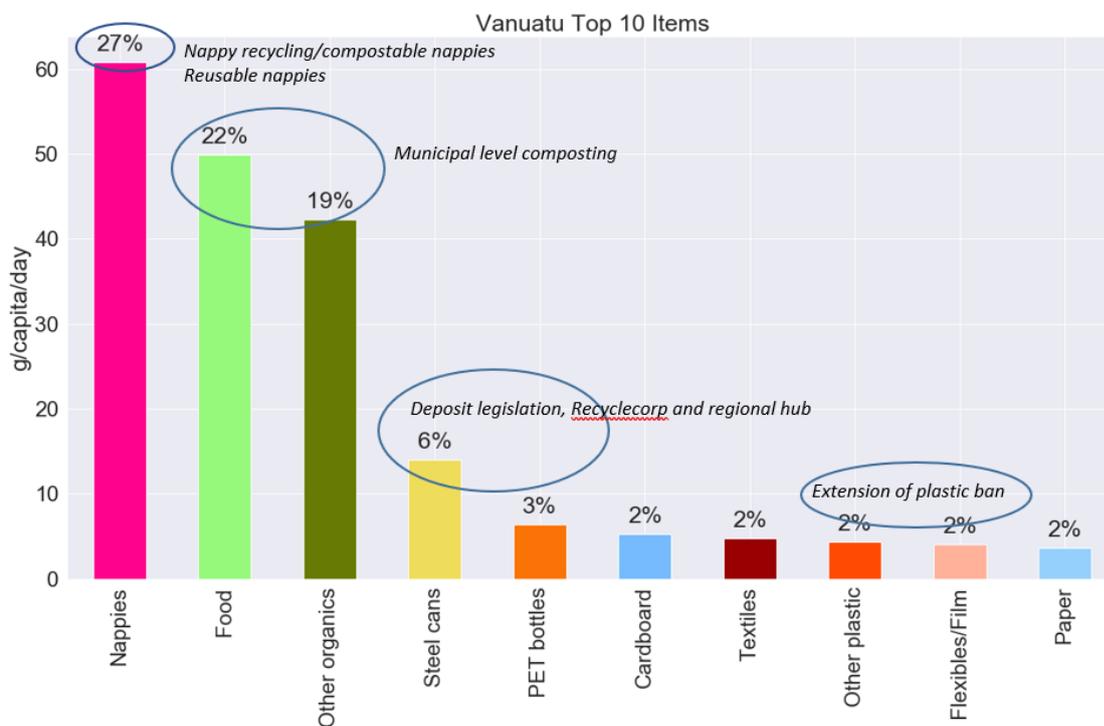


Figure 4: Vanuatu's top 10 waste items and proposed solutions

Commercial sources had comparatively more paper and e-waste and less hygiene and metal waste than household sources. Both had similar quantities of organic waste. Solutions for organic waste and containers would go some way to addressing more than 70% of commercial waste generated in both Port Vila and Luganville. Batteries, metal and e-waste, which are more common in business waste than household waste, are included in the scope of the PRIF regional hub.

3.1 Service gaps

The following gaps (Table 1) have been identified in the provision of waste management services in Vanuatu.

Table 1: Gaps in overall waste management in Vanuatu

Theme	Gaps
Policy/legislation	<ul style="list-style-type: none"> • SWM by-law has not yet been passed. PVMC has no legal basis to collect waste fees. (This is not true for LMC.) • The new solid waste management plan for PVMC has to be adopted in 2019. There is no current plan. • There is no clarity around accountability for waste management and implementation of plans both within PVMC as well as within the Department of Environment.

Theme	Gaps
	<ul style="list-style-type: none"> • There is no waste unit or team within the Department of Environment. • Provinces are lagging and there is no clear policy or plan in place around waste management. • The ban on plastic bags has led to the introduction of other materials, such as mesh bags, which pose similar (if not worse) environmental risks. • The plastic bag ban has the potential to be more extensive. • Both municipal councils and provinces need to have action plans with specific targets to work towards.
Data collection and decision making	<ul style="list-style-type: none"> • All waste data i.e. household collection and disposal as well as litter of dumping data, is collected with the help of JICA volunteers. • There is no internal capacity within local councils or provincial staff to use data for decision-making processes. Not only is there no capacity to analyse the data collected by various external organisations, the analysed data where provided is also not being utilised appropriately. • While most international waste data collection is focused on household waste management, there is no clarity on who should collect litter data and then use it to make decisions around litter reduction. • Data for incoming waste is collected at the Bouffa landfill in registers but it is not being entered into the computer or used for any decision making. • Luganville landfill records are limited to data collected by the JICA volunteer. • Most provinces don't have landfills or even managed dumping spaces. • Most islands don't have any waste disposal facilities or any accounting structure for what is happening with their waste.
Economic instruments	<ul style="list-style-type: none"> • All income from yellow bags/red bags goes to a central account. • All expenditure on solid waste management cannot be clearly accounted for in either PVMC or LMC. • The budget for solid waste management is limited. • The provinces are behind in developing economic instruments. • Although provinces are thinking about having financial mechanisms in place, it is not currently the case.
Collection services	<ul style="list-style-type: none"> • Collection services are only provided by PVMC, LMC and in LTMC. • No provinces or islands are covered by a collection service or have plans to do so. • The collection services in PVMC and LMC are also limited to the urban areas and expansion to the peri-urban areas, although required, will require substantial support.
Equipment and maintenance	<ul style="list-style-type: none"> • There is limited stock of spare parts. • Maintenance capacity is limited. • There were broken-down collection trucks in each of the municipal councils visited. • Both PVMC and LMC need more collection trucks.
Contracts and tenders	<ul style="list-style-type: none"> • Waste collection contractors are not being used by either of the councils, but this option should be explored. • Tender and contract management capacity is limited in each of the councils and the provincial governments assessed.

Theme	Gaps
Landfill design and management	<ul style="list-style-type: none"> • Lifespan of landfill is limited for Bouffa and Luganville. • Landfill is not sanitary and there was no soil cover seen in either of the landfills. • Lack of equipment at landfill for daily, weekly or monthly activities. • Heavy equipment is not available (LMC) or broken down (PVMC). • Both municipalities are dependent on hired equipment to undertake landfill activities work. • Both landfills have waste pickers of all ages and genders working in unsanitary conditions. • In both landfills, waste picker activity is not regulated or formalised.
Education and engagement	<ul style="list-style-type: none"> • There is no formal environment education/awareness programme for communities including remote islands where there is little likelihood of collection services being provided in the immediate future, although awareness activities are undertaken by both councils. Environment education is a part of school syllabus. • Waste education/awareness is missing in provinces and outer islands. • There is no co-ordination between the plethora of national and international projects being undertaken in the waste space. • There is no staff capacity within either the Department of Environment nor within councils to undertake this co-ordination. • There are no staff currently undertaking nor responsible for waste education or awareness activities.
Recycling	<ul style="list-style-type: none"> • The only recycling currently happening in Vanuatu is the result of waste-picker and scavenger activity plus the bottle buy-back scheme. • Organics are not being composted or even source-separated; 30–50% of household waste being brought to landfills is organic in nature and composting or processing of organics provides great opportunity to save on landfill space and achieve good environmental outcomes. • There has been no push for better source separation. In communities where it has been trialled, there is real disillusionment due to lack of follow-up and in some cases pick-up when the materials were separated. • 10–20% of material in households and 20–40% in commercial premises is recyclable, including plastic, paper, aluminium, etc. However, recycling capacity in Vanuatu is very limited. Shipping cost is expensive, which makes it harder to export materials for recycling.
Monitoring	<ul style="list-style-type: none"> • There is no monitoring and evaluation being undertaken for the NWMPCS nor for the local solid waste management plans. • There is no internal capacity within either the department nor local councils to do so.
Training	<ul style="list-style-type: none"> • Some local council and Ministry of Environment staff have had extensive training under the JICA, EU and other regional projects whereas others have had none. • There is a disparity between waste management capacity in councils in urban areas and staff in provinces.

3.2 Stakeholder mapping

The APWC team spent three weeks in Vanuatu to understand the current capacity of staff implementing waste management initiatives in Port Vila, Shefa Province, Sanma Province and Luganville.

Figure 5 lists and categorises the stakeholders consulted to assist in understanding the current capacity gaps and to determine the training needs to improve waste management in Vanuatu.

Please note that this list excludes port authorities and those involved in managing ship waste and medical waste. A separate report (Port Reception and Facility Review) detailing the consultation process for those managing ship waste has been provided to Cefas, as part of CLiP.

National & international agencies	Municipal council	NGOs and community groups	Provincial Government, islands & contractors
<ul style="list-style-type: none"> • Department of Environment • SPREP • JICA (JPRISM II) 	<ul style="list-style-type: none"> • PVMC waste manager • PVMC collection supervisor • PVMC landfill manager • PVMC assistant landfill manager • Chief health officer LMC • JICA volunteer LMC • Assistant Accountant LMC • Waste officer LMC • Foreman LMC • Mayor and City Clerk LMC 	<ul style="list-style-type: none"> • Green Wave Pacific • Won Smol bag • World Vision • Vanuatu Conserve • Waste Wise Consulting • RecycleCorp • Vanatu Environment and Science Society 	<ul style="list-style-type: none"> • Sanma Province enforcement officer • Chief finance officer Shefa province • Paramount Chiefs - Lelepa, Tutuba, Mavea, Ifira • Ward supritendant Ifira • CK rubbish removal • Shefa province waste contractors

Figure 5: Stakeholders consulted in Solomon Islands regarding training needs

Based on consultation, APWC notes there has been considerable effort put into training staff in the municipal councils through J-PRISM and SPREP. The list of trained personnel in each Pacific country (PIDOC – Pacific Island Database of Counterparts) is not freely available and APWC has been provided access. This list was used to choose staff to help facilitate the Vanuatu in country workshop so that they can then be promoted to in-country experts capable of providing training to their counterparts when required.

This training has had a positive impact in that the counterparts at both and national and municipal level understand where there are gaps in their understanding and capability. By contrast, counterparts at regional and provincial level have been largely left out of the loop. The situation lends itself to the

municipal councils having a higher degree of capacity and a greater proportion of trained staff, while regional and provincial staff require training in basic waste management practices.

This disparity has already been identified by JICA and SPREP and there are plans under J-PRISM II to have the previously trained local counterparts deliver in-country training to move up to the level of local experts within each country. This also encourages and builds capacity and capability within the country.

APWC proposed to split the training into two sections, both to increase capacity for previously trained staff as well as to empower local experts to train their provincial counterparts by facilitating an in-country workshop on waste management.

3.3 Training gap analysis

Each stakeholder was consulted on their current workload, capacity to deliver services, their previous training history, their history with the organisation as well as their understanding of the gaps in their training and capacity.

Nine major themes emerged, which are presented below in **Error! Reference source not found.** Figure 6. This figure is not exhaustive but rather presents the gaps identified based on the stakeholders consulted. Both, training and best practice actions undertaken by APWC were based on this gap analysis. Please note the gaps are applicable to the stakeholder groups identified under each theme.

Theme	Gaps identified
1. Basic data collection and management skills (government officials, contractors and community groups)	<ul style="list-style-type: none"> • Data collection on household waste generation and litter • Data collection from landfills and dumpsites • Understand trends in waste data • Use data collected for decision making
2. Design and implementation of waste collection systems (government officials)	<ul style="list-style-type: none"> • The option of setting up in-house vs. contracted-out model of waste collection • How to monitor effectiveness of collection systems if in-house or contracted out
3. Design and implementation of economic instruments (government officials, contractors)	<ul style="list-style-type: none"> • How to design and implement any or all of the following (include policy, by-law and legislation): • User-pays system (post-use fee collection) • Pre-paid bag system • Green fees • Bans
4. Equipment and maintenance (government officials, contractors)	<ul style="list-style-type: none"> • Acquisition of vehicles that can be used and maintained in the long term • Collection vehicles maintenance and stock management of spare parts • Landfill, heavy equipment maintenance and stock management of spare parts
5. Contracts and tenders (government officials)	<ul style="list-style-type: none"> • Design of tender processes and evaluation • Design of contracts for pre-paid bag systems, CDL, collection contracts, contracts for hire of equipment
6. Landfill design and management (government officials)	<ul style="list-style-type: none"> • Determine the next stage of landfill design or management for each country • Help staff be ready for the next stages
7. Education and engagement (government officials/NGOs)	<ul style="list-style-type: none"> • Use case studies to help staff, community groups learn about best practice for engagement
8. Waste management strategy and monitoring (government officials/NGOs)	<ul style="list-style-type: none"> • Waste strategy development and development of a monitoring framework
9. Recycling (government officials and contractors)	<ul style="list-style-type: none"> • Help recyclers find the best market for their products • Train government officials in EPR projects such as CDL

Figure 6: Training gap analysis

Based on previous training delivered by J-PRISM, SPREP, EU and other projects, APWC decided to split the training into two phases:

1. **Phase I:** Waste data collection and monitoring;
2. **Phase II:** Use of data for decision making, capacity building through technical training and collaboration with other counterparts.

In order to ensure training is not limited to staff in the major municipalities, training invitations were extended to provincial staff, delivered in part by local staff and facilitated by APWC.

The training component in Australia was delivered in conjunction with the best-practice demonstrations and is covered in the Best Practice report. Thus, this report focus's on the in-country delivered training.

According to J-PRISM II training program for 2019, Vanuatu and Solomon Islands will have training delivered on the following topics:

- Collection vehicles maintenance and stock management of spare parts (direct management);
- Other economic instruments design/development (Green fee, environment tax, etc.);
- CDL.

JICA is also promoting the setting up of a waste management association in both Vanuatu and Solomon Islands. Waste Management Association of Australia (WMAA) and Waste Contractors and Recyclers Association of NSW (WCRA) were involved in providing the training for those staff that attended the best practice showcase in Australia. This will also help create ongoing relationships between the associations from each country, as well as with WMAA and WCRA in Australia.

Keeping the above context in mind, the in-country staff were provided with a range of potential training topics to be covered. Those given most interest were highlighted during the three-day training workshop in Luganville from 20–22 February 2019.

4 In-country training – Phase I

During the scoping visit in November 2018, APWC was able to train a number of staff from Port Vila Municipal Council (PVMC) and Luganville Municipal Council (LMC) in data collection and auditing (including paperwork and staff interviews) in each of the locations visited. This section provides details on the training conducted during Phase I of the project – data collection in the field.



Image 1: Lyonel Tari conducting household interviews under supervision

4.1 Training delivered

Error! Reference source not found. Figure 7 below presents the

staff trained as well as the training already provided. Berry Mahau was also released by the city clerk of PVMC to accompany the APWC team to Solomon Islands to help support south-to-south relationships with staff from Solomon Islands.

APWC engaged local council staff in the process of developing the protocol for the waste audits, undertaking collections, sorting of waste, recording the observations as well as inputting data for analysis. The staff also assisted APWC staff in undertaking interviews. The various steps are described below:

4.1.1 Developing a protocol:

The principles of the waste audit were explained PVMC and LMC staff and they were asked to provide information around the following:

- a) Collection routes;
- b) Number of collection vehicles;
- c) Collection methodology;
- d) The availability of sort site;
- e) The availability of sorting containers;
- f) Their understanding of the waste audit process.

APWC acknowledges that due to J-PRISM's waste auditing process most local council staff were aware of the requirements and principles behind waste auditing. APWC staff used this existing foundation in explaining the process required for the methodology to be used, utilising the council staff's experience to co-design the on-ground operations for the audit.



Image 2: Developing a protocol and briefing LMC staff on participation

4.1.2 Waste collection and interviews

Council staff accompanied APWC’s collection supervisor over the course of all collections to familiarise themselves with the processes and methods used to collect and record data using the data collection sheets and selecting the geo-location of collection sites.

An interview was conducted with each household participating in the waste collection audit to assist in understanding and analysing waste disposal behaviour.



Image 3: APWC staff supervising the interview process

4.1.3 Waste sorting

Staff from both PVMC and LMC were trained to undertake sorting of waste to the high-level categories used by APWC as well as the CDS sorting categories.

The APWC sorting supervisor undertook a three-hour toolbox talk with the local council staff, in which the following was covered:

- the waste audit code of conduct,
- the required outcomes from the audit
- the work, health and safety considerations during the audit process.

All sorting activities were undertaken with local council staff, under the supervision of the APWC sorting supervisor.

Further, staff were trained in completing all required paperwork based on the sorting process, which is then usually transcribed into an Excel database for analysis.



Image 4: Local staff undertaking training on sorting and paperwork

Overall, eight staff members were trained across Vanuatu in undertaking sample collection, sorting, recording information and conversion to Excel database. Details of staff trained are provided in Figure 7.

Staff trained	Topics of training
<ul style="list-style-type: none"> • Port Vila staff trained <ul style="list-style-type: none"> • Berry Mahau • Lynol Tari • Kalo Mark • Luganville staff trained <ul style="list-style-type: none"> • Ikuko Yamazaki • Jimmy Avock • Leonard Tambe • Naomi Povet • Ray Vilvil 	<ul style="list-style-type: none"> • Topics covered are below: <ul style="list-style-type: none"> • Collection of samples and completing corresponding paperwork • Sorting of garbage and recycling • Identification of materials to 40 categories • Recording information • Conducting stakeholder interviews <ul style="list-style-type: none"> • Households • Commercial premises • Litter audits

Figure 8-7: Staff trained in-country for Vanuatu

5 In-country training – Phase II

Following the in-country training undertaken in November 2018, APWC was able to refine and develop Phase II of the country-specific training to focus on closing the gaps in service and supporting waste management strategies that would lead to the greatest improvements.

Attendees from Port Vila Municipal Council (PVMC) travelled to Luganville for three days of training and direct experience of the local initiatives implemented by Luganville Municipal Council (LMC). Representatives attending the training are provided in [Figure 9](#) ~~Figure 8~~.

Luganville Municipal Council	Port Vila Municipal Council	Department of Environment and Provinces
<ul style="list-style-type: none"> • Trevor Lenka – Assistant Planning Officer • Johnny Vavangele - Youth Office • Armel Sairus – Council waste collector • Jimmy Avock - Composting officer • Simon Frank - Council waste collector • Roger Isom – Council waste officer • Allan Felton - Council Waste Truck driver • Ikuko Yamazaki - JICA volunteer • Ray Vilvil - Waste Manager • Robinson Toka - Town Clerk • Othniel Bule - Planning Officer 	<ul style="list-style-type: none"> • Aromalo Rex – Collection supervisor (Manages 59 staff) • Berry George - Assistant Landfill Manager (Bouffa) • Andrew Mark - Landfill Manager (Bouffa) 	<ul style="list-style-type: none"> • Anaclet Philip - Sanma Environment Officer • Rontextar Mogregor - Department of Environment

Figure 9: Attendees of Phase II training

Although waste management strategies and action plans have been developed in both Port Vila and Luganville municipalities, the progress made by each municipality differs substantially.

Based on APWC’s scoping visit in November 2018, it was noted that LMC has made considerable progress in undertaking a number of waste management initiatives, both at the landfill as well as generally in collection, source separation and community education. In November, extensive data was also collected by APWC on the waste management practices on both islands of Efate and Santo. The results of this data are reported in the APWC Waste Data report for Vanuatu.

As a consequence, a three-day workshop was designed to showcase the activities being undertaken by LMC. This included the presentation of collected data to the relevant stakeholders and encouragement to improve collaboration and communication between the two municipalities facing similar challenges in Vanuatu.

5.1 Objectives of the Workshop:

The main objectives of the workshop were:

- Enhancing the understanding of waste data; using data to make decisions; and undertaking ongoing data collection activities to help achieve better waste management outcomes;
- Improved co-ordination and communication between the two municipal councils;
- Supporting the development of local waste management specialists and experts for sustainable provision of the needed waste management technical advice and assistance to governments and the people of Vanuatu; and
- Enhancing technical capacity of waste management staff to meet the needs of future planned activities such as CDL.

5.1.1 Enhancing the understanding of waste data; using data to make decisions; and undertaking ongoing data collection activities to help achieve better waste management outcomes

During the November 2018 visit by APWC, waste audit data was collected from both Port Vila and Luganville. This data was collected with the help of staff from PVMC and LMC. After further training at the workshop, the staff trained in November were able to use the templates provided to undertake ongoing data collection. Staff were provided with a data collection toolkit including templates, and corresponding Excel sheets and demonstrated data entry and analysis processes to ensure that ongoing data collection is undertaken as part of municipal operations. This increased capacity within the municipalities allows for implementation of future in house studies.

Based on the data collected by APWC and presented in the Waste data report for Vanuatu, it was noted that organic waste is a material of concern for Vanuatu. The focus for the first day of the workshop was on the activities undertaken by Luganville in the implementation of strategies for organics management, leading to increasing available space in landfills and therefore better management of plastics and other harmful materials. The details of all LMC initiatives discussed are provided in section 5.4.

5.1.2 Improved co-ordination and communication between the two municipal councils

Through this workshop, the Ministry of Environment and PVMC were able to establish contacts with the participating staff and workers from LMC and the regional co-ordinator for the Department of Environment, who are responsible for implementing a range of initiatives in waste management including:

- a) Detailed data collection at landfill;
- b) Maintenance and management of waste trucks;
- c) Organics separation and processing from markets;
- d) Community-scale composting and sale of prepared compost at the markets;

- e) Use of cardboard to make briquettes for fuel;
- f) Signage and separation of materials dumped on the landfill sites;
- g) Community outreach activities and local education materials.

Budgets and well as bilateral waste management projects were discussed. Other discussion topics included a co-ordinated approach to the implementation of the plastic ban as well as marine litter issues such as illegal dumping in waterways.

5.1.3 Supporting the development of local waste management specialists and experts for sustainable provision of the needed waste management technical advice and assistance to governments and the people of Vanuatu.

Supporting the regional staff skills development approach promoted by SPREP and J-PRISM II, this workshop was led and partially delivered by Ray Vilvil and his waste management team from Luganville Municipal council with support from APWC.

Ray Vilvil is listed as the result regional local waste specialist and expert in the Pacific Islands Database Of Counterparts (PIDOC) administered by SPREP. The outcome of this workshop has been provided to JICA for reviewing and updating of the current rating status of the involved local waste experts in the SPREP and JICA PIDOC. APWC will update Cefas. Ray Vilvil has been identified as a local expert in PIDOC. This is important in building and enhancing these local waste experts for future recognition in similar waste management programmes in Vanuatu as well as in the other PICs if their expertise is needed and requested.

5.1.4 Enhancing technical capacity of waste management staff to meet the needs of future planned activities such as CDL

The workshop had an emphasis on deposit legislation on the final day. The various models currently under development or being implemented in various PICs were discussed in detail at the workshop to help staff understand the impacts of such legislation on the current systems in place. As a result of the workshop, a greater understanding of the way the CDL works, as well as the best way to implement it in the future, was developed through discussions among the participants.

5.2 Key Outcomes

5.2.1 Draft list of initiatives for the PVMC staff and future collaborations between PVMC, LMC and Department of Environment

The participating staff and officials from PVMC are preparing a presentation based on their experiences from LMC and presenting it to PVMC to gain approval to initiate some of the activities they were instructed in during their training at Luganville.

The first step is the construction of a compost enclosure at the Bouffa landfill in Port Vila and continued engagement with their counterparts by bringing the composting expert at LMC to assist with the development of a protocol to make compost at PVMC. The exact time of this exchange has not been organised at the time of writing of this report.

PVMC staff were also able to receive educational material from the LMC staff regarding household segregation of waste, why not to burn waste, household composting and appropriate disposal. A copy of this material shared is provided in Appendix A. The template for collecting relevant data from the landfill for all entering vehicles was also shared.

5.2.2 Improved Future Communication and Collaboration between the Ministry of Environment and the municipalities

The workshop brought together all key staff and officials responsible for waste management in different municipalities and levels of government. It is hoped that this will form the basis of future communication and collaboration between the Ministry of Environment and the municipalities. With existing waste management plans at the municipal and council levels, this can become a sound platform to foster co-operation between officials and staff to monitor progress with the implementation of their waste management initiatives, share their challenges and successes and to plan their next set of initiatives. Regular gatherings (once or a year twice) will improve future communication and collaboration between the Ministry of Environment and the municipalities. This will contribute in the improvement of the implementation of the waste management strategies in the municipalities as well as achieving the targets and reporting for the national waste management strategy. APWC made this recommendation to both PVMC and LMC town Clarks at the time of our visit in February 2019.

5.2.3 Supporting the development of Local Waste Experts and specialists skills and experiences in Vanuatu

This opportunity to come together for a waste management workshop like the one described in this report is important for the local staff and officials to demonstrate their skills and experiences. As full-time government employees, many do not have the opportunity to demonstrate and display their full capacity in the implementation of different waste management tasks. The ability to understand and develop a skill base in data development policy and contribute to the development of initiatives that will impact on their functions in the future allows them to have greater ownership of the process.

5.3 Programme

Table 2 outlines the training programme delivered to the delegates attending Phase II.

Table 2: Training programme – Phase II Vanuatu

DAY 1: 20 February 2019		
2:00pm	Arrival and registration	Luganville Municipal Council
2:30-4:30pm	SITE VISIT to Luganville Municipal Council markets and landfill site <ul style="list-style-type: none"> • Green waste composting from markets • Small-scale composting at the markets • Large-scale composting at the landfill Cardboard at the landfill	
4:30-5:30pm	Presentation on Composting	Ray Vilvil
DAY 2: 21 February 2019		
Public Holiday	Luganville Municipal Council staff volunteered to share outreach examples to Port Vila Municipal Council staff, focusing on home composting	Island of Tutuba
DAY 3: 22 February 2019		
8:30am	Prayer	Aromalo Ruber
8:45am	Welcome to Luganville	
9:15-10:30am	Waste audit data from Port Vila, Shefa and Luganville	Amardeep Wander (APWC)
10:30-11am	Questions and discussion	
11-12:30pm	Examples of best-practice actions undertaken by Luganville Municipal Council	Ray Vilvil
12:30-2pm	Lunch	
2-3:00pm	Deposit legislation around the Pacific	Amardeep Wander
3-3:30pm	Workshop – design of deposit scheme in Vanuatu	All participants
3:30pm	Presentation of certificates and future steps	Lord Mayor – LMC
4:00pm	Close	

5.4 Summary of the Phase II training experience

5.4.1 Day 1: Field visits – LMC waste management initiatives

LMC has a variety of current waste management initiatives underway. Day 1 of the workshop started with a visit to Luganville landfill. The initiatives demonstrated included:

- a) Detailed data collection at landfill;
- b) Organics separation and processing from markets;
- c) Community-scale composting and sale of prepared compost at the markets;
- d) Use of cardboard to make briquettes for fuel;
- e) Signage and separation of materials dumped on the landfill sites.



Image 5: Appropriate signage used at the Luganville landfill

During the afternoon session, workshop attendees from the Ministry of Environment and PVMC learned about data-collection activities at Luganville. The templates for the data collection were then made available to the PVMC staff for implementation and consistent data collection across municipalities.



Image 6: Luganville Municipal Council large-scale organics trail explained by Ray Vilvil



Image 7: Ray Vilvil and Jimmy Avock explaining the process of making small-scale compost and selling the final product



Image 8: LMC’s small-scale briquette-making machine and briquettes made from cardboard and coconut husk

During the field visits (as shown in Image 6, 7 and 8), LMC staff explained the segregation of organics from the six markets in LMC to help reduce the total volume of organic matter going to landfill. Jimmy Avock demonstrated the use of a shredder to undertake smaller scale composting that is then sold to the community for \$50 VT for a 2-kilogram bag.

LMC staff also demonstrated the use of a simple device made by the staff to create briquettes from cardboard. The income generated from the sale of compost and the briquettes led to extensive discussions between counterparts. PVMC staff noted they were provided with a shredder to dispose of waste after Cyclone Pam and that there was a possibility it could be used for composting operations at Bouffa.

After the site visits, Ray Vilvil provided a 30-minute overview of the basic principles followed by staff at LMC follow while managing their composting operations.

5.4.2 Day 2: Outreach activities undertaken by LMC

LMC has developed an education strategy and educational resources in Bislama. These resources are distributed door to door as well as through community-based educational activities. These activities are also conducted in outer islands.

The workshop was held on 20 and 22 February (21 February is Walter Lene day, a public holiday). However, during discussions with the workshop participants, it was also noted that the public holiday presented an excellent opportunity to undertake some community engagement activities because most residents would be at home.

Therefore, the group visited the island of Tutuba and provided resources and discussed community concerns around waste disposal with three distinct groups on the island. The PVMC staff and the Ministry of Environment participants were highly engaged throughout the process and even provided examples from the urban context to the community members. The community has since requested LMC to help them install a community composting facility on the island, which is now being considered.



Image 9: Community engagement and outreach activities during the workshop



Image 10: Community engagement at Tutuba

The engagement activities at Tutuba resulted in approximately 45 sets of brochures being provided to the community dealing with source separation, the appropriate disposal of sanitary waste and composting. See appendix A.

The pastor and the village chief were also consulted. Both have requested the LMC staff to continue their visits and undertake hands-on compost training as a next step to help achieve better waste management outcomes for the community. LMC plans to follow-up in each community but the exact times will be determined as part of the work planning for LMC waste management staff.

5.4.3 Day 3: Waste data, legislation and training

Day 3 of the workshop focussed on three main topics:

- a) Presentation of data from sea-based and land-based sources to the councils and Ministry of Environment staff
- b) Undertaking hands-on training to help council staff undertake simple data entry and analysis
- c) Workshopping deposit legislation ideas

Day 3 started at 8.30 with an introduction to the PVMC team and Ministry of Environment staff to LMC council field staff. Lively discussion took place as the field staff from the two councils discussed the daily challenges faced by the two municipalities around collection, source separation and disposal behaviours. It was noted that LMC requires all commercial premises to separate cardboard, which is then collected separately. A trial is currently underway to convert this cardboard into briquettes to be sold at the markets, which would then generate another revenue stream for LMC.

PVMC staff expressed a desire to learn from their colleagues and start a similar initiative at Port Vila.



Image 11: LMC's town clerk Mr Robinson Toka officially welcoming workshop delegates

The workshop officially started at 9.30am with a prayer by the town clerk, Mr Robinson Toka. This was followed by formal introductions and an official welcome was extended to PVMC colleagues and Ministry of Environment delegates by LMC's mayor, Mr Onen Gaviga.

Following the introductions and welcome, land and sea-based data collected during APWC's visit in November was presented to the delegates by APWC's Amardeep Wander. The presentation raised many questions regarding better management of specific waste types as well as how to deal with the extension of the plastics ban announced by the Vanuatu government on 20 February 2019.

A short break was taken during which the staff from both PVMC and LMC were shown the data entry and analysis process. Templates for waste data collection and processing were provided to all participants.

After the presentation of data by Amardeep Wander (APWC), Ray Vilvil presented an overview of all of LMC’s waste management initiatives, emphasising those not covered during the site visits on day 1 of the workshop. Some highlights included:

- a) Introduction of a bulky waste collection scheme by LMC;
- b) Installation of aluminium can collection cages by LMC;
- c) Installation of 240L MGBs around Luganville main markets for disposal of nappies (diapers) and plastic wastes to reduce contamination of plastic waste;
- d) Diversification of income for the waste department through the sale of compost, briquettes and fines for illegal dumping;
- e) Printer and toner cartridge recycling scheme in collaboration with PDL Shipping and Croxley Recycling in New Zealand;
- f) Cardboard recycling from commercial premises;
- g) Luganville school’s education project that includes school’s clean-up and incorporation of waste education into the curriculum.



Image 13: Cardboard stored separately at Luganville landfill fenced in using old pallets. This fence succumbed to a fire in late 2018 and is now being reconstructed

There was great interest from the PVMC staff around a number of initiatives. The need for more collaboration among municipalities to foster the exchange of ideas and information was enthusiastically encouraged.



Image 14: Ray Vilvil presenting Luganville Municipal Councils waste management initiatives overview to the workshop delegates

After lunch, the delegates reconvened to discuss deposit legislation. Amardeep Wander presented a number of CDS options being proposed or in progress in various PICs. This led to discussions around how such a scheme would work in Vanuatu and what changes would be experienced by the staff currently managing waste streams. There was overwhelming support for deposit legislation among the workshop attendees and many expressed a desire to participate in the developmental stages. JICA has engaged a consultant to undertake a pre-feasibility study for deposit legislation in Vanuatu. Therefore, the names of those who would like to participate in development of legislation have been communicated to J-PRISM.

The workshop closed at 3.30pm with the presentation of certificates by Mayor Robinson Toka. The overwhelming feedback from the workshop has been a desire to continue the collaboration through the first PVMC staff visit since 2008 and to have a follow-up meeting later in the year to discuss progress on various initiatives both in Luganville and Port Vila. It was suggested that the collaboration meeting should become a part of the regular council events calendar. However, achieving this could be challenging due to lack of available funds.



Image 15: Workshop participants with certificates

6 Lessons learned

6.1 Staff participation

About ten staff from Port Vila and Shefa province were invited to attend the workshop in Luganville. However, only four were able to attend due to other engagements as well as family and health issues in some cases. We believe that it is important to have a longer engagement period of more than three months before confirming delegate participation to ensure that the best outcomes can be achieved for each of the workshops.

6.2 Ongoing support

The workshop brought together staff from PVMC and LMC to collaborate and learn from each other for the first time since 2008. Participants agreed that a workshop of this nature could become a successful platform for bringing together officials and staff to monitor their progress in relation to implementation of waste management strategies, the challenges and successes of these initiatives, and also to share and plan future initiatives. Such regular gatherings (once or twice a year) will improve future communication and collaboration between the Ministry of Environment and the municipalities.

6.3 Nation-specific examples

One of the most interesting aspects for workshop participants was to see initiatives being implemented in-country using low-tech, local solutions. This was a great staff motivator for other municipalities and the Ministry of Environment as they could witness the scope of initiatives achievable through appropriate allocation of funds, human resources provision and the encouragement of staff initiative. APWC believes that collaboration between municipalities and provinces within Vanuatu offers the best outcomes for motivating local government staff to implement better waste management initiatives.

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Appendices

Appendix A: Education pamphlets in Bislama produced by LMC

Wanem ia hemi Kompos?

Kompos hemi wan prodak we yumi mixim ol material we oli save roten mo kam long fom blong kraon.

Yu save mixim wetem kraon blong mekem se kraon hemi rich long kakae blong ol plants.

Taem we yu plan long hem bae ol plants blong yu bae oli kro kut.

Wanem nao yu nidim blong mekem Kompos?

- *Ol krin materioli
- *Ol braon materioli
- *Toti blong kijin
- *Wota
- *Shovel
- *Kontena(cadbod)
- *kaliko o niuspepa



Luganville Municipality
Waste Management office
Waste Management Officer
Leonard Lolo
5311341 / lolotambe2013@gmail.com

Hao blo mekem kompost lo kontena



HAO BLO MEKEM KOMPOST

1. Katkatem ol krin mo braon materi ol mo toti blong Kijin I smolsmol afta putum insaed long Kontena.(ratio 1:1:1)
2. Mixim kut wetem smol wota.
 - ⇒Taem we yu katkatem kut toti blong yu bae I save rotten kwik taem
 - ⇒Taem we wota blong hem bae I ron aot kut long Kontena ba hemi kipim wan kut moisja level long 40-60%



★Yu mas luk se moisja [wota] blong hemi no mas hae tumas spos no bae kompos I no save brok daon mo I save kivim aot smel



3. Kavaremap ol materi ol we yu bin katkatem.
 - ⇒Kavaremap ol toti blong kijin wetem ol krin mo braon materi ol koko yu no mo save luk toti blong kijin.
 - ⇒Afta kavaremap wetem Nius pepa or kaliko blong mekem I wom mo kipim ol insek aot.
4. Mixim wantaem long wan dei.

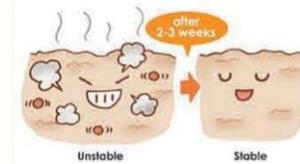
⇒Yu mas stiaem kut wan taem long wan dei. Mekem sem fasin evritaem yu putum wan niu toti kasem taem we Kontena I fulap.

★Spos stim hemi kamaot lomg hem taem we yu stap tanem hemi minim se kompos blong yu I laef, hemi stap brok daon long wan tempreja blong 40-50°C



5. Plesem kompos Kontena long wan ples we AIR hemi flo kut

⇒Taem we Kompos hemi fulap, yu save karemaot blong luk se spos I drae tumas adem sam wota blong mekem. Livim kompos I redi kut bifo yu save usim(kasem 2wek).



Notis

Kompos blong yu save tekem long taem blong I redi spos tempreja hemi low. Long kes ia, yu save resemap long tufala fasin ia.

*Adem sawdust mo mixim

*Fulmap hot wota long wan Bet botel mo kavsatemala long Kontena kompos.

Kompot I gud lo
wanem??

*Add nutrient lo
vegetable mo fruit

*Mekem gud lo kraon
qualiti

*Savem mani blo
pem fertiliza

*Preventem kraon
mekem drae

*Preventem small
bebet

Luganville Municipality
Waste Management office
Mon-Fri 8:00-11:30 13:00-16:30
Waste Management Officer
Leonard Lolo
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HAO BLO USUM KOMPOST





HAO BLO USUM KOMPOST

A: PLANEM SID WE I NO KRO YET.

U save fulumap kraon long wan pot plant mo mixim wetem Kompost . Afta u save planem wanem we yu wantem planem.

B: PLANEM OL PLANTS WE I KAMAOT LONG NURSERY.

Ol plants we I kamaot long nursery hemi kut tu from ruts blong hem I save holem taet kompost taem yu planem long pot plant. U save putum smol kompsot bakeken afta planem sid.

C: TAEM OL PLANT OLI KRO FINIS.

Taem we plant blong yu I kro finis u save karem sam kompost mo putum raon long stampa blong hem.

Kompost I gud lo evri samthing.

D: LONG TOP LONG KRAON.

Taem we ol plants blong yu oli kro finis yu save sakem tu long top long kraon insaed long karen. Taem we I ren bae I washem ol niutrens we I stap long kompost I ko long ruts system blong ol plants.

E: MIXIM WETEM KRAON TAEM WE YU DIKIM KRAON.

Taem we yu stap dikim graon blong palnem ol plants blong yu, u save mixim kraon we yu dikim wetem kompost. Hemia hemi kut long clay mo sandy kraon.[Kraon we ino rich]

F: PLANEM OL PLANTS DAEREKLY LONG KOMPOST.

I kat sam plants olsem tomato mo Pumkin we yumi save planem daretli long kompost. So taem kompost blong yu I redi yu save planem I ko long kompost nomo.

Yu save pem gudfala kompost blo municipal lo center market
2kg=100Vt

Trae usum wantaem



HAO BLONG USUM KOMPOST

A, PLANEM SID WE I NO KRO YET.

U save fulumap kraon long wan pot plant mo mixim wetem Kompost . Afta u save planem wanem we yu wantem planem.

B, PLANEM OL PLANTS WE I KAMAOT LONG NURSERY.

Ol plants we I kamaot long nursery hemi kut tu from ruts blong hem I save holem taet kompos taem yu planem long pot plant. U save putum smol kompsot bakeken afta planem sid.

C, TAEM OL PLANT OLI KRO FINIS.

Taem we plant blong yu I kro finis u save karem sam compost mo putum raon long stampa blong hem.

D, LONG TOP LONG KRAON.

Taem we ol plants blong yu oli kro fini yu save sakem tu long top long kraon insaed long karen. Taem we I ren bae I washem ol niutrens we I stap long kompos I ko long ruts system blong ol plants.

E, MIXIM WETEM KRAON TAEM WE YU DIKIM KRAON.

em we yu stap dikim graon blong palnem ol plants blong yu, u save mixim kraon we yu dikim wetem kompos. Hemia hemi kut long clay mo sandy kraon.[Kraon we ino rich]

F, PLANEM OL PLANTS DAEREKLY LONG KOMPOS.

I kat sam plants osem tomato mo Pumkin we yumi save planem daretli long kompos. So taem kompos blong yu I redi yu save planem I ko long kompos nomo.





About us

The Centre for Environment, Fisheries and Aquaculture Science is the UK's leading and most diverse centre for applied marine and freshwater science.

We advise UK government and private sector customers on the environmental impact of their policies, programmes and activities through our scientific evidence and impartial expert advice.

Our environmental monitoring and assessment programmes are fundamental to the sustainable development of marine and freshwater industries.

Through the application of our science and technology, we play a major role in growing the marine and freshwater economy, creating jobs, and safeguarding public health and the health of our seas and aquatic resources

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INVESTOR IN PEOPLE

Our customer base and partnerships are broad, spanning Government, public and private sectors, academia, non-governmental organisations (NGOs), at home and internationally.

We work with:

- a wide range of UK Government departments and agencies, including Department for the Environment Food and Rural Affairs (Defra) and Department for Energy and Climate Change (DECC), Natural Resources Wales, Scotland, Northern Ireland and governments overseas.
- industries across a range of sectors including offshore renewable energy, oil and gas emergency response, marine surveying, fishing and aquaculture.
- other scientists from research councils, universities and EU research programmes.
- NGOs interested in marine and freshwater.
- local communities and voluntary groups, active in protecting the coastal, marine and freshwater environments.

www.CEFAS.co.uk

Customer focus

We offer a range of multidisciplinary bespoke scientific programmes covering a range of sectors, both public and private. Our broad capability covers shelf sea dynamics, climate effects on the aquatic environment, ecosystems and food security. We are growing our business in overseas markets, with a particular emphasis on Kuwait and the Middle East.

