7.2 Kiribati

7.2.1 Clean School Program report

a. Clean School Program report 2014

ENVIRONMENT AND CONSERVATION DIVISION

[ECD]

Phone: (686) 28593/2800 Fax: (686) 28425

ECD vision: *Improving the quality and sustainability of the fragile atoll environment of the Republic of Kiribati through conservation and management*

J-Prism Clean School Program Competition 2014

Judging Team : 1. ECD – Environment Outreach Unit	**Date of Judging:** 2nd – 3rd December 2014 **Reporting Officer:** Robite Teaete **Supporting Officer:**
+Transport for Judges provided by: Ministry of Environment, Lands and Agricultural Development	**Participating schools:** Temwanoku & Tebwanimwaneka Primary School

i. Summary

Clean school program was part of J-Prism initiatives funded by JICA and implemented by MELAD through ECD – Environment Outreach Unit with the supports from relevant stakeholders such as Agriculture, BTC and TUC.

The main purpose of this Clean School program is to introduce the 3R (Reduce, Reuse & Recycle) concepts to the schools at primary level on Tarawa with the following objectives:

- To give the opportunity for schools to practice proper waste management
- To target children in creating awareness on the concept of waste minimization at schools, home and communities

The expected outcomes of this program still remain the same from the previous year which is focused on the following;

- For the school children to enhance their understanding on the 3R concept system
- For the schools to establish their own compost using organic wastes for their own school garden
- To encourage schools to establish their own 'Kaoki Mange' by making use of recyclable wastes (cans, bet bottles, etc)
- To encourage children to stop littering at the school compounds

Based on the 3 components, the schools have done or carried out their own activities according to their action plan submitted to ECD after the teachers' workshop held in September 2012. At first, the number of participating schools is 4 and these schools are the ones submitted their action plan. Due to some reasons, the other two schools which are; Abaunamou and Tabontemaneaba did not complete the program for some reasons/issues as well as other important school commitments which make them unable to continue on with the program.

During the start of the program, there have been number of school visits done by ECD to monitor the progress of the activities undertaken within each of the schools. The school visits form part of the program in which the schools requested ECD to deliver presentations on some of the components of the program. The final monitoring of activities was done at the end of November 2014, where it finally shows that Temwanoku and Abaunamou Primary school are the only 2 schools participate in the competition.

1

Overall, there have been great efforts done by the schools towards the end of November 2014 regardless of the challenges they faced due to lack of resources needed by the schools to maintain their activities. Final judging was done in December 2nd – 3rd, one week after the final monitoring in order for the schools to get enough time to do more preparation before the judging.

ii. Results and Findings

Below are the findings collected and compiled as of the final judging done by Agriculture, BTC, TUC and ECD which is coordinating the program. The judging criteria based on how have been the 3 major components on Environmental Awareness raising, School compost, Waste separation & Recycling achieved followings:

a) Environmental impacts – whether the practice improves waste minimization or proper disposal of waste at school
b) School and community involvements – this focuses on engagement and participation of students, teachers, school administrators, parents and communities
c) Sustainability – the continuity of the practice or its impact
d) Management workability – that is the workability of the 3R (Environment) committee. Communication is effective between the communities and the rest of school, initiative taken for implementing the practice, etc
e) Originality – creativity and uniqueness of ideas shown for attracting students and keeping interest of all teachers.

Scoring results based on the above criteria.

Table 1.1

School	Temwanoku Primary School	
Division 1: Environmental Awareness Raising	**Score**	
	1. Environmental Impact	6/10
	2. School & Community Involvement	5/10
	3. Sustainability	6/10
	4. Management workability	3/5
	5. Originality	4/5
	Sub-total	**24/40**
Division 2: School Composting	**Score**	
	1. Environmental Impact	6/10
	2. School & Community involvement	3/5
	3. Sustainability	3/5
	4. Management workability	3/5
	5. Originality	4/5
	Sub-total	**19/30**
Division 3: Rubbish Separation and Recycling	**Score**	
	1. Environmental Impact	6/10
	2. School & Community involvement	3/5
	3. Sustainability	3/5
	4. Management workability	3/5
	5. Originality	3/5
	Sub-total	**18/30**

2

Table 1.2

School	Tebwanimwaneka Primary School	
Division 1: Environmental Awareness Raising	**Score**	
	1. Environmental Impact	7/10
	2. School & Community Involvement	8/10
	3. Sustainability	5/10
	4. Management workability	3/5
	5. Originality	4/5
	Sub-total	**27/40**
Division 2: School Composting	**Score**	
	1. Environmental Impact	9/10
	2. School & Community involvement	3/5
	3. Sustainability	3/5
	4. Management workability	3/5
	5. Originality	4/5
	Sub-total	**22/30**
Division 3: Rubbish Separation and Recycling	**Score**	
	1. Environmental Impact	5/10
	2. School & Community involvement	3/5
	3. Sustainability	2/5
	4. Management workability	3/5
	5. Originality	3/5
	Sub-total	**16/30**

Images:
Temanoku Primary School initiatives – Environmental Awareness Raising

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School compost:

Waste Separation & Recycling

Images for Tebwanimwaneka Primary School initiatives

Environmental Awareness Raising

4


Waste Separation and Recycling:



School Compost:



5

1. Discussion

The results shown in the above tables clearly show the final scoring of each school with respect to the three components of clean school program and the five criteria. This year the two schools have just started implementing few number of activities in July and the result of such activities somehow are not sustainably managed by the schools. Towards the end of the year, some of the activities have been continued with ongoing support from JICA and ECD. All three components of the program were implemented by the two participating schools such as Environmental awareness raising, School compost making, Waste Separation and Recycling. Based on these 3 components, each school had come up with their own initiatives and creativity regarding the 3 major components of the program which are very successful towards the end of the year but still need further improvements. The final judging was done based on the existing criteria and as well as through a thorough observation of the overall impacts of the program within each school. Referring to the two tables showing the results, it is clear that the winning school for this year's competition goes to the Tebwanimwaneka Primary school. The final judging was based on the overall impacts of clean school on the environment as well as the active involvement of the students, teachers and the parents.

Below are some of the issues encountered during the implementation of the program both by the schools and the project itself and need to be improved in the future. Such issues are more related to the 3 major components of clean school competition focus on Solid Waste Minimization.

1. Environmental Impacts – maintaining cleanliness of the school compounds is another issue found that is common to the two schools. School compounds need to be maintained clean at all times by encouraging students not to throw rubbish in the school compound so that there

2. Issue of Sustainability – the recurring issue/problem to do with implementation of the activities by the schools is related with management workability and sustainability which are a bit slack and need more improvement in order to achieve a better result of the activity. The schools need to practice a more sustainable way of reusing their rubbish in order to maintain a clean school environment

3. Transport availability – the issue with transport can sometimes affects the program especially during school visits. For ECD as an implementer of most of the activities, there are critical times where transport is not available and so school visits and monitoring are difficult to organize due to this problem.

4. Funding – the participating schools can sometimes loose interest in the program due to the lack of funding to support their activities. This happens at beginning of the program where they enquire for funding support which is not really encouraged for such except ongoing technical support to be provided in support of the school activities.

5. Insufficient human resource – since this is an extra task for Environment Outreach Unit, it is very hard to deliver the activities effectively and efficiently as expected. There are other tasks need to be accomplished as part of the unit normal routines so it is very crucial to have one particular officer to assist with the project implementation in order to achieve the best outcome in the end.

Conclusion & Recomencation

Overall, the implementation of clean school program on South Tarawa for this year is very successful even that there are still some challenges faced by the schools due with loads of tasks and commitments within their schools . It demonstrated a very good environmental friendly initiative that is being practiced by younger children with the supports from teachers and parents, students' relatives and from the community

6

as well. At the same time students at this level have gained more knowledge and understanding on how to take care of their environment through minimizing wastes problems starting from their school and to be able to apply this at their home and their communities. Students have learnt basic ideas on how to manage their wastes based on the three important components of the program which are have now completely implemented for the year 2014.

Despite the successful implementation of the program, the schools need to improve further on some areas regarding proper waste management to achieve better results in the end. The final judging shows very good results from all those participated including Aratokotoko which has won this year's competition. It is anticipated that the program will continue for next year with more support to be provided from ECD and partners including JICA.

Recommendations

In order to address the recurring issues, the following are considered as recommendations:

1) ECD to further work collaboratively with partners like Agriculture, IUC and BTC to help raise awareness to children and the teachers on activities related with proper waste management initiatives.
2) Schools to be provided with materials or tools to further support their activities like seedlings, cleaning tools like rakes, wheel barrow, etc
3) JICA to consider providing awards/prizes which can be more attractive to the schools and also to help sustain the schools' initiatives as part of the program.
4) JICA to provide support to ECD on transportation, awareness tools and the relevant tools for the schools that they need for their activities.

7

b. Clean School Program report 2015

ENVIRONMENT AND CONSERVATION DIVISION
[ECD]

Phone: (686) 28593/2800 Fax: (686) 28425

ECD vision: *Improving the quality and sustainability of the fragile atoll environment of the Republic of Kiribati through conservation and management*

Final report for J-Prism Clean School Program Competition 2015

Judging Team : *ECD – Environment Outreach Unit – Robite Teaete* *TUC – Harry Langley* *Kaiea – Not Available*	*Date of Judging: 3rd December 2015* *Reporting Officer: Robite Teaete* *Supporting Officer: Harry Langley*
Transport for Judges provided by: TUC	*Participating schools: Bareaumai, War Memorial, Abaunamou, Tebwanimwaneka, St John, Temwanoku*

i. Summary

Clean school program was part of J-Prism initiatives funded by JICA and implemented by MELAD through ECD – Environment Outreach Unit with the supports from relevant stakeholders such as Ministry of Education, Agriculture, BTC and TUC. This year 2015, Clean School Program started in February 2015

The main purpose of this program is to introduce the 3R (Reduce, Reuse & Recycle) concepts to the schools at primary level on Tarawa with the following objectives:

- To give the opportunity for schools to practice proper waste management
- To target children in creating awareness on the concept of waste minimization at schools, home and communities

The expected outcomes of this program still remain the same from the previous year which is focused on the following;

- For the school children to enhance their understanding on the 3R concept system
- For the schools to establish their own compost using organic wastes for their own school garden
- To encourage schools to establish their own 'Kaoki Mange' by making use of recyclable wastes (cans, bet bottles, etc)
- To encourage children to stop littering at the school compounds

As usual, the implementation of the program within the schools still focused on the 3 major components. For this year 2015, there are 6 schools participated in the program which are Abaunamou, Tebwanimwaneka, Bareaumai, War Memorial, St John and Temwanoku Primary school. These participating schools have done or carried out their activities according to their action plan submitted to ECD in April 2015. During the implementation of the program this year, ECD is working in collaboration with implementing partners from the two councils, BTC and TUC, Ministry of Education as well as Agriculture Division. At the same time there have been also supports provided from UDP-NZ project (Urban Development Program) through its Organic

1

waste Project where they assisted in the promotion of organic waste recycling and conducting trainings to the participating schools on compost making. This activity was also supported by the Agriculture Division.

For this year, most of the activities conducted by ECD with the assistance of J-Prism consultant, Ms Keiko, are mainly focus on school visits, monitoring of school activities and conducting of trainings and workshops. This year, there are only 3 monitoring activities undertaken and these were done in June, August and November. The major highlight for this year's activities is the coordination of a Field trip to landfills and also to Recycling facilities as well as lectures on Solid waste management which were undertaken in November this year (2015). This is the first trial but rather a successful initiative where Abaunamou Primary School has chosen to participate in this trial with an aim to improve awareness and knowledge of young students on what are the current waste management initiatives still ongoing on Tarawa. This is also another good opportunity for the school kids to experience field activities conducted outside the classroom and will exposed them to experience the reality of what are environment issues and challenges for Kiribati particularly on wastes. This has marked the most successful campaign for school kids this year and the outcome is very useful where all students have gained more knowledge on the issue with solid waste management.

ii. **Results and Findings of Clean School Program Final Judging**

Below are the findings collected and compiled as of the final judging done by ECD and TUC. The judging criteria based on how have been the 3 major components on Environmental Awareness raising, School compost, Waste separation & Recycling achieved followings:

a) Environmental impacts – whether the practice improves waste minimization or proper disposal of waste at school
b) School and community involvements – this focuses on engagement and participation of students, teachers, school administrators, parents and communities
c) Sustainability – the continuity of the practice or its impact
d) Management workability – that is the workability of the 3R (Environment) committee. Communication is effective between the communities and the rest of school, initiative taken for implementing the practice, etc
e) Originality – creativity and uniqueness of ideas shown for attracting students and keeping interest of all teachers.

Scoring results based on the above criteria.

Table 1.1

School	**Abaunamou Primary School**	
Division 1: Environmental Awareness Raising	**Score**	
	1. Environmental Impact	6/10
	2. School & Community Involvement	6/10
	3. Sustainability	5/10
	4. Management workability	3/5
	5. Originality	4/5
	Sub-total	**24/40**
Division 2: School	**Score**	

2

Composting	1. Environmental Impact	7/10
	2. School & Community involvement	3/5
	3. Sustainability	3/5
	4. Management workability	3/5
	5. Originality	4/5
	Sub-total	**20/30**
Division 3: Rubbish Separation and Recycling	**Score**	
	1. Environmental Impact	5/10
	2. School & Community involvement	3/5
	3. Sustainability	3/5
	4. Management workability	2/5
	5. Originality	3/5
	Sub-total	**16/30**
	Total score	**60/100**

Table 1.2

School	**Tebwanimwaneka Primary School**	
Division 1: Environmental Awareness Raising	**Score**	
	1. Environmental Impact	7/10
	2. School & Community Involvement	8/10
	3. Sustainability	6/10
	4. Management workability	3/5
	5. Originality	4/5
	Sub-total	**28/40**
Division 2: School Composting	**Score**	
	1. Environmental Impact	8/10
	2. School & Community involvement	3/5
	3. Sustainability	3/5
	4. Management workability	3/5
	5. Originality	4/5
	Sub-total	**21/30**
Division 3: Rubbish Separation and Recycling	**Score**	
	1. Environmental Impact	6/10
	2. School & Community involvement	4/5
	3. Sustainability	3/5
	4. Management workability	3/5
	5. Originality	3/5
	Sub-total	**19/30**
	Total marks	**68/100**

School	**War Memorial Primary School**	
Division 1: Environmental Awareness Raising	**Score**	
	6. Environmental Impact	4/10
	7. School & Community Involvement	3/10
	8. Sustainability	6/10
	9. Management workability	3/5
	10. Originality	3/5

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	Sub-total	**24/40**
Division 2: School Composting	**Score**	
	6. Environmental Impact	3/10
	7. School & Community involvement	3/5
	8. Sustainability	2/5
	9. Management workability	3/5
	10. Originality	3/5
	Sub-total	**14/30**
Division 3: Rubbish Separation and Recycling	**Score**	
	6. Environmental Impact	6/10
	7. School & Community involvement	3/5
	8. Sustainability	3/5
	9. Management workability	3/5
	10. Originality	3/5
	Sub-total	**18/30**
	Total score	**56/100 marks**

School	**Bareaumai Primary School**	
Division 1: Environmental Awareness Raising	**Score**	
	11. Environmental Impact	6/10
	12. School & Community Involvement	5/10
	13. Sustainability	6/10
	14. Management workability	3/5
	15. Originality	4/5
	Sub-total	**24/40**
Division 2: School Composting	**Score**	
	11. Environmental Impact	6/10
	12. School & Community involvement	3/5
	13. Sustainability	3/5
	14. Management workability	3/5
	15. Originality	4/5
	Sub-total	**19/30**
Division 3: Rubbish Separation and Recycling	**Score**	
	11. Environmental Impact	6/10
	12. School & Community involvement	3/5
	13. Sustainability	3/5
	14. Management workability	3/5
	15. Originality	3/5
	Sub-total	**18/30**
	Total score	**61/100**

4

Photos: J-PRISM Clean School Program for Kiribati 2015

Abaunamou students field trip to Nanikaai Landfill



War Memorial Primary School (4th winner)



Bareaumai Primary School (2nd winner)


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Tebwanimwaneka Primary School (winner of CSP 2015)

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Abaunamou Primary School (3rd winner)

iii. Discussions

Based on the results above, it shows that Tebwanimwaneka Primary School is the winning school for this year's competition. The second winner is Bareaumai Primary School and the third winner is Abaunamou while the War Memorial primary school came fourth. The other two schools which are Temwanoku and St John Primary School were participated in the program for this year (2015), however, their activities are not successfully completed towards the end of the year due to the ongoing maintenance of their classrooms and the rest of the school buildings. As agreed during the final judging, Tebwanimwaneka Primary school has chosen to be the winner based on the significant output they had produced at the end of the program. The sustainability of their activities as well as involvements of students and teachers is also considered producing a good result. During the final judging, the school compound remains cleaned and all wastes remain contained. School compost is still maintained and there is an improvement on the status of their compost though they had used the previous compost for their ongoing gardening activities. The other schools which are Bareaumai and Abaunamou have done a great work in implementing the 3 components of the program, however there are still issues with regard to the sustainability of the activities. Maintaining compost in Bareaumai and Abaunamou is not so effective and actually failed in the end. For Bareaumai primary school, there is a need for further commitments in sustaining some of their activities such as compost making and the 3Rs initiatives. The War Memorial School, the overall implementation of the program in some way not really progressing or too slow due to staff turnover especially the assigned teachers. The responsible head-teacher as well continued changing throughout the year in which she is totally new to the program. Those are the issues that have contributed much to the unsuccessful implementation of the program within the schools.

7

within the schools.

iv. Challenges & Issues

- Interests of the schools – some participating schools are not very keen in the program due to loads of tasks and commitments within the schools.
- Lots of similar introduced programs implemented by the schools so
- Transport – difficult to organize school visit due to transport problems. Need to have funding for transportation to cover such issue in critical times
- Issue with sustainability of activities for each school. Schools to improve further on their activities to achieve better result and positive impacts.

v. Recommendation & future plans

- ECD together with the councils, MoE, AID and other relevant partners to continue on with the program ensuring that more schools will participate in future
- Ministry of Education to continue support in terms of encouraging teachers to be more active in teaching proper waste management to students and encourage field work activities on solid waste management
- ECD and the councils to strengthen monitoring of activities at the schools
- To continue on with number of trials at the rest of primary schools where possible by pulling resources together with the councils, MoE and other partners

vi. Conclusion

Overall, the implementation of clean school program on Tarawa for the year 2015 is very successful despite some recurring issues and challenges faced by the schools and ECD with partners during the implementation. Nevertheless, the program has demonstrated a very good environmental friendly initiative that is being practiced by younger children with the supports from teachers and parents, students' relatives and from the community as well. At the same time students at this level have continued to learn a lots from what they had experience during their engagement in the activities and more importantly is to gain far more knowledge and understanding on how to contribute in taking care of their environment through minimizing wastes problems. This is starting from their school and to be able to apply this at their home and their communities. Students have learnt basic ideas on how to manage their wastes based on the three important components of the program which are have now completely implemented for the year 2015

Despite the successful implementation of the program, the schools (teachers & students) still need further improvement and strong commitment to the program in order to achieve better results that will help to contribute further in enhancing their knowledge on proper waste management. Based on the final judging, it is highlighted that achieving sustainability of the activities is very critical as one of the anticipated positive outcome of the project. Given that this is the final year and the project has come to an end, it is very important for the schools with support from Environment, Education, the councils and other implementing partners to continue on with the program with the other schools and to strengthen monitoring activities to those participating schools for further improvement and a success of the school program in future.

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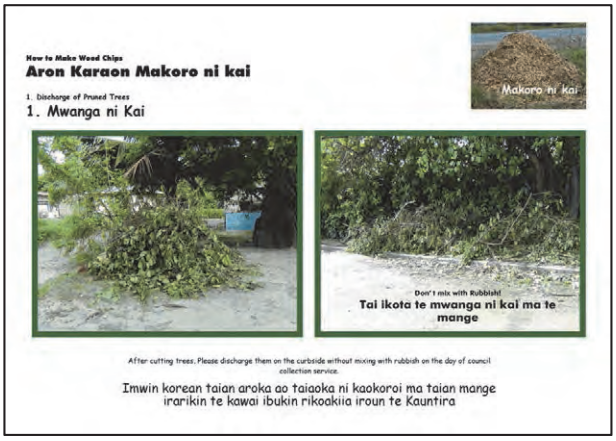
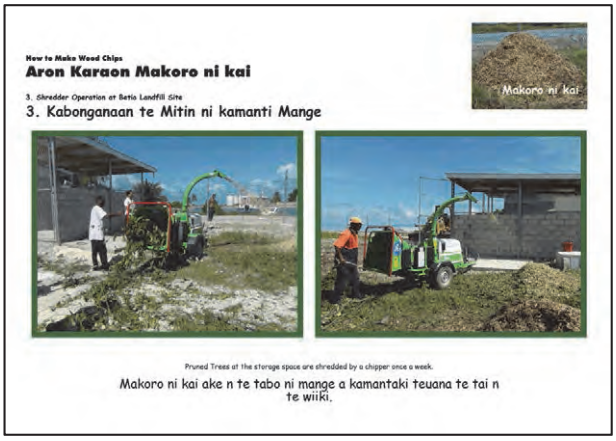
8

7.2.2 Awareness Materials: Firewood & Chainsaw Rental Promotion





Introduction of Organic Waste Recycling Activities in Betio
(separate collection of fallen trees and shredder operation at Betio Landfill)

A poster promoting the sales of firewood

A poster promoting chainsaw rental

7.2.4 Report of Third Public Opinion Survey

Result of Opinion Survey in 2015

1. Outline of the Survey

1.1 Purpose

The opinion survey in 2015 is the third survey conducted during the project period. The first and second surveys were conducted in 2011 and 2013 respectively.

The purposes of three surveys are summarized below.

- To estimate the change in number of people who understand compost and use it for vegetable growing, in order to evaluate the effect of the project
- To know the changes in awareness and understanding of solid waste management in South Tarawa during the project period
- To check the changes in people's behavior in the field of solid waste management including 3Rs

1.2 Survey Method

The opinion survey was conducted based on a set of questionnaire sheets. The sample numbers of the three surveys are shown below.

	Betio Town Council (BTC)	Teinainano Urban Council (TUC)	Total
2011	69	135	204
2013	49	111	160
1025	48	102	150

1.3 Items of Questions

The questionnaire contains the following questions. In order to know the actual level of understanding, questions for oral answers were included as many as possible.

- Problems caused by improper waste management
- Waste generation and treatment of waste at home
- Gardening and compost
- Waste collection service and discharge method
- Recycling activities

2. Preparation Work

The following preparation work was implemented.

2.1 Selection of interviewers

Three interviewers were selected based on the introductions by people who worked for the project before.

2.2 Preparation of sampling

The following documents and materials were collected in order to decide a sampling method.

- Report on the Kiribati 2010 Census of Population and Housing, Volume 1: Basic information and tables
- Report on the Kiribati 2010 Census of Population and Housing, Volume 2: Analytical report

- 2005 Census of Population, Volume 1: Basic information and tables
- 2005Census, Volume 2: Analytical report
- Analysis of the 2006 Household Income and Expenditure Survey
- Digital map (South Tarawa)
  The digital map was made more than 10 years ago and was modified according to google map and field survey.

The target of the survey was the whole area of South Tarawa, and samples were selected from the following villages, considering the income level.

		Sample number
TUC	Bairiki	9
	Bikenibeu	42
	Causeway	3
	Eita	18
	Nawerewere	3
	Teaoraereke	18
	Temaiku	9
	sub total	102
BTC	Betio	48
	sub total	48
Total		150

The target households were selected randomly by interviewers at the time of interview survey, according to a rule, selecting every 4th house along the designated streets on the map.

The number of samples is limited. In addition, due to the lack of sampling tools such as resident's ledger and detailed housing maps, it is difficult to properly conduct a random sampling. As a result, there could be a certain level of errors, but it is still possible to see some kinds of trends in the past 5 years.

2.3 Preparation of questionnaire sheet

The draft of questionnaire in English was prepared by J-PRISM expert based on the questionnaire sheet used for the previous survey in 2013, and modified based on the opinions and comments from CPs. It was finalized based on the result of the mock interview during the training.

2.4 Training

Training was arranged for three interviewers on May 20, in order to show them the purpose and methods of the survey.

3. Implementation

3.1 Implementation of the survey

The survey started on May 22 and continued until June 3. The additional survey was conducted on June 4, in order to clarify the answers to some questions at Temaiku and Causeway. Interviewers were requested to randomly select samples according to the area maps.

4. Result

4.1 About respondents

The distributions of samples by area, sex, age, and formal education are shown below.

Town	BTC	TUC							
		Bairiki	Bikenibeu	Causeway	Eita	Nawerewere	Teaoraereke	Temaiku	total
Number	48	9	42	3	18	3	18	9	150

Sex	BTC		TUC		total	
	Count	%	Count	%	Count	%
Female	16	33%	34	33%	50	33%
Male	32	67%	68	67%	100	67%
total	48	100%	102	100%	150	100%

Age	BTC		TUC		total	
	Count	%	Count	%	Count	%
18 – 24 years	6	13%	7	7%	13	9%
25 – 29 years	9	19%	23	23%	32	21%
30 – 34 years	8	17%	16	16%	24	16%
35 – 39 years	5	10%	13	13%	18	12%
40 – 44 years	4	8%	17	17%	21	14%
45 – 49 years	6	13%	11	11%	17	11%
50 – 54 years	3	6%	7	7%	10	7%
55 – 59 years	1	2%	4	4%	5	3%
60 – 64 years	4	8%	4	4%	8	5%
over 65 years	2	4%	0	0%	2	1%
total	48	100%	102	100%	150	100%

the last grade of completed formal education

	BTC		TUC		total	
	Count	%	Count	%	Count	%
No formal schooling	1	2%	4	4%	5	3%
Some primary	4	8%	3	3%	7	5%
Completed primary school	3	6%	10	10%	13	9%
Some secondary	9	19%	8	8%	17	11%
Completed secondary school	22	46%	58	57%	80	53%
Technical/Vocational	3	6%	6	6%	9	6%
University	2	4%	2	2%	4	3%
Post Graduate	1	2%	4	4%	5	3%
Do not know	1	2%	5	5%	6	4%
Refused	2	4%	2	2%	4	3%
Total	48	100%	102	100%	150	100%

Frequency of getting news from newspaper, radio and TV

	newspaper	radio	TV
Never	8	10	146
rarely	3	9	2
sometimes	115	79	1
every day	24	52	1
total	150	150	150

Did you hear the radio ad, promoting waste separation?

	BTC		TUC		total	
	Count	%	Count	%	Count	%
Yes	31	65%	78	76%	109	73%
No	17	35%	24	24%	41	27%
total	48	100%	102	100%	150	100%

Average monthly utility cost

	Electricity		Telephone		Cooking gas/kerosene	
	Number of respondent to answer	Average monthly payment	Number of respondent to answer	Average monthly payment	Number of respondent to answer	Average monthly payment
BTC	22	$52.3	5	$12.0	33	$30.7
TUC	35	$61.5	7	$25.7	41	$28.9
total	57	$57.9	12	$20.0	74	$29.7

4.2 Environmental awareness

In general, it can be estimated that more people recognized problems caused by improper solid waste management in the past 5 years.

Q1a In South Tawara, are there any problems caused by improper waste management?

	2011		2013		2015	
	Count	%	Count	%	Count	%
Yes	141	69%	127	79%	149	99%
No	6	3%	17	11%	1	1%
I don't know	57	28%	15	9%	0	0%
Total	204	100%	159	100%	150	100%

Q1b In South Tarawa, what kinds of problems are there now? (Check all answers you observe.)

	2013		2015	
	Count	%	Count	%
A lot of wastes are scattered on the street, beaches, and in the living environment.	121	95%	149	100%
A lot of wastes are dumped illegally along the beach.	110	87%	148	99%
Wastes scattered on the street are scavenged by animals.	56	44%	147	99%
Wastes left on the street attract insects and rodents.	53	42%	148	99%
Wastes left on the street cause offensive odor.	54	43%	146	98%
Dumped wastes in the beach pollute water	51	40%	147	99%
Wastes are scattered around the garbage container	50	39%	138	93%
Landfill sites are not managed well.	29	23%	144	97%
Others	1	1%	1	1%

Base: 127 (2013), 149 (2015)

Q1c What is the most serious problem?

	2013		2015	
	Count	Count	Count	%
A lot of wastes are scattered on the street, beaches, and in the living environment.	36	28%	20	13%
A lot of waste are dumped illegally along the beach.	50	39%	43	29%
Wastes scattered on the street are scavenged by animals.	7	6%	12	8%
Wastes left on the street attract insects and rodents.	3	2%	18	12%
Wastes left on the street cause offensive odor.	6	5%	32	21%
Dumped wastes in the beach pollute water	13	10%	9	6%
Wastes are scattered around the garbage container	9	7%	5	3%
Landfill sites are not managed well.	1	1%	7	5%
no response	2	2%	3	2%

Base: 127 (2013), 149 (2015)

Q2 Do you know where is your waste brought? If yes, where it is?
The percentage of respondents who answered correctly

	2013		2015	
	Count	%	Count	%
BTC	42	86%	36	75%
TUC	58	52%	74	73%

The increase in the percentage of correct answers in TUC shows that more people recognized the newest disposal site in Bikenibeu.

4.3 Solid Waste Management at home

More than 80% of the respondents feed kitchen waste for pig, while around 40% discharge fallen leaves for collection services.

Q4a Generation Amount of kitchen waste per day (by plastic bags)

	BTC	TUC	total
average number of rice bags	1.1	1.0	1.0

Base: 47 (BTC), 101 (TUC)
Q4b Usually how do you treat kitchen waste?

	BTC		TUC		total	
	Count	%	Count	%	Count	%
being collected by a collection vehicle	5	10%	6	6%	11	7%
feeding it for pigs and/or fowls	37	77%	90	88%	127	85%
composting	2	4%	1	1%	3	2%

burying	8	17%	6	6%	14	9%
burning			1	1%	1	1%

Base: 47 (BTC), 101 (TUC)

Q5a Generation Amount of Green Waste per Week (by rice bags)

	BTC	TUC	total
average number of rice bags	4.6	5.1	5.0

Base: 47 (BTC), 101 (TUC)

Q5b Usually how do you treat green waste?

	BTC		TUC		total	
	Count	%	Count	%	Count	%
being collected by a collection vehicle	22	46%	41	40%	63	42%
composting	10	21%	17	17%	26	17%
burying	15	31%	51	50%	66	44%
burning	7	15%	56	55%	63	42%
others	1	2%	3	3%	4	3%

Others: bring by our truck with business waste
keep leaves in a drum
throw away on the beach

4.4 Gardening and compost

Between 20% and 30% of the respondents answered that they knew compost at the three surveys, but according to the result of questions for oral answers, many of them actually did not understand compost well. Among those who answered that they use compost, it can be assumed that some of them actually used black soil, which is mixed sand with pig manure, not compost.

Q4b Do you know compost?

	2011		2013		2015	
	Count	%	Count	%	Count	%
Yes	69	34%	47	30%	31	21%
I head it but I do not know what it is	100	49%	71	45%	81	54%
I never heard it.	35	17%	41	26%	38	25%
total	204	100%	159	100%	150	100%

Q22 Do you grow vegetables and/or flowers at your garden?

	2011		2013		2015	
	Count	%	Count	%	Count	%
Yes, I do.	71	35%	48	30%	70	47%
No, but I am interested.	4	2%	7	4%	3	2%
No	125	61%	101	63%	76	51%
no response	4	2%	4	3%	1	1%
Total	204	100%	160	100%	150	100%

At the third survey, banana, bread fruit, and coconut cultivation is included in the activities of vegetable growing, and this resulted in the increase in the share of the respondents who answered yes.

Q24 What kinds of vegetables do you grow?

	BTC		TUC		total	
	Count	%	Count	%	Count	%
chinese cabbage	8	28%	22	54%	30	43%
tomato	2	7%	8	20%	10	14%
cucumber	1	3%	5	12%	6	9%
capsicum	2	7%	3	7%	5	7%
eggplant	1	3%	1	2%	2	3%
pumpkin	7	24%	8	20%	15	21%
powpow	7	24%	10	24%	17	24%
banana	8	28%	15	37%	23	33%
cassava	13	45%	11	27%	24	34%
kumara	2	7%	9	22%	11	16%
bean	2	7%	0	0%	2	3%
Bread fruit	5	17%	15	37%	20	29%
coconut	1	3%	3	7%	4	6%

Base: 29 (BTC), 41 (TUC)

Q26 Do you use compost?

	2013		2015	
	Count	%	Count	%
Yes, I am now using it	18	38%	25	35%
I used it but now not using	2	4%	2	3%
I never use it	27	56%	44	62%
no response	1	2%		
	48	100%	71	100%

Base: 48 (2013), 71 (2015)

The proportions of the respondents using composts now to the whole respondents at the survey in 2011 and 2015 are **11%** and **17%** respectively. Even though there could be a relatively large error, but it can be said that more than 5% of people in South Tarawa use compost for vegetable growing.

How do you get compost

	BTC		TUC		total	
	Count	%	Count	%	Count	%
make by myself	7	88%	13	68%	20	74%
get from others	1	13%	4	21%	5	19%
Buy			2	11%	2	7%
Total	8	100%	19	100%	27	100%

Base: 8 (BTC), 19 (TUC), 27 (Total)

Even though 20 respondents answered that they made compost by myself, some of them made black soil, based on their answers to question, how to make compost.

4.5 Recycling (Kaoki Mange)

In Betio, the share of the respondents participating in the Kaoki Mange program increased from 30.8% in 2011 to 68.6% in 2015. The Kaoki Mange program is more active in Betio, because it is possible to sell recyclables at any time in Betio, while three places which accept recyclables in TUC are open only once a week.

Q18. Do you separate recyclables from other waste and sell them to recyclers?

	BTC		TUC		total		2011	
	Count	%	Count	%	Count	%	Count	%
Yes	33	69%	43	42%	76	51%	72	35%
No	15	31%	59	58%	74	49%	126	62%
No response	0	0%	0	0%	0	0%	6	3%
total	48	100%	102	100%	150	100%	204	100%

Q19 Why do you separate and sell them?

	BTC		TUC		total	
	Count	%	Count	%	Count	%
Recycling would reduce the amount of waste to landfill	1	3%	1	2%	2	3%
Recycling would help to protect the environment	16	48%	14	33%	30	39%
Recycling would earn you some extra money	30	91%	42	98%	72	95%

Base: 33 (BTC), 43 (TUC), 76 (Total)

Q20 The number of respondents who separate and sell the following items

	BTC	TUC	Total
PET bottles	8	8	16
Aluminum cans	33	43	76

Aluminum cans are the main target of the Kaoki Mange. They are kept in green bags or mesh bins for a certain amount of period, from one month to one year. The average annual earnings from selling PET bottles and aluminum cans among the respondents who could answer the amount of earning are $36.0 and $233.0 respectively.

Q20 The average annual earnings by selling these items

	earnings
PET bottles	$36
Aluminum cans	$233

Base: 7 (PET bottles), 56 (aluminum cans)

Q21 Why don't you separate recyclable waste such as paper, bottles, and metals from other waste?

	BTC		TUC		total	
	Count	%	Count	%	Count	%
It is inconvenient or difficult	8	53%	41	69%	49	66%
It would take too much time	4	27%	11	19%	15	20%
The need/benefit of recycling are not clear	2	13%	17	29%	19	26%
There are no recycling systems	0	0%	0	0%	0	0%

Base: 15 (BTC), 59 (TUC), 74 (Total)

4.6 Collection Services in South Tarawa

Since the start of Green Bag Collection Service in 2012, there are two types of collection services, Council Collection Service and Green Bag Collection service, and the frequency of each collection service is once a week.

(1) Recognition of two collection services in South Tarawa

At first, the respondents were asked to mention the name(s) and provider(s) of collection services available in South Tarawa. 82 respondents gave Boboto Kiribati (Council collection service) as an example, while 105 respondents mentioned Green Bag Collection Service.

Regarding the service providers, 90% of respondents who mentioned the council collection service knew that their council, either BTC or TUC, was a service provider, while few respondents knew a responsible organization of Green Bag Collection.

Who provide collection services in South Tarawa?
(1) Provider of Boboto Kiribati (Council Collection Service)

	BTC		TUC		total	
	Count	%	Count	%	Count	%
Council	40	95%	34	85%	74	90%
don't know	2	5%	4	10%	8	10%
No reply			2	5%	2	
total	42	100%	40	100%	82	100%

(2) Provider of Green Bag Collection Service

	BTC		TUC		total	
	Count	%	Count	%	Count	%
Council	0	0%	2	2%	2	2%
FSPK	0	0%	3	3%	3	3%
Kiribati government	0	0%	3	3%	3	3%
Green bag company*	3	25%	30	32%	33	31%
Moel	4	33%	7	8%	11	10%
New Zealand	0	0%	12	13%	12	11%
don't know	5	42%	30	32%	35	33%
no reply	0	0%	6	6%	6	6%
total	12	100%	93	100%	105	100%

* 33 respondents thought that a company, which they did not know well, was a responsible organization.

(2) Council Collection Service

The first question in this section is if there is a regular collection service or not. In TUC two-thirds of the respondents answered that the council did not correct their waste.

Q7a Does the council collection truck collect your waste regularly?

	BTC		TUC		total		2013	
	Count	%	Count	%	Count	%	Count	%
Yes	38	79%	33	32%	71	47%	130	81%
No	10	21%	69	68%	79	53%	29	18%
no response	0	0%	0	0	0	0	1	1%
total	48	100%	102	100%	150	100%	160	100%

In villages of the eastern side of TUC, along with Eita, few respondents used the council collection service, as shown in the table below.

Q7a Does the council collection truck collect your waste regularly?
The number of respondents by village in TUC

Village in TUC	Yes	No	Total
Bairiki	7	2	9
Teaoraereke	5	13	18
Eita	1	17	18
Bikenibeu	20	22	42
Nawerewere	0	3	3
Causeway	0	3	3
Temaiku	0	9	9
Total	33	69	102

According to the result of the survey in 2013, around 80% of the respondents answered that they received the council collection service, but the percent decreased to 47% in 2015. Based on the comments on the council collection service, some respondents in villages in the eastern side of TUC and Eita gave up the council collection service and decided to use only the green bag collection service, because the frequency of the council collection service was too low, once a month or less.

Among respondents who answered that there was a regular collection service by the Council, about 50% of them told that the frequency of the collection service was once a week, while 35% of them told that they received the collection service only once a month.

Q8Actually how often a collection vehicle come and pick up your waste?

	BTC		TUC		total	
	Count	%	Count	%	Count	%
Twice a week	2	5%	2	6%	4	6%
Once a week	16	42%	18	55%	34	48%
Once every second week	0	0%	1	3%	1	1%
Once a month	15	39%	10	30%	25	35%
I do not know	4	11%	1	3%	5	7%
every second month	1	3%	0	0%	1	1%
no reply	0	0%	1	3%	1	1%
Total	38	100%	33	100%	71	100%

Note: BTC and TUC are supposed to provide a collection service once a week

Evaluation of the council collection service

Punctuality	BTC	TUC	total	Quality	BTC	TUC	total
very good	3	4	7	No left over of waste	14	20	34
Good	9	17	26	A little bit left over	15	10	25
not good so much	10	8	18	A lot of left over	9	3	12
not good at all	16	4	20				
Total	38	33	71	total	38	33	71

(3) Green Bag Collection Service

About 90% of the respondents used the green bag collection service.

Q16 Do you use green bag collection?

	BTC		TUC		total		2013	
	Count	%	Count	%	Count	%	Count	%
Yes	45	94%	90	88%	135	90%	141	88%
no	2	4%	11	11%	13	9%	15	9%
no reply	1	2%	1	1%	2	1%	4	3%
total	48	100%	102	100%	150	100%	160	100%

Radio of the biggest source of information on the green bag collection.

Q16c How did you get instructions?

	BTC		TUC		total	
	Count	%	Count	%	Count	%
from the Council	10	22%	7	8%	17	13%
from NGO	2	4%	14	15%	16	12%
from radio	34	76%	61	67%	95	70%
from neighbors	5	11%	24	26%	29	21%
from family members	10	22%	40	44%	50	37%
no instructions	1	2%	1	1%	2	1%

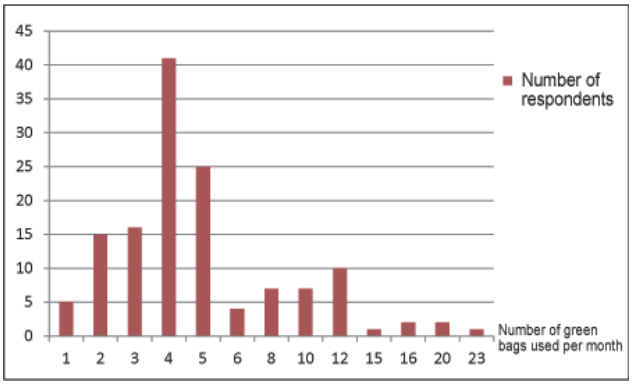
Base: 45 (BTC), 91 (TUC), 136 (total)

Q16e How often do you use green bag collection service?

	BTC		TUC		total	
	Count	%	Count	%	Count	%
every week	32	71%	65	71%	97	71%
every second week	7	16%	22	24%	29	21%
once a month	6	13%	4	4%	10	7%
Total	45	100%	91	100%	136	100%

Q16f the number of green bags used every month

	BTC	TUC	Total
average	4.7	5.9	5.5
median	4	4	4



Q16f how much money do you spent for green bags every month

	BTC	TUC	Total
average	AUD 0.9	AUD 1.2	AUD 1.1
median	AUD 1.0	AUD 0.8	AUD 0.8

Almost all the respondents who used the green bag collection were satisfied with its service. Compared to the monthly utility cost, shown in the section 4.2, the monthly average cost of green bags is small and 90% of them thought the price of bags was reasonable.

How do you think about green bag collection (evaluation)?

Punctuality

Punctuality	BTC		TUC		total	
	Count	%	Count	%	Count	%
very good	24	53%	67	71%	91	65%
good	20	44%	26	27%	46	33%
not good so much	0	0%		0%		0%
not good at all	1	2%	1	1%	2	1%
no response	0	0%	1	1%	1	1%
total	45	100%	95	100%	140	100%

Quality

Quality	BTC		TUC		total	
	Count	%	Count	%	Count	%
No left over of waste	42	93%	90	95%	132	94%
A little bit left over	1	2%	1	1%	2	1%
A lot of left over	2	4%	3	3%	5	4%
no response	0	0%	1	1%	1	1%
total	45	100%	95	100%	140	100%

Fee

Total cost of green bags	BTC		TUC		total	
	Count	%	Count	%	Count	%
too expensive	4	9%		0%	4	3%
expensive	5	11%	1	1%	6	4%
reasonable	34	76%	92	97%	126	90%
Cheap	0	0%	0	0%	0	0%

no response	2	4%	2	2%	4	3%
total	45	100%	95	100%	140	100%

(4) Distinguish of Council Collection Service and Green Bag Collection Service

The survey in 2015 tried to know how much the respondents recognize the differences of the two collection services. The table below is the number of respondents who use/don't used the council and green bag collection services.

Close to 10% of the respondents used neither the council collection service nor the green bag collection service. Many of them live on the Pacific Ocean side. More than a hald of the respondents in TUC used only the green bag collection service. According to the conversation with them, they were basically satisfied with the green bag collection service, but many of them wanted to increase the collection frequency from once a week to twice a week.

	BTC		TUC		Total	
	Count	%	Count	%	Count	%
use both collections	38	79%	32	31%	70	47%
use only council collections	0	0%	1	1%	1	1%
use only green bag	7	15%	58	57%	65	43%
use no collection service	2	4%	11	11%	13	9%
no reply	1	2%	0	0%	1	1%
total	48	100%	102	100%	150	100%

The respondents were asked what kinds of waste are discharged for the council and green bag collection service respectively.

Q9 What do you discharge for the council collection? (Council Collection)

	BTC		TUC		total	
	Count	%	Count	%	Count	%
kitchen waste	30	79%	25	76%	55	77%
plastic packages	36	95%	33	100%	69	97%
paper and newspaper.	29	76%	19	58%	48	68%
PET bottles	28	74%	28	85%	56	79%
glass bottles	33	87%	32	97%	65	92%
beer cans	8	21%	13	39%	21	30%
tin cans	36	95%	32	97%	68	96%
card boards	25	66%	18	55%	43	61%
fallen leaves	20	53%	11	33%	31	44%
branches	19	50%	11	33%	30	42%
diapers	28	74%	26	79%	54	76%
others	0	0%	0	0%	0	0%

Base: 38 (BTC), 33 (TUC), 71 (total)

What do you discharge for green bag collection?

	BTC		TUC		total	
	Count	%	Count	%	Count	%
kitchen waste	31	69%	65	71%	96	71%
plastic packages	38	84%	90	99%	128	94%
paper and newspaper.	22	49%	43	47%	65	48%
PET bottles	26	58%	63	69%	89	65%
glass bottles	34	76%	79	87%	113	83%
beer cans	4	9%	34	37%	38	28%
tin cans	37	82%	89	98%	126	93%
card boards	21	47%	21	23%	42	31%
fallen leaves	11	24%	15	16%	26	19%
branches	10	22%	11	12%	21	15%
diapers	44	98%	91	100%	135	99%
others	0	0%	0	0%	0	0%

Base: 45 (BTC), 91 (TUC), 136 (total)

There are 70 respondents who answered that they used both collection services. The table below shows that how many respondents discharge specific items for the two different collection services. As a comparison, the case of respondents who used only the green bag collection is shown on the left side of the table.

	Those who use both collection service		Those who use only green bag collection
	Council collection	Green bag collection	Green bag collection
kitchen waste	55	52	44
plastic packages	68	64	63
paper and newspaper.	47	27	39
PET bottles	55	47	42
glass bottles	64	56	56
beer cans	21	16	22
tin cans	67	62	63
card boards	42	25	17
dead leaves	30	13	13
branches	29	12	9
diapers	54	69	65
others	0	0	
Base: 70			Base: 65

As a whole, these respondents used both the council and green bag collection services in order to discharge rubbish. (It seems that they don't care much about the differences of the two collection services)

Less respondents discharge card board, dead leaves and branches in green bags. It's partly result of the awareness activity. In addition, these types of waste tend to be bulky and to increase the number of necessary green bags, and this resulted in the disincentive for respondents to discharge for the green bag collection service.

The number of respondents who discharge beer can is small. It can be said that many of beer cans are collected and sold to Kaoki Mange program.

5. Findings and Conclusions

Findings

The findings of the survey are summarized below.

- The share of respondents who recognized the problems caused by improper solid waste management in Kiribati increased in the past 5 years.
- About 20% of respondents answered that they know compost, but based on the result of questions of oral answers, it can be said that some of them actually don't know compost well.
- The proportions of the respondents using composts now to the whole respondents at the survey in 2011 and 2015 are 11% and 17% respectively. Even though there could be a relatively large error, but it can be said that more than 5% of people in South Tarawa use compost for vegetable growing.
- The Kaoki Mange program is more active in Betio, almost 70% of the respondents participated in the program, because it is possible to sell recyclables at any time in Betio, while three places which accept recyclables in TUC are open only once a week.
- In TUC two-thirds of the respondents answered that there was no regular council collection service, and more than a half of the respondents used only green bag collection service.
- There were still 10% of the respondents, who did not use any collection services.
- 90% of the respondents used the green bag collection service and most of the green bag collection users were satisfied with its service, but few respondents knew who provided the collection service.

Conclusions

- People's awareness of solid waste management in South Tarawa increased in the past 5 years.
- It is important to make more people know what compost is, in order to promote compost in Kiribati. Under the new school curriculum, compost and composting is one of the new topics in Environment Science for Year 5 & 6, and this could resulted in the increase in the number of people, who make and use compost for their gardening in a near future.
- Both the council collection service and green bag collection service are basically used as rubbish collection services. It can be said that the two collection services are redundant.

- Since the councils could not provide a satisfactory level of the collection service for customers, contracting out one rubbish collection service, combining the council and green bag collection services, could be an option for the South Tarawa in a future. (In this case, it is necessary to review the current collection fee and its fee collection system.)

The Councils could provide a green waste collection service once a month or so at each collection area in their towns. It is also possible for the councils to continue to provide a collection service for a large scale dischargers.

Interview Survey



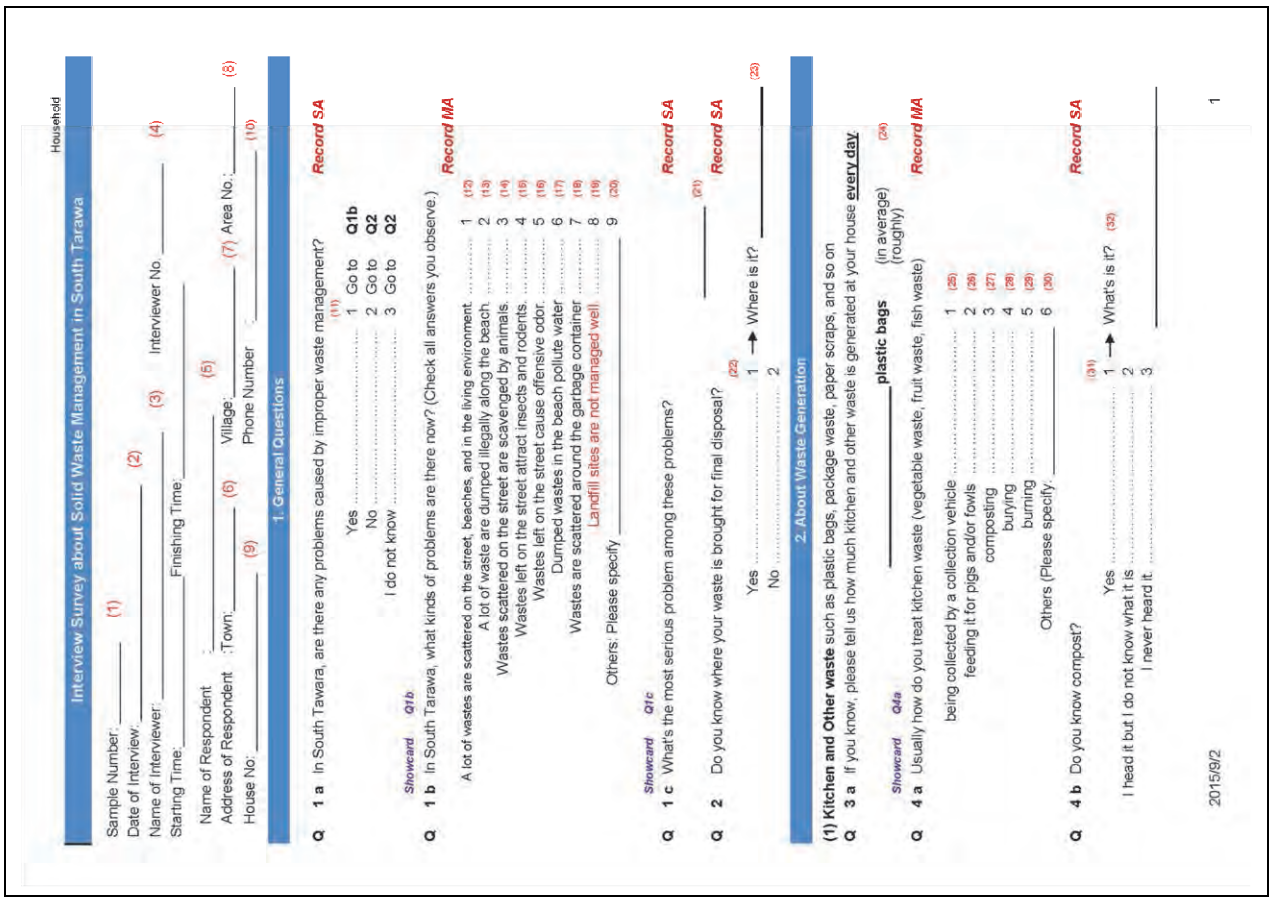
Interview Survey


Aluminum cans in a green bag


Leaves in a hole


Vegetable garden

Questionnaire



Household

Interview Survey about Solid Waste Management in South Tarawa

Sample Number: _____ (1)
Date of Interview: _____ (2)
Name of Interviewer: _____ (3) Interviewer No. _____ (4)
Starting Time: _____ Finishing Time: _____
Name of Respondent : _____ (5)
Address of Respondent :Town: _____ (6) Village: _____ (7) Area No.: _____ (8)
House No: _____ (9) Phone Number _____ (10)

1. General Questions

Q 1 a In South Tawara, are there any problems caused by improper waste management? **Record SA** (11)
Yes ..... 1 Go to Q1b
No ..... 2 Go to Q2
I do not know ..... 3 Go to Q2

Showcard Q1b
Q 1 b In South Tarawa, what kinds of problems are there now? (Check all answers you observe.) **Record MA**
A lot of wastes are scattered on the street, beaches, and in the living environment. 1 (12)
A lot of waste are dumped illegally along the beach 2 (13)
Wastes scattered on the street are scavenged by animals. 3 (14)
Wastes left on the street attract insects and rodents. 4 (15)
Wastes left on the street cause offensive odor. 5 (16)
Dumped wastes in the beach pollute water 6 (17)
Wastes are scattered around the garbage container 7 (18)
Landfill sites are not managed well 8 (19)
Others: Please specify _____ 9 (20)

Showcard Q1c
Q 1 c What's the most serious problem among these problems? **Record SA** (21)

Q 2 Do you know where your waste is brought for final disposal? **Record SA** (22)
Yes ..... 1 → Where is it? _____ (23)
No 2

2. About Waste Generation

(1) Kitchen and Other waste such as plastic bags, package waste, paper scraps, and so on

Q 3 a If you know, please tell us how much kitchen and other waste is generated at your house **every day**:
_____ **plastic bags** (in average) (roughly) (24)

Showcard Q4a
Q 4 a Usually how do you treat kitchen waste (vegetable waste, fruit waste, fish waste) **Record MA**
being collected by a collection vehicle 1 (25)
feeding it for pigs and/or fowls 2 (26)
composting 3 (27)
burying 4 (28)
burning 5 (29)
Others (Please specify: _____ 6 (30)

Q 4 b Do you know compost? **Record SA** (31)
Yes ..... 1 → What's is it? _____ (32)
I head it but I do not know what it is 2
I never heard it 3

2015/9/2 1

Household
(2) Garden Waste
Q 5 a How much garden waste is generated every week? (in average)
0 or _____ rice bags
in average (approximation)
Showcard Q5b
Q 5 b Usually how do you treat green waste?
Record MA
being collected by a collection vehicle
composting
burying
burning
Others (Please specify: _____
3. Your Waste Management
Q 6 a How do you store kitchen waste at your house? (Please let a respondent answer freely and select the most relevant one.)
Record SA
In a plastic/paper/rice/cement bag inside the house
In a container inside the house
In a plastic/paper/rice/cement bag outside the house
In a container outside the house
On the ground outside
Others (Please specify: _____
4. Collection Service
Q 7 What types of collection services are there in South Tarawa? Who provide these collection services?
collection service
service provider
4-1 Collection Service by the Council
Q 7 a Does the council collection truck collect your waste regularly?
Record SA
Yes
No
Go to Q7b Q12 & Q15
Q 7 b Do you know the collection day?
Yes
No
Go to Q7c Q8
Q 7 c What's the collection day?
Q 7 d How did you get the information on collection day?
Q 8 a Actually how often a collection vehicle come and pick up your waste?
Twince a week
Once a week
Once every second week
Once a month
I do not know
Showcard Q9
Q 9 What do you discharge for the council collection?
Record MA
kitchen waste
plastic packages
paper and newspaper
PET bottles
glass bottles
beer cans
tin cans
card boards
dead leaves
branches
diapers
Others: Please specify _____
2015/9/2
2

Household
Q 10 a Do you pay collection fee?
Record SA
Yes, I pay collection fee to a fee collector directly
Yes, it is withheld from paycheck
Yes, it is withheld from business license fee
No, I do not pay collection fee
I do not know
Q10b
How much does your household pay for collection services every month?
AUD _____
Q 11 a How do you think about the collection service by council?
Record SA
(1) Punctuality
very good
good
not good so much
not good at all
(2) Quality of service
No left over of waste
A little bit left over
A lot of left over
Go to Q15
Necessity of the collection service (or those who do not receive a collection service)
Showcard Q12
Q 12 How is your waste disposed of? Please select all that you do in your daily life.
Record MA
It is dumped on the street, on the beach or open land
It is fed for livestock
It is burned outside
It is burned in the garden
It is composted
It is transported to a collection point in other areas
It is collected by Green bag collection
Others: Please specify _____
Q 13 Do you need waste collection service?
Record SA
Yes, very much
Yes to some extent
I do not need very much
I do not need at all
I do not know
Go to Q14a
Go to Q15a
Q 14 a Are you willing to pay to receive the waste collection service?
Record SA
Very willing
Willing to some extent
Not willing very much
Not at all
Q 14 b How much can you afford to pay per month to receive the collection service?
AUD _____
4-2 Green Bag Collection Service
Q 15 a Do you know green bag collection?
Yes
No
Go to Q15b
Go to Q16a
Q15b What is it?
Q 16 a Do you use green bag collection service?
Yes
No
Go to Q 16-b,c,d,e,f,g
Go to Q17
Showcard Q16b
Q 16 b What kinds of waste do you put in a green bag?
Record MA
kitchen waste
plastic packages
paper and newspaper
PET bottles
glass bottles
beer cans
tin cans
card boards
dead leaves
branches
diapers
others (please specify) _____
Q17
2015/9/2
3

Household

Showcard Q16c

Q 16 c How did you get instructions on how to use green bags — Record MA

from the Council	1	(91)
from NGO	2	(92)
from radio	3	(93)
from neighbors	4	(94)
from family members	5	(95)
no instructions	6	(96)
others (please specify) _____	7	(97)

Q 16 d When is the collection day? _____ (98)

Q 16 e How often do you use green bag collection service? — Record SA

every week	1	(99)
every second week	2	
once a month	3	
others (please specify) _____	4	

Q 16 f How many green bags do you use **per month**? How much do you spend to buy green bags **per month**?

_____ pieces (100) _____ dollars (100)

Q 16 g How do you think about green bag collection service?

(1) Punctuality		(101)	(2) Quality of service	(102)
very good	1		No left over of waste	1
good	2		A little bit left over	2
not good so much	3		A lot of left over	3
not good at all	4			
(3) Fee (Price of a bag)		(103)		
too expensive	1			
expesive	2			
reasonable	3			
cheap	4			

Only for those who said "No" of Q16a

Q 17 Why don't you use green bag collection service? _____ (104)

5. Reuse/recycling issues

Q 18 Do you separate recyclables from other waste and sell them to recyclers? — Record SA (105)

Yes 1 **Go to Q19**
No 2 **Go to Q21**

Showcard Q19

Q 19 Why do you separate and sell them? — Record MA

Recycling would reduce the amount of waste to landfill	1	(106)
Recycling would help to protect the environment	2	(107)
Recycling would earn you some extra money	3	(108)
Others (Please specify) _____	4	(109)

Q 20 What kinds of wastes do you sell?
How often do you bring them to a collection point and how much (weight or value) do you sell?

Items	Sell or not		Frequency		Selling amount at each selling		
23-1. PET bottles	1. Yes	2. No (110)		(111)	____ Kg (112)	____ AUD	(113)
23-2. aluminum cans	1. Yes	2. No (114)		(115)	____ Kg (116)	____ AUD	(117)
23-3. glass bottles	1. Yes	2. No (118)		(119)	____ Kg (120)	____ AUD	(121)
23-4. steel cans	1. Yes	2. No (122)		(123)	____ Kg (124)	____ AUD	(125)
23-7. vehicle battery	1. Yes	2. No (126)		(127)	____ Kg (128)	____ AUD	(129)
23-8. others specify:	1. Yes	2. No (130)		(131)	____ Kg (132)	____ AUD	(133)

Go to Q22

Showcard Q21

2015/9/2

Household

Q 21 Why don't you separate recyclable waste such as paper, bottles, and metals from other waste? — Record MA

It is inconvenient or difficult	1	(134)
It would take too much time	2	(135)
The need/benefit of recycling are not clear	3	(136)
There are no recycling systems	4	(137)
Others (Please specify) _____	5	(138)

6. Home gardening and composting

Q 22 Do you grow vegetables and/or flowers at your garden? — Record SA (139)

Yes, I do	1	**Go to Q23a**
No, but I am interested	2	**Go to A1**
No	3	**Go to A1**

Q 23 a How long have you grown vegetable or flowers? — Record SA

_____ years (140)

Q 23 b What (any person/groups or event) made you decide to start home gardening? (141)

Q 24 What kinds of vegetables or flowers do you grow? _____ (142)

Q 25 Do you sell vegetables or flowers on the market? (143)

Yes, I do	1	
No, but I am going to start	2	
No	3	

Showcard Q26

Q 26 Do you use compost? (144)

Yes, I am now using it	1	**Go to Q27&28**
I used it but now not using	2	**Go to Q27&28**
		→ Why did you stop using compost? (145)
I never use it	3	**Go to Q29a**

Q 27 How do you get compost? (146)

I (or family member) make compost	1	→ How to make compost? (147)
I get it from others for free	2	
I buy it	3	

Showcard Q28

Q 28 How do you think compost? (148) — Record SA

It makes vegetables grow faster/larger	1
It makes vegetables grow faster/larger a little bit	2
it does not have an effect on the growth of vegetables	3

Q 29 a Are you willing to buy compost? (149)

I'm willing to buy it	1
I want to buy it if it is cheap enough	2
I do not want to buy it	3

Q 29 b how much are you willing to pay it?

AUD _____ (150)

2015/9/2

Household

D 2 What is the last grade of formal education you completed? (168)

No formal schooling 1
Some primary 2
Completed primary school 3
Some secondary 4
Completed secondary school 5
Technical/Vocational 6
University 7
Post Graduate 8
Do not know 98
Refused 99

D 3 a Who is the head of your family? (169)

1. Male adult (Age:_____) 1
2. Female adult (Age:_____) 2

D 4 a How many people permanently live in your house? Please include yourself other adults, children and babies. Please include servants or guests who may be visiting you. (172)

D 4 b How many male and female? Please tell me age group of male and female.

Male				Female			
0-4	(171)	40-44	(177)	0-4	(190)	40-44	(196)
5-9	(172)	45-49	(178)	5-9	(191)	45-49	(197)
10-14	(173)	50-54	(179)	10-14	(192)	50-54	(198)
15-19	(174)	55-59	(180)	15-19	(193)	55-59	(199)
20-24	(175)	60-64	(181)	20-24	(194)	60-64	(200)
25-29	(176)	65-69	(182)	25-29	(195)	65-69	(201)
30-34	(177)	70-74	(183)	30-34	(196)	70-74	(202)
35-39	(178)	75+	(184)	35-39	(197)	75+	(203)
		Total	(185)			Total	(204)

D 5 Do you participate in any community groups? (205)

Yes ..... 1 → What's kinds of groups? (206)
No 2

D 6 How much do you pay for other utility services or basic need every month?

1. Electricity AUD _____ (207)
2. Drinking water AUD _____ (208)
3. Telephone AUD _____ (209)
4. Gas/kerosene AUD _____ (210)

Showcard D7

D 7 Could you please tell me, which category on this card best describes your **household** in terms of:

	Monthly Income (211)	Monthly Expenditure (212)	Monthly Saving (213)
Less than AUD 500	1	1	1
AUD 500 - AUD 1,000	2	2	2
AUD 1,000 - AUD 1,500	3	3	3
AUD 1,500 - AUD 2,000	4	4	4
More than AUD 20,000	5	5	5
Don't Know	98	98	98
Refused	99	99	99

Do you have any ideas to increase participation in using the Green bag collection?
If yes, please let us know.

_____

Please make comments regarding solid waste management in South Tarawa

_____
_____
_____
_____

Thanks again for your cooperation.

2015/9/2 7

Household

About you and your family

A 1 How old are you? (151)

Record Actual Age ☐☐ (152)

under than 18 (not qualified)	1	45 – 49 years	7
18 – 24 years	2	50 – 54 years	8
25 – 29 years	3	55 – 59 years	9
30 – 34 years	4	60 – 64 years	10
35 – 39 years	5	over 65 years	11
40 – 44 years	6		

A 2 Are you_____ (153) **Record SA**

Female 1
Male 2

A 3 Are you literacy? (154) **Record SA**

Yes 1
No 2

A 4 How many years have you dwelled in present premises? If you moved to the current place less than 5 years ago, where are you from? (155)

Less than 5 years ..... 1 → Where are you from? (159)
5 - 9 years 2
10 - 19 years 3
20 years or more 4
No response 5

Livestock

A 5 a Do you have livestock? (157)

Yes ..... 1 → How many? pigs ____ (158)
fowls ____ (159)
No ..... 2 others ____ (160)

A 5 b How do you treat manure of these livestock? (161)

_____

Media

How frequency do you _____

	Never	Rarely	sometimes	every day	
A 6 a read the **news** on newspaper?	1	2	3	4	(162)
A 6 b read the **news** on magazine?	1	2	3	4	(163)
A 6 c listen to the **news** on the radio?	1	2	3	4	(164)
A 6 d watch the **news** on TV?	1	2	3	4	(165)

A 7 Did you heard a radio ad promoting waste separation and recycling of organic waste before? (166)

Yes 1
No 2

Demographics

D 1 What is your occupation? (167)

full time (employed/self-employed) 1
part-time(employed/self-employed) 2
unemployed 3
retired 4
house wife 5
student 6

2015/9/2 6

7.2.5 Report of Delivery Lecture on Waste Education and Site Visits

Report of Delivery Lecture and Field Trip to a Landfill and Recycling Sites

J-PRISM organized a trial of Field Trip to Nanikai Landfill in order to develop a program and educational materials of field trips in the field of waste education. The outline of the field trip is summarized below.

1. Outline

1) Targets and Destination of Field Trip

- Target school: Abaunamoub Primary School
- Target students: Students of Year 4 (around 90)
- Site Visits: Nanikai Landfill, Betio Town Council, and Material Recovery Facilities

2) Program

Date: November 10, 2015

Venue: Abaunamoub Primary School

Schedule:

Time	Activities	Person in charge
8:15- 9:15	Lecture/Discussion at a classroom • Icebreaker: What's waste? • Lecture 1: Wastes in South Tarawa	ECD officers/Council officers
9:15 – 9:30	Moving to a landfill	TUC will arrange Taiwan trucks
9:30 – 9:50	Site visit (Nanikai Landfill) Lecture 2: Disposal site Management and three landfills in Tarawa	ECD officer (TUC officer)
9:50 – 10:10	Moving to Betio	
10:10 – 10:30 10:30 – 10:50	Site visit (two recycling sites) ● Betio Town Council (organic waste recycling) ● MRF of Kaoki Mange (aluminum cans and PET bottles recycling)	BTC officer Owner of the recycling company responsible for Kaoki Mange
10:50 – 11:10	Moving back to school	
11:10 – 11:40	Q&A Refreshment	

2. Contents of Lecture/Discussions

1. Icebreaker **What's Waste?**	**1) What's Waste?** Using illustrations of various types of waste

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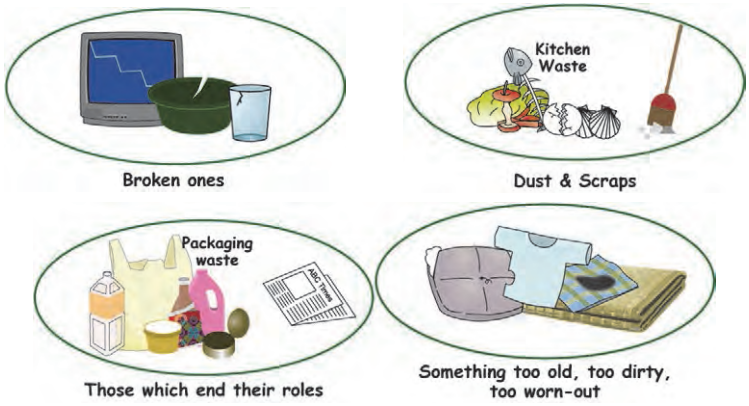
<u>Procedures</u>
1. To ask students to give examples of waste, thinking about daily life at home and school
2. To post illustrations of waste, which are mentioned by students, on the walls of the classroom

2) Definitions of Waste
Looking at illustrations of various types of wastes posted on the wall, try to divide them into several groups, according to the reasons why they became waste and define each group.

Examples


3) Categorization of Waste
Encourage students to categorize wastes, posted on the wall, according to the following categories.
● Returning to soil or not (Organic or Inorganic)
● Recyclable or Non-recyclable
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<td>2. Lecture
Our Waste in South Tarawa</td>
<td>
1) Current Situations of Solid Waste Management
● To introduce basic data and information on Solid Waste Management in South Tarawa
● To show the flow of waste, waste generation, storage, collection/illegal dumping/waste scattering to landfills

2) Problems
● To show problems caused by improper solid waste management
● To think about countermeasures
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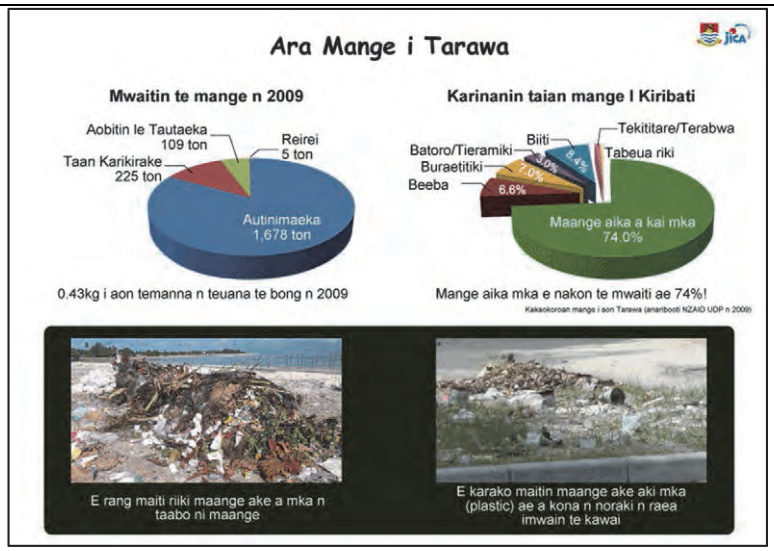


3) Necessity of Waste Minimization

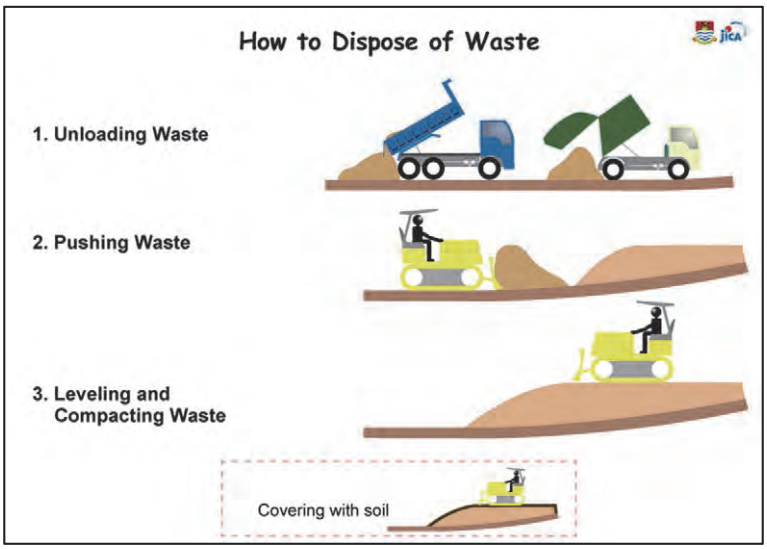
- To show why waste minimization is necessary
- To show examples of waste minimizations (3R related activities)
- To encourage schools and students to do waste minimizations
- To promote School Kaoki Mange
- To promote Waste Separation at schools for composting

3. Lecture

Waste Disposal in South Tarawa

1) What's disposal treatment at landfill sites?

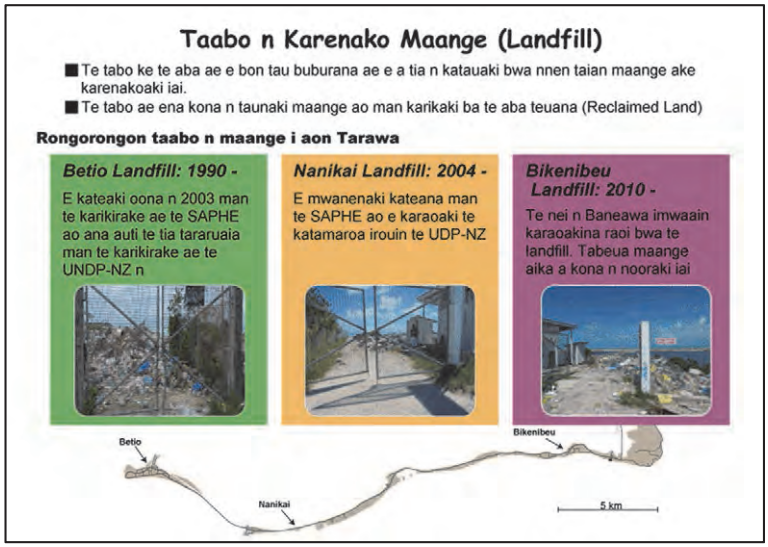
- Why we need landfill sites?
- How to dispose of waste at landfill sites?



2) 3 disposal sites in South Tarawa

- Introductions to 3 landfill sites in South Tarawa

3) Types of waste which accepted at landfill sites



3. Result

(1) Icebreaker, “What’s Waste”

Students were actively involved in the activities during the icebreaker. The result of categorization of wastes by students is shown below. The result shows that students well understood wastes and successfully categorized wastes into two groups, organic waste and inorganic waste, and later recyclables and unrecyclables.

Introduction of the icebreaker

A facilitator posted illustrations of waste, which

Students were requested to categorize each waste on

were mentioned by students the wall

Students were requested to categorize each waste on the wall

Result of categorization (a group of inorganic waste)

Result of categorization (a group of recyclables)

(2) Lectures and Site Visit

An ECD officer explained about disposal site management at Nanikai

A BTC officer showed their organic waste recycling activities at BTC office

BTC staff demonstrated a shredder operation

Head of recycling company, responsible for Kaoki Mange program, explained recycling activities

During the lectures and site visits, students were very active and got interested in solid waste management. It can be said that a field trip is good opportunity for students and teachers to get interested in issues of solid waste management in Tarawa and to consider starting 3R related activities, such as composting and Kaoki Mange, both at schools and home.

It is preferable for Ministry of Education to establish a cooperative relation with organizations concerned, such as ECD and councils, and to develop programs and educational materials of field visits in cooperation with these organizations.

7.3 Tonga

7.3.1 Operation Manual for Vava'u Rehabilitated Disposal Site (revised)

The Operation Manual for Vava'u Rehabilitated Disposal Site

Oct. 2014, Ministry of Health, TONGA

1. Daily Operations

1.1 Regular staff meeting

In order to make sure a proper gate control and management of incoming waste, MoH Health Inspectors shall visit the dumpsite **twice a week at least.**

MoH Health Inspectors shall check the following matters with (a) care taker(s);

- **Site conditions**
- **Operation work**
- **Working records**

If only one care taker appointed, MoH Health Inspectors shall send a trained replacement during his absence.

1.2 Gate Control System

Receiving and inspecting waste are the most important parts of daily operations.

All incoming vehicles shall stop at entrance point by crossing bar, and a care taker shall follow the necessary procedures before opening the gate as shown below;

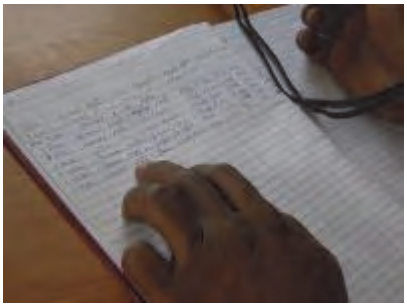
Gate Control

1.3 Information to be recorded:

It is important to collect information about the daily quantity and type of the waste in order to improve daily operations and for the future planning of waste management. The following information should be recorded in the working record book:

- **Time of arrival**
- **Type of waste** (e.g., general waste, green/organic waste, bulky waste, etc)
- **Generation source of waste** (Neiafu, etc)
- **Quantity of waste** (=Volume (on a load basis))
- **Source of waste** (e.g., residential, commercial, industrial, port, etc)
- **Vehicle type** (e.g. dump truck, van, pick-up, etc)


Recording in the office


Working record book


Opening the gate

After recording, the gate is finally opened. Once the vehicles enter the site, gate should be closed.

1.4 Recycling station

All incoming vehicles are inspected what they are carrying at entrance. In order to reduce waste going to the disposal site, the driver is requested to separate **Metals (UKAMEA)** and/or **Aluminum cans (KAPA),** and to place them at the designed recycling station.

Signboard for recycling station at site


Recycling station

1.5 Direction to the correct location for disposal


Guiding incoming vehicles to the correct location

Guiding vehicle to the proper disposal points

To ensure waste is disposed at the correct location, drivers are directed to the disposal location by a care taker. It is highly recommended to guide incoming vehicles until stopping to get them come closer to the proper disposal points.

1.6 Control over waste (WHERE waste should be disposed?)

Waste will be disposed as much as close to the embankment for easier pushing. Actually the incoming waste will be absorbed by the embankment leaving the cell base clear at all time.

Proper location for disposal
(between embankment and leachate pipes)

Waste disposed on the access road
(Need to avoid being this situation!)

1.7 Maintenance of the facility

Maintaining a clean, pleasant and secure the site is very important for maintaining a good image and good relationships with dump users and neighbors, and is also beneficial for workers. The following activities ensure the site is in a sanitary condition.

a. Killing unwanted weeds on the embankment

To avoid being bush at site, the embankment shall be kept clean by cutting grass. Landscaping works shall be carried out **once a month for dry seasons** and **twice a month for rainy seasons.**

b. Picking up scattered rubbish

Cutting grass on the embankment

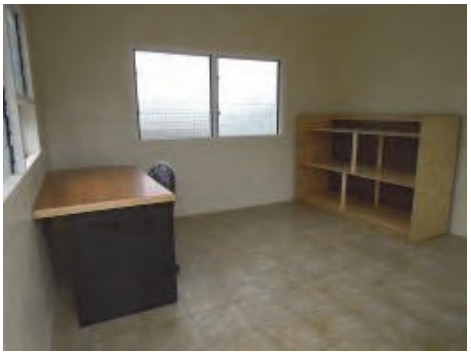
Changing of filtration materials

Picking of scattered waste from surrounding area

Scattered rubbish from the surrounding area of the gate and the administration office, outside of the embankment, on the access road and leachate treatment facility, must be picked up **when needed (once a month at least)**. Recyclable items can be also taken to the recycling cages by care takers.

c. Cleaning of inside of the Office

Clean sweep with broom and give the floor a mop **when it becomes dirty.**



Inside of the Office

1.8 Close of the day

a. Meeting

The meeting should be held in case some matters or problems regarding the operation work, fire events, accidents, etc., occurred. Necessary arrangements should be made for the next day's work.

b. Closing the gate

At the end of the operation work, the crossing bar shall be down and be locked using a key and chain.

Care taker locking a gate

2. Regular maintenance

2.1 Pushing of waste

MoH shall hire a Loader to push the disposed waste against the embankment **every two months.**

There are some options, so MoH shall choose the most cost-effective way.

	Frequency	Equipment (capacity)	Unit cost	Total cost for a year
Option 1	Monthly	Sinali's loader (2 ton)	TOP$100/hour	2 hour x 12 times a year = TOP$100 x 2 x 12 = TOP$2,400
Option 2	Monthly	Hamani's loader (23 ton)	TOP$300/hour	2 hours x 6 times a year = TOP$300 x 2 x 6 = TOP$3,600
Option 3	Monthly	Loader owned by Min. of Infrastructure (20 ton)	TOP$142/hour (for machine) and TOP$40/hour (for operator)	2 hours x 6 times a year = TOP$182 (TOP$142 + TOP$40) x 2 x 6 = TOP$2,184

2.2 Soil covering (if possible)

After pushing, the heap is ideally covered by soil to prevent flies generation, smell and fire if soil, machines and budget are available.

As there is good quality soil available within the boundary of Kalaka disposal site, this should be used for covering. Store a reasonable quantity of soil near the working face in an unobtrusive location.

Rough indication of thickness of covering is 15 to 20cm for periodical cover. Using too much soil will use up the soil more quickly and more importantly will consume landfill leaving less space available for rubbish.


Pushing of waste and soil covering by loader


Compacting waste and creating side slope

After covering, side slope shall be made and compressed by using an excavator.

2.3 Maintenance of access road

The approach road shall always be kept in a good condition by checking for proper drainage, so that no puddles or mud is formed.

Limestone is purchased from private company (TOP$150/5ton), so will construct and maintain a good approach road.

Before paving a limestone, the cell base should be well-leveled. When the road is paved, consider the vertical interval and slope angle around the road, otherwise the road will be buried with mud in the event of heavy rains. The access road shall be kept free of puddles and mud, especially in the working area.

The above maintenance works should be carried out **during the rainy season.**


Heap for drainage of rain water


Leveling by loader


Paving limestone

3. Finance plan for landfill management

MoH needs to secure necessary budget allocation shown below.

Works		Cost
(1). Management of incoming waste	Pushing and compaction of incoming waste (two hours for every time, every two months)	(a) Hiring of Wheel Loader : TOP$300/hour **(b) Yearly: TOP$3,600** (=(a) x 2 hours x 6 times a year)
(2). Maintenance of facility	Leachate treatment facility, Drains, Access road, Fence, Soil covering (two (2) times a year)	(a) Hiring of Excavator : TOP$350/hour (b) Hiring of Trailer and Truck for the transportation of Excavator : TOP$1,400 for a round trip (c) Total cost for one time: TOP$3,150 (= (a) x 5 hours + (b)) (d) **Yearly: TOP$6,300** (=(c) x 2 times a year)
(3). Administration costs (including the cost for garbage collection system)	Safety and protection gears for caretaker, Landscaping (grass cutters, etc), Facility expenses such as water tank, Fuel cost for inspection, etc	(a) Monthly: TOP$300 **(b) Total cost : TOP$3,600** (= (a) x 12)
	Total	**T$13,500 (annually)**

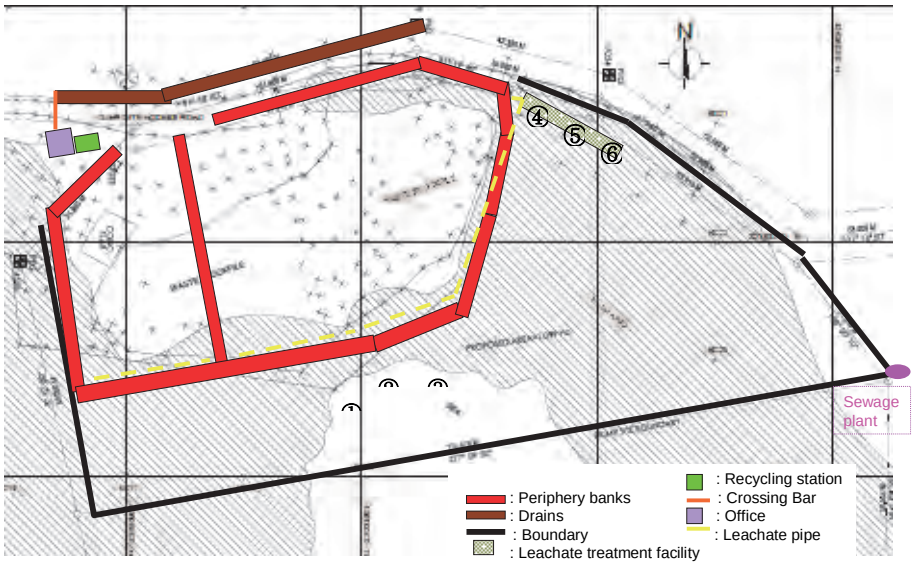
4. Water quality monitoring

4.1 Background

Kalaka landfill has been rehabilitated, however, there has been still serious concerns, especially water pollution at lagoon area. In order to assess the level of pollution caused by Kalaka disposal site and nearby environment, water quality monitoring shall be carried out **on a quarterly basis**, in collaboration with GEF-funded Integrated Water Coastal Management (IWCM) Project (former IWRM Project).

4.2 Sampling points

The monitoring team collects water samples at six (6) sites of Kalaka, includes three (3) points from lagoon areas facing to Kalaka disposal site and each sample from three (3) leachate ponds.



4.3 Monitoring parameters

Water quality determines the 'goodness' of water for particular purposes. Water quality tests will give information about the health of the waterway. By testing water over a period of time, the changes in the quality of the water can be seen.

The primary water quality parameters selected for the testing are shown as below;

Parameters	
On-site tests	Laboratory testing
- Turbidity/Transparency	- Ammonia
- Temperature	- Nitrate
- pH	- Phosphate
- Electrical conductivity (EC)	- Faecal coliforms (indicator bacteria for possible pathogenic organisms which are harmful to human health).
- Dissolved Oxygen (DO)	

On-site test is conducted on site. Simple laboratory for water monitoring was newly established in the MoH Vava'u office (in the Nqu Prince Hospital, Vava'u) in October 2013, so all water samples collected in the field is also analyzed in the laboratory.

Summary of monitoring parameters (source: IWCM report)

Parameter	Instrument	Expected Results
EC	WPR-84 Water Quality Meter	
Depth to Water	Solinist	
pH	WP-84 Water quality Meter	A ph range of 6.5 – 8 is optimal for freshwater. A range of 8 – 9 is optimal for estuarine and sea water.
Temp	DelAgua membrane filtration kit/Solinist	
Dissolved Oxygen	Handhelp YSI Water Quality Meter	Estuaries 60 – 120 Marine 90 - 110
Turbidity	DelAgua membrane filtration kit	Excellent = 10 NTU's Fair 15-30 NTU's Poor > 30 NTU's
Bacteria (faecal coliforms)	DelAgua membrane filtration kit	Saltwater 104 CFUs per 100 ml Fresh water 61 CFUs per 100 ml
Ammonia	HACH Method	– no guideline based on health; guideline based on odour and taste are 1.5 and 35mg/L respectively.
Phosphate	HACH Method	As PO_4 Low < 0.06 Medium 0.06 – 0.15 High > 0.15 – 0.45 Very High > 0.45
Total Nitrogen /Nitrate	Hach Method	Total N Low < 0.5 (2.2) Medium 0.5 – 1.0 (4.4) High > 1.0 – 3.0 (13.2) Very High > 3

Confirmation of monitoring procedures at site

Sampling from lagoon area next to disposal site

Sampling from leachate pond

Collected samples（left three (3) taken from lagoon area, right three

Testing at Laboratory established in MoH Vava'u Office

Testing of Faecal Coliform by MoH staff

(3) taken from leachate ponds）

4.4 Reporting and countermeasures

The results of water quality monitoring shall be reported to the Vava'u Solid Waste Management Steering Committee.

Necessary countermeasures should be examined and taken if any negative results were found.

5. Monitoring Committee

As proposed in the Rehabilitation Plan of Kalaka final disposal site in Vava'u, which was finalized in Aug. 2012, Monitoring committee shall be established to make sure a proper dumpsite management system.

The committee will have the following duties;

- The committee members shall visit the site to observe the environmental condition of the site and its surroundings every six months.
- The committee shall be regularly reported based on the working records and the result of water monitoring.
- The committee shall give a necessary advice and assistance immediately to any incident of effect on environment such as fire.

The committee members will be consisted of relevant Ministries, organizations and community representatives as follows (tentative).

① Governor of Vava'u (Chair of Vava'u Solid Waste Management Steering Committee)
② OIC of MEC
③ OIC of MoH Prince Nqu Hospital
④ OIC of Ministry of Infrastructure
⑤ OIC of Ministry of Finance
⑥ VEPA
⑦ Town Officer of Okoa Village

Japanese Technical Cooperation Project
for Promotion of Regional Initiative
on Solid Waste Management in Pacific Islands (J-PRISM)
in Kingdom of Tonga

Garbage collection Plan in Vava'u

Incl. Pilot Project Plan

(Final draft)

April 2015

Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication (MEIDECC)
Ministry of Health
Ministry of Internal Affairs

Vava'u Solid Waste Management Steering Committee

Index

ANNEX

1 Background

In order to achieve the vision of the Vava'u Solid Waste Management (SWM) Plan, which is to "Establish an effective Solid Waste Management system in Vava'u by the year 2021, in order to keep great Vava'u clean and healthy", a garbage collection system with introduction of waste minimization practices should be established.

2 Current Garbage Collection System in Vava'u

2.1 Waste flow

Based on the baseline survey, which was carried out by J-PRISM Project in FY 2011, a waste flow in Neiafu Distinct is drawn as shown in Figure 1. All the figures shown were estimated based on the average amount between on-season and off-season.

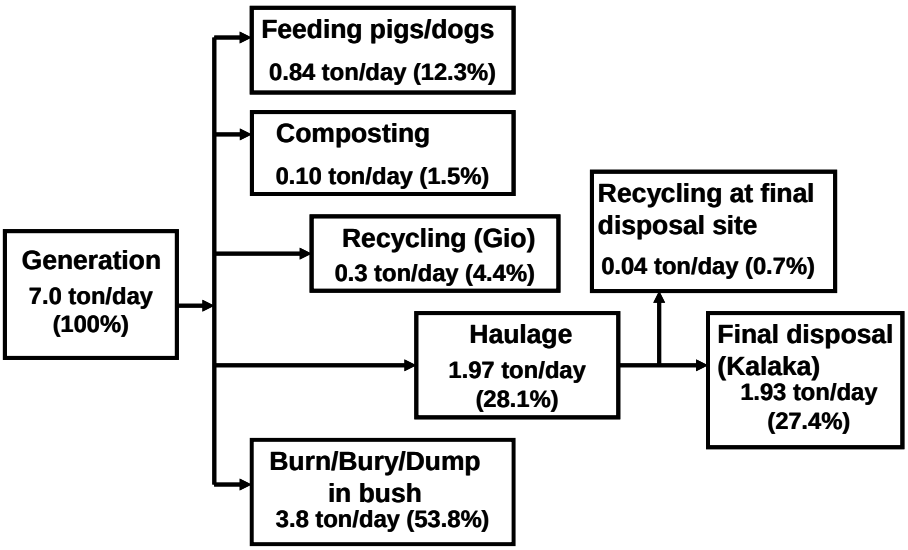


Figure 1: Waste stream diagram of Neiafu District

2.2 Storage/Discharge

a. Household waste

Burning, burying and dumping waste in the bush are common methods for households in Vava'u due to lack of garbage collection service. Most kitchen waste is used for feeding pigs and dogs. Some people carry out composting but in a traditional and natural way such as covering on their plantation farm. A few communities, namely Toula and Leimatu'a, have placed rubbish bins on streets in their area on their own initiative.

Open burning in the backyard

Rubbish bin placed in Toula

Rubbish cage placed in Leimatu'a

b. Commercial waste

Most of businesses have own yard or space to storage for their waste. Some businesses store their waste separately by waste type.

Storage yard at Bar and restaurant (incl. yacht waste)

Storage place at wholesale store

2.3 Collection / Final disposal

a. Household waste

There is no garbage collection system for households, therefore, residents have no other choice than to haulage their waste to the final disposal site (Kalaka) by themselves.

Toula community in Neiafu District, has placed rubbish bins on streets in the area, hires a truck by community and empties bins every Saturday. The operation cost is paid for primarily by foreign residents living in the area.

Also, Kava Club youth group of Leimatu'a community has taken initiative to carry out a garbage collection services. They also collect metals separately for recycling purpose. This activity was not conducted irregularly, but undertaken on their own initiative. There are some possibilities to apply similar system to other communities in Vava'u.

Resident dumping waste at Kalaka landfill

Truck hired by community with rubbish bin (Toula)

Collection work by community (Leimatu'a)

b. Commercial waste

One private company has provided a garbage collection service on individualized contract basis. Service users are mainly business establishments like bars, restaurants and some foreign residents. As of June 2012, around 14 businesses are using the service. Collection fee is charged from TOP$30 - TOP$350 per month that depends on the frequency of collection, the amount of garbage discharged and the location of collection point.

Ministry of Health (MoH) is collecting general waste discharged from the Nqu hospital and their staff compounds. MCTLA (Ministry of Commerce, Tourism and Labor) placed the bins in 2014, and different government departments and businesses are responsible for emptying the bins.

Collection of commercial waste by private company

MoH workers collecting waste from Nqu hospital staff compounds

Bins placed by MCTLA

2.4 Equipment for collection

The trucks as shown below are currently utilized for garbage collection in Vava'u. The 3.0 ton - truck owned by MoH Vava'u is often broken down. The private company owns a 2.5 ton – truck and used for collection of commercial waste, however, the compaction function of truck is out of order.

Truck (3.0ton) owned by MoH Vava'u

Truck (2.5 ton) owned by private company

3 Definition and Category of Waste

Vava'u residents are not used to discharging their waste due to lack of garbage collection system in place, so they might not clearly understand (1) "what waste is" and (2) "what to do with each type of waste". Definition of "Waste" should be clearly defined and be aware by Vava'u residents through a series of awareness activities.

3.1 What is "Waste"?

"VEVE" means "waste" in Tongan language, and is defined under the Health Act 1992 as " 'Oku kau ki ai 'a e veve (garbage), veve faka'api, melenga, moveve pea mo e veve mei ha 'api ngau e".

In English, the above means "waste will include garbage, household and commercial waste , which is unwanted leftover from consumption and production process, and discharged output which has no marketable value.

3.2 What to do with each type of waste?

After clarifying the definition of "Waste", Vava'u residents also need to fully understand that waste can be divided into the following four (4) categories;

Table 1 Category of waste

Category	Target waste	Ratio to total household waste (%)
"Waste" to be self-disposed at home	Kitchen waste, Green waste (food peelings, plants, branches, leaves, grass, weed, soils, etc)	51.5 %
"Waste" to be discharged to recycling containers/station which are placed in the community	Aluminum cans, Tin cans, Small metals	4.5 %
"Waste" to be taken directly to GIO Recycling	Bulky waste (home electronic waste, etc), Metals (except the above ②)、E-waste, etc	4.5 %
"Waste" to be discharged to garbage collection service	Other than those above (Plastics, Paper, Glass, Textile/ Cloth, Diaper, etc)	39.5 %

a. "Waste" to be self-disposed at home

Kitchen waste and Green waste should be discouraged to discharge to the garbage collection. These waste accounts for approx. 50% of total generation amount of household waste, so proper self-disposal practices such as composting should be promoted, that contribute much to reduce waste amount to be collected and to be disposed at dumpsite.

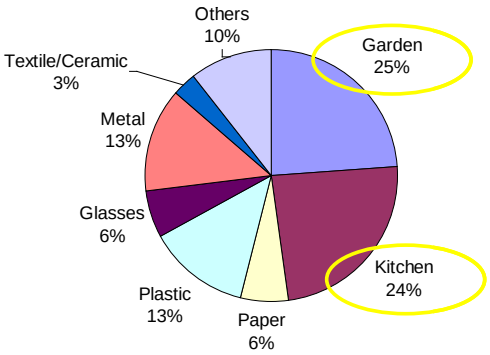


Figure 1 Waste composition in Vava'u[1]

a.1 Kitchen waste

In Vava'u, most of kitchen waste is fed to pigs and dogs at home. Some other kitchen waste such

[1] Waste Amount and Characterization Survey was conducted by JICA-J-PRISM Project in 2011 and 2012.

as taro pealing can be taken to the backyard to make compost mixing with green waste.

Typical kitchen waste

Feeding pigs

a.2 Green waste

Green waste is discouraged to dispose at Kalaka landfill in order to prevent leachate generation. Green waste can be taken to the backyard to make a compost. Open burning of green waste mixing with other waste, especially plastics, is also discouraged to avoid harmful gas generation such as dioxin.

Green waste

Composting at backyard

b. "Waste" to be discharged to recycling containers/station which are placed in the community

b.1 Target items

Target items which can be discharged to recycling containers/station, should meet the following requirements;

① Acceptable to the recycling company such as GIO Recycling
② Sufficient amount of items can be discharged
③ Small size can be fit to recycling containers/station

In Vava'u, Aluminum cans, Tin cans and small batteries will be mainly targeted.

b.2 Containers/Stations of recyclables collection

The following table shows some options of recycling container and station to be established in the community are shown below;

Table 2 Options of recycling container and station

				
Type	Plastic basket	Iron cage	Nylon sack	Wire, Steel plate
Cost	$10 – 20 /bin	$125 – 600 /cage	$60	- $100
Advantage	- Easily obtainable - Removable	- People has already accustomed to this for recycling - Adjustable size	- Large capacity - Visually attaractive	- Large capacity - Easy setting up
Disadvantage	- Lack of stability (easily movable by strong wind, etc) - To be stolen easily	- Expensive to procure - it gets rust easily	- Need to procure from Tongatapu or overseas - Will take time to fill up - To be easily mixed up with other waste as it's not visible externally	- Need to find enough open space - Need to monitor to avoid mixing of other waste

b.3 Location and responsible management

The location of recycling containers/station and the responsible management strategy and function should be determined by community (see some options shown below). The recycling station should be placed at an easy-to-access place for all residents, i.e, community halls, churches, schools and Falekoloa (shops). Community halls and Falekoloa (shops) are the best location as the large amount of empty can is discharged.

Table 3 Location and responsibly body of recycling station

Location of recycling station	Responsibly body
1. Community halls	Community group (Town Officer, Kava club, etc)
2. Churches	Pastor, Youth group, Women's group
3. Schools	"VEVE" (= Waste) Management Committee which is established through Clean School Program
4. Falekoloa (Shops)	Manager of the shop or shopkeeper

Cage placed at Community Hall

Cage placed at Falekoloa (Shops)

Cage placed at School

b.4 Operation procedure

Operation procedure for recycling station is as follows;

1) "VEVE" Committee, which is established in the community, will monitor each recycling station on a regular basis.
2) If the cages/containers become full with recyclable items, the Committee hauls them to the GIO Recycling on garbage collection days. GIO Recycling weighs them and pay money in accordance to the market price.
3) The Committee records the amount of recyclables collected and the amount of profits received.
4) The records are reported to the whole community through meetings on a regular basis.

Apart from the above system, each household is encouraged to bring recyclable items to "GIO" directly.

c. "Waste" to be taken directly to GIO Recycling

Bulky waste like abandoned vehicles, refrigerators and iron roofing shall divert directly to the GIO Recycling as it will become obstacles for normal garbage collection. In case residents can't take them directly to GIO Recycling by themselves, contact GIO Recycling for necessary arrangements.

Bulky waste

d. "Waste" to be discharged to garbage collection service

Waste other than the above waste that includes "Plastics, Paper, Glass, Textile/ Cloth, Diaper, etc.

4 Proposed garbage collection system

The quantity and quality of waste generated from (1) households and (2) businesses are different therefore, the optimum garbage collection system should be examined in different ways.

4.1 HOUSEHOLD WASTE

4.1.1 Background

The following points were taken into consideration in examining optimum garbage collection system in Vava'u.

a. Limited capacity of government (MoH)

In Tonga, there are no local municipalities, so the national government has normally a small branch office in each main island. Under the Waste Management Act and Public Health Act No29 of 1992, Ministry of Health (MoH) has a responsibility for solid waste management (SWM) in outer islands groups, however, their technical, institutional and financial capacities are very limited. Only two health inspectors have been assigned to look after 15,000 population size of the Vava'u Islands. MoH Vava'u owns an old 3.0 ton open truck and uses it for collection of waste generated from hospital compounds, but has continuously faced mechanical issues. The MoH's average annual budget for waste management in Vava'u is TOP$1,500 (≒US$900). The people of the Kingdom of Tonga do not have current obligations to pay a residence tax, including a waste levy, so that MoH's budget is the only revenue for waste management in Vava'u.

b. Issues of garbage collection system in Tongatapu

In the capital of Tonga, Tongatapu, the Waste Authority Limited has provided commercial, industrial and residential waste collection services. Each household needs to pay $10 per month in exchange for specific bags to discharge waste. Only waste filled in specific bags are collected by the Authority on the collection days (once a week). The waste levy collected by households was supposed to cover the operation cost, however, the government has been forced to subsidy the cost as not all households pays (recovery rate is less than 50 %). The Waste Authority is expected to expand their service to the outer islands such as Vava'u in future, but their system needs to be firmly established in a sustainable way in Tongatapu first.

c. Lessons learnt from the past

The garbage collection was piloted by the project funded by EU (2004 - 2006) and collection works had been contracted out to the private company. It was successful during the project, however, the service was stopped after the project ended since the government (MoH) couldn't secure sufficient budget to pay the contract fee. The government would provide a garbage collection service in the same way that other countries do, however, it seems be risky to rely fully on the government budget allocation.

d. Finance issues of outer islands

MoH has the authority to impose a waste levy, however, Vava'u Islands are remote islands, so that all the monies collected from the people of Vava'u would be integrated into the general account of the MoH head office in the capital island, Tongatapu. This is one of the main difficulties to ensure appropriate budget allocation not only for Vava'u but for other outer islands in Tonga.

e. Strongly united community in outer islands

The households in Vava'u belong to a community group led by Town and District Officer according to the living area. These community groups are well-organized, united and implement various community activities such as clean-up activity. The expenses of these activities are normally covered by the community funds collected through a series of fundraising programs. Some community members have owned a 1.5 – 3.0 ton open dump truck, which can be used as garbage collection truck. In fact, some communities in Vava'u like Leimatu'a and Toula have already conducted a garbage collection system with community's own initiative. Community itself must have the potential to implement a garbage collection by themselves, instead of relying on the government.

4.1.2 Outline of community-based garbage collection system

Taking the above conditions into consideration, community-based garbage collection system is an optimum system for Vava'u.

a. Target waste

Waste items except for kitchen waste, green waste, recyclables waste (metals).
That includes plastics, papers, glasses, textile/cloth and diapers.

b. Implementation unit (community unit)

The community-based garbage collection is implemented by each town/village unit. Neiafu Town is divided to some divisions like Aloitalau, Vaipua, etc.

Table 4 Town and village of Vava'u Islands[2]

	Name of District/Town	Population	No. of Households		Name of District/Town	Population	No. of Households
Neiafu District		5,774	1,087	Hahake District		2,297	418
	Neiafu	4,051	771		Ha'alaufuli	412	82
	Makave	443	88		Ha'akio	139	28
	Toula	411	83		Houma Vava'u	136	25
	Utui	302	46		Mangia	104	19
	Ofu IS	161	27		Ta'anea	706	121
	Okoa IS	266	50		Tu'anekivale	487	86
	Olo'ua IS	140	22		Koloa	197	37
Pangaimotu District		1,325	244		Holeva	116	20
	Pangaimotu	661	125	Hihifo District		2,105	405
	Utulei	132	26		Longamapu	613	121
	Nga'unoho	218	34		Taoa	496	89
	Utungake	311	57		Tefisi	588	113
	Tapana Is	3	2		Vaimalo	95	20
Leimatu'a District		2,436	466		Tu'anuku	313	62
	Leimatu'a	1,105	218	Motu District		985	214
	Holonga	453	81			**Total Pop.**	**Total No. of Household**
	Feletoa	388	65			**14,922**	**2,834**
	Mataika	490	102				

c. Implementation procedure

The implementation procedure is shown below.

c.1 Decide target communities

According to the Expansion Plan which is shown on Page 31, target communities for the year are decided. The plan should be revised when necessary.

c.2 Contact Town Officer to request for arrangement of the meeting

MEIDECC officer in charge contacts Town Officer of target community to request for arrangement of the meeting with the District Officer's support.

c.3 Meeting with Town Officer and community representatives to confirm their willingness

In the meeting with Town Officer and community representatives, the following topics are explained.

- Current status and issues of waste management in Vava'u Islands
- Need of garbage collection system
- Why community-based?
- Outline of the community-based garbage collection system
- Implementation procedure
- Case study of pilot communities
- Request for establishment of "VEVE" (= waste in Tongan language) Committee

[2] Referred to Tonga Census Report 2011.

Community meeting
（Mataika, Sep 2014）

MEC answering questions
（Tefisi, Sep 2014,）

c.3.1 (Community to) Establish a "VEVE" Committee

The community is encouraged to establish a "VEVE Committee" (= Waste Committee in Tongan language). The Committee is composed of Town officer as a chairman, women group and youth group members.

VEVE Collection members (Longomapu)

The name of all members is filled in the format (see ANNEX 1 "Format of VEVE Committee List") and the community needs to submit it to MEIDECC or MoH.

The committee will play an important role for waste management in the community, in terms of planning, awareness rising, implementation and monitoring. Youth members are main actors for implementation of collection works.

c.4 (VEVE Committee to) Develop an implementation plan

Once VEVE Committee is established, they need to develop an implementation plan of waste collection. The plan format is attached as ANNEX 2 "Format of Hiko VEVE Plan". The plan is composed of the following items.

① Frequency of collection *(How often?)*
② Collection day *(Which day?)*
③ Collection time *(What time?)*
④ Collection workers *(by Who?)*
⑤ Collection truck *(by What?)*

Collection rote

⑥ Platform for collection of "VEVE" (= waste in Tongan language)
⑦ 3R Plan (Cages for collection of "KAPA" (= empty cans in Tongan language))
⑧ Finance plan *(financial source for operation cost)*
⑨ Implementation schedule

*(1) Questionnaire survey (to be highly recommended to conduct by VEVE committee)

It is recommended to conduct a questionnaire survey in order to understand resident's views on the need of garbage collection, convenient timing of collection and willingness to pay, etc. The format questionnaire is attached ANNEX 3 "Format of Questionnaire survey". The results of

survey should be reflected the plan.

* (2) Technical advice provided from MEIDECC/MoH

Community-based waste collection is new concept for the community, so MEIDECC and MoH provide technical advice when necessary.

MoH joining in the Committee meeting (Kameli)

MoH discussing with Committee members (Tu'anekivale)

Committee members discussing the location of cages to be placed (Longomapu)

① Frequency of collection

The frequency of collection should be determined considering the following conditions;

1) Population size
2) Estimated amount of waste discharged (approx. 40% of total waste generation amount)
3) Distance to Kalaka final disposal site
4) Community's own capacity (finance, capacity of collection truck, etc)

It is recommended to have a collection day:

- Town area: once or twice a month
- Villages: once a month

The frequency of collection can be re-examined according to the actual conditions.

② Collection day

It depends on the community, but should be fixed on a specific week and day of every month (i.e. last Saturday of every month). If collection day is re-scheduled by some reasons, VEVE Committee should inform the whole community of the change in advance.

③ Collection time

A collection time is determined by community, but should be set at specific time like 9am on collection days. Collection work should start at the designed time on every collection day.

④ Collection body and workers

The necessary number of collection workers depends on the community though it is recommended to include one driver and two workers at least. Youth members will be main actors for implementation of collection works.

⑤ Collection truck

Community needs to examine the possibility to use trucks which belong to the community or

individuals. A 3.0 ton pick-up truck and back-lifter are the most appropriate for waste collection works, and load-carrying tray should not be too high to load waste manually.

Collection truck (Kameli)

Collection truck Tu'anekivale)

⑥ Collection rote

Based on the road map of the target community, the efficient collection rote should be examined in advance. A driver needs to follow the designated rote on collection days.

⑦ Platform for collection of "VEVE" (= waste in Tongan language)

Curbside on the main road is a desirable place to discharge. Residents, who live in off-street area, are requested to bring their waste to the main road.

It is strongly recommended to let households build a platform as collection station to avoid scattering waste by pigs and dogs. It also make collection work easily and efficient. Platform can be shared among neighbors.

Waste discharged on curbside (without platform)

Waste discharged on platform

Waste discharged on platform

⑧ 3R Plan (Cages for collection of "KAPA" (= empty cans in Tongan language)

In order to reduce waste going to disposal site, some cages are placed in the community for collection of KAPA. The location of cages should be determined by the community.

The cages should be placed at an easy-to-access area for all residents, i.e, community halls, churches, Falekoloa (supermarkets) and schools. Community hall is the best location as large amount of empty cans are discharged through various occasions and events that take place. Appointed people such as VEVE Committee members should monitor cages regularly.


Community Hall (Longomapu)


Falekoloa (Longomapu)


GPS (Longomapu)

⑨ Finance plan (financial source for operation cost)

(1) Expenditure

Garbage collection requires a cost, so the community needs to find financial source to cover the operation cost somehow. The amount of collection fee should be determined according to;

① fuel cost
② hiring cost of truck
③ labor cost (or refreshments cost for labors)

In addition, if the committee distributes plastic bags for waste discharge to households, the cost should be included in the operation cost. The table below shows an example of average expenditure of collection work at pilot communities.

Name of District	Neiafu District	Hahake District	Leimatu'a District	Hihifo District
Name of community	Kameli	Tu'anekivale	Leimatu'a	Longomapu
① fuel cost	TOP$100	TOP$40	TOP$50	TOP$100
② hiring cost of truck				
③ Refreshments	TOP$35	TOP$20	TOP$100	TOP$45
Total	TOP$135	TOP$60	TOP$150	TOP$145

(2) Income

In Vava'u, each household belongs to community group led by Town and/or District Officer. These community groups are well-organized, and implement various community activities such as clean-up activities using community funds, that is the money collected from households through fundraising. The money is also well managed by treasurer who has been appointed by the community. In order to secure sufficient operation cost, there are two options to be proposed to the community, which are;

1) community funds (money collected through fundraising)
2) waste levy (to be collected from each household)


Fundraising Kava Club (Leimatu'a)


Resident paying a waste levy to VEVE Committee (Kameli)

⑩ Implementation schedule

The Committee needs to decide implementation schedule of the following activities with due date.

1) Establish a VEVE Committee
2) Develop a HIKO VEVE PLAN
3) Awareness raising for the whole community
4) Build platforms by households for garbage discharge
5) Assemble cages for collection of small metals
6) Start implementation of garbage collection work

c.5 (VEVE Committee to) Organize a community meeting to finalize the Plan

After drafting the implementation plan, VEVE Committee will organize a community meeting to call upon all households, and explain about contents of the "HIKO VEVE" draft plan and make amendments from the community's views as necessary.

Once the plan and collection schedule are confirmed, the development of a collection calendar will be one of the most effective ways to inform households of the annual schedule. An example of collection calendar (made by Tu'anekivale community) is as shown below (see ANNEX 4). The collection day is indicated by yellow color.

Resident paying waste levy to VEVE Committee (Kameli)

Collection calendar (Tu'anekivale)

c.6 (VEVE Committee to) assemble cages for collection of KAPA

According to the final plan, cages for collection of KAPA (=metals) are assembled by VEVE Committee members, and are placed at designed place.

VEVE Commiittee assembling cages (Tu'anekivale)

Installation of cages by VEVE Committee (Tu'anekivale)

c.7 (VEVE Committee to) start implementation of garbage collection

c.7.1 (Households) Storage

Households need to prepare the approximate number and size of bags/containers for storage of their waste.

c.7.2 (Households) Discharge rules

Each household needs to follow the discharge rules as described below.

1) Discharge day *(Which day to discharge?)*
2) Discharge time *(What time)*
3) Ways of discharge (waste should be packed in the bag/sack and be tied properly with a string

The discharge rules should be informed by VEVE Committee through a series of awareness activities to each household.

① **Discharge day** *(Which day to discharge?)*

Households need to discharge their waste on the collection day.

② **Discharge time**

Households need to discharge their waste on the specific time on the collection day. In order to prevent wastes from being left for a long and scattered by pigs and dogs, it is recommended to discharge waste just before the designed collection time. Some people might hand their garbage bags over to collection workers, but it is not recommended in terms of efficiency of collection works.

Resident discharging waste before collection

Resident handing their waste bag over to collection worker

③ **Ways of Discharge**

Options for discharge bag/container are as shown below. If discharged by bags or sacks, it should be bound when discharged, that makes collection work easy and efficient. .


a) Leaf bags


b) Plastic bags


c) Nylon sack


d) Carton box


e) Plastic container


f) Wheelie bins

c.7.3 Announcement/ Reminder by Town Officer or VEVE Committee

In order to encourage households to discharge their waste on collection days, it is recommended to make announcement through **speaker and local radio** just before the collection work starts.


Announcement by Town Officer (Okoa)


Announcement by VEVE Committee (Longomapu)

c.7.4 (VEVE Committee to) Implement a waste collection

According to the collection schedule (at designed time and day), VEVE Committee will implement waste collections. KAPA (=metals) is separately collected.

(1) Waste (=VEVE)


Waste collection from platform (Kameli)


Collection of waste disposed in wheelie bin (Longomapu)


Waste disposal at Kalaka disposal site (Tu'anekivale)

(2) Metals (=KAPA)

Collection of recyclable items (Longomapu)

KAPA (=empty cans) separately discharged in cages (Longomapu)

Collection points of recyclables (Tu'anekivale)

Collection of KAPA (Leimatu'a)

Recyclables items hauling to Gio (Longomapu)

Representatives of VEVE Committee received profits (TOP$25.55) (Longomapu)

c.8 Monitoring

On collection days, MoH and MEIDECC visit the sites and follow collection trucks to monitor community's collection work.

Monitoring done by MEIDECC/MoH

VEVE Committee is requested to submit "Monitoring sheet" after every collection day to MEIDECC/MoH. The format of monitoring sheet is attached as ANNEX 5 "Monitoring Sheet". The monitoring results were shared with VEVE Committee of each community.

Reviewing of monitoring results and discussing for further improvement (Longomapu）

Sharing of monitoring results with VEVE Committee (Kameli)

4.2 COMMERCIAL WASTE

The amount of commercial waste generated from business activity is larger than that of household waste. In general, businesses people should deal with their waste as their own responsibility. In Vava'u, the following practices are promoted to business establishments;

1) Promote August Hoefts garbage collection service
2) Promote 3R practices
3) Awareness for proper disposal of waste generated from yachts at businesses that provide this service.

4.2.1 Promote August Hoefts garbage collection service

The Project conducted a survey on current waste management system for some businesses in Aug 2011 and Jan 2012 as a part of baseline survey. It was found that 14 businesses, especially bars and restaurants, are using the garbage collection service which is provided by a private company, Mr August Hoeft, while other businesses such as Chinese supermarkets *(Falekoloa)* are hauling their waste by their own pick-up truck.

For businesses who do not have own garbage collection system, August's service is the option to use. The details like frequency of collection and its fee should be negotiated between businesses and Mr. August Hoeft.

4.2.2 Promote 3R practices

a. Target items

Businesses discharge a huge amount of following items;

Table 5 Waste type by type of business

Type of business	Items to be discharged	3R method
1. Bars / Restaurants	Beer bottle, Aluminum can, Wine bottle, PET bottle	Separate discharge for recycling
2. Supermarket（Falekoloa）/ wholesale store	Cardboard boxes	Reuse as much as possible (as alternative to plastic bags)

b. Cardboard boxes

Cardboard boxes should be reused as alternative to plastic bag as much as possible.

c. Aluminum cans and tin cans

Once all the items are mixed up with other waste, it is difficult to segregate them again. Therefore, it is very important to discharge separately at each generation source. The following methods of separate discharge are promoted;

c.1 To be taken directly to GIO Recycling

A recycling company based in Vava'u, GIO recycling, has currently established a "Drop Point" for cans, e-waste, batteries and metals. Any businesses and residents can access to this point. The system should be promoted to all businesses.

Drop point with Gio manager

Drop point

Container for carton box with lid

c.2 Establish a communal recycling station

It is recommended to establish a communal recycling station at places where shops surroundings can easily access. Removal recycling station such as cage, will be appropriate for this. Location of recycling station and its responsible body should be determined by businesses. The person, who has a shop nearby recycling station, will have a responsibility for the management of station. The owners of recycling station are requested to contact a GIO Recycling when containers are filled up with recyclables. GIO recycling will visit the site to empty cages. The necessary cost of establishment of recycling cages/stations should be borne by businesses.

4.2.3 Awareness for Yacht waste

Visiting yachts are not aware what to do with their waste, so waste discharge points and location of recycling station should be guided by Ministry of Heath as a part of health declaration activity. The leaflet can be provided when they arrived at harbor. Environmental tax for tourists is also examined (refer to the Solid Waste Management Plan for Vava'u for more details).

5 Pilot Project Plan

5.1 Objective

The pilot project will be conducted to verify the practicability of the proposed community- based Garbage Collection System and 3R Activity (recycling).

The proposed system will be reviewed, evaluated and re-examined considering good practices and lessons learnt through pilot projects.

5.2 Period

Pilot Projects will be implemented from September 2013 to February 2014 for 6 months.

5.3 Implementation procedure

The Pilot Project will be implemented according to the following procedure and schedule.

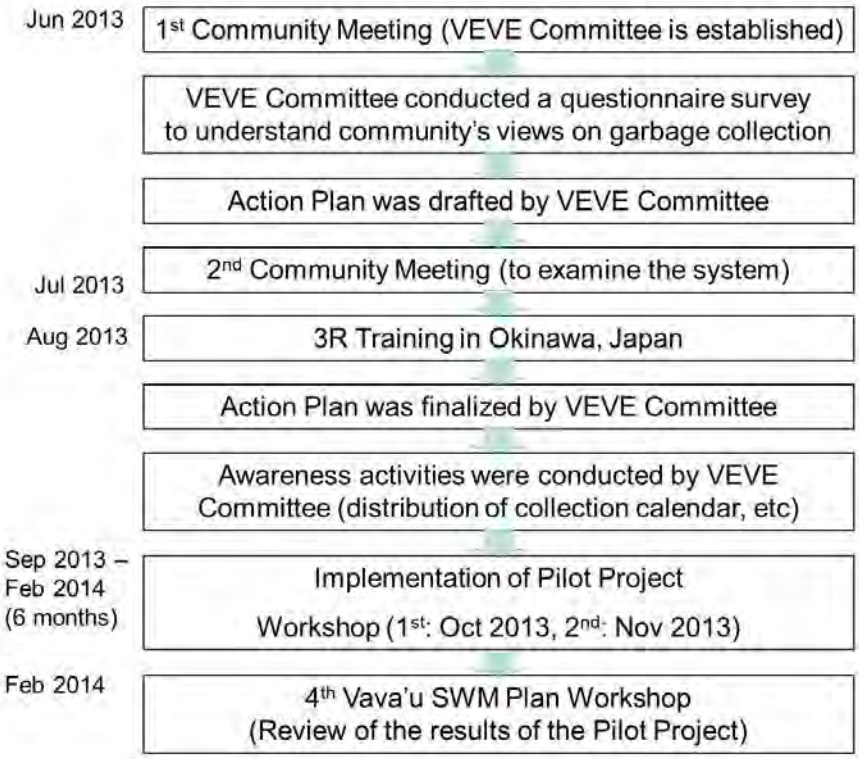


Figure 2 Implementation schedule of Pilot Project

5.3.1 Select pilot community

Vava'u islands can be divided into the following district[3].

[3] Tonga National Population and Housing Census 2011, Preliminary Result, Statistics Department Tonga, April 2011

Table 6 Vava'u district and its population

		Total Pop.	No.Household	Percentage (%)
Name of District		**14,936**	**2,828**	**100.0%**
	Neiafu	**5,768**	**1,082**	**38.3%**
	Pangaimotu	**1,327**	**244**	**8.6%**
	Hahake	**2,300**	**418**	**14.8%**
	Leimatu'a	**2,434**	**465**	**16.4%**
	Hihifo	**2,104**	**405**	**14.3%**
	Motu	**1,003**	**214**	**7.6%**

Taking into account its geographical characteristic of area, the Project selected the following four sites from each District as pilot project sites;

Table 7 Outline of pilot communities

District	Area	Total Pop.	No. H/H	Notes
Neiafu	Kameli	1,065	213	- Community groups such as women's group are well-organized and are active. Community has shown strong initiatives on waste management.
Hahake	Tu'anekivale	488	86	- Youth group is in active and is willing to carry out waste management project.
Leimatu'a	Leimatu'a	1,104	218	- Second largest district and home village of CP of MLECCNR (Mrs.Feauni). - Small cages are placed for cans on recycling purpose. - Community groups like women's group and youth group are well-organized and are active. They have shown initiatives on waste management.
Hihifo	Longamapu	613	121	- Far from Kalaka dumpsite, so illegal dumping is one of the serious issues. - Community groups such as youth group are well-organized and are active. They have shown initiatives on waste management.

5.4 Estimated waste generation amount and waste composition

Waste Amount and Characterization Survey was conducted in FY2011, and the Project estimated "Household Waste Generation Amount" as 503g/day/person. Waste generation amount at each pilot project site and waste amount to be collected (40 % of total waste generation amount (see page 8)) are estimated as shown in Table 3.

Table 8: Waste generation amount at Pilot Project sites

District	Area	(1) Total population	(2) Waste generation amount (kg/day) : (=(1) x 503/1,000)	(3) Waste generation amount (ton/month) (=(2) x 30/1,000)	(4) Waste amount to be collected (ton/month) (=(3) x 0.4)

Nieafu	Whole town	4,045	2,034.6	61.0	24.4
	Kameli	1,065	535.6	16.0	6.4
Hahake	Tu'anekivale	488	245.5	7.4	3.0
Leimatu'a	Leimatu'a	1,104	555.3	16.7	6.6
Hihifo	Longamapu	613	308.3	9.3	3.7

5.5 Establishment of Waste Management Committee

Target communities are encouraged to establish a "Waste Management Committee" on the community's initiative. The committee will perform essential functions for waste management in the community, and will conduct door-to-door visits and community meetings to deliver necessary information and awareness rising. Activities related to waste management are to be monitored by the committee members. They are also very useful to make up for the limited capacity of the government.

Community representative inspecting house-to-house (Kameli)

5.6 Planning with Waste Management Committee

The detailed plan; will be discussed with the Waste Management Committee from each community.

Planning with Committee members (Tu'anekivale)

Planning with Committee members (Longamapu)

5.7 Preparing for awareness materials (collection calendar)

Based on the designed system, a leaflet needs to be prepared to provide necessary information on garbage collection system like target waste, collection day, how to store and discharge their waste, and so on. Illustrations and photos should be used as much as possible to make residents easily understand. In order to let residents fully understand, leaflet should be translated into Tongan language.

Draft leaflet (Kameli-English)

5.8 Conduct awareness activities

a. Door-to-door visits

A door-to-door visit is very effective way to deliver necessary information directly to the people. Waste Management Committee will implement a door-to-door visit for each household. Training for Waste Management Committee members should be conducted before going to the site to practice the way of explanation if necessary.

b. Community meeting

Community meeting should be organized just after the door-to-door visits. Invitation leaflet can be distributed during the door-to-door visits. The date and venue of the meeting should be decided with Waste Management Committee.

Meeting with community representatives (Kameli)

Community meeting for residential area (Leimatu'a)

5.9 Start collection

a. Announcement

Announcement conducted during collection work is very useful to remind people to discharge waste on the collection day.

b. Collection

Collection work should be started on the designated time on the collection day. Announcement should be started just after the collection truck arrived at target area. Truck should be driven as slow as possible as most of residents may discharge their waste when the collection truck is approaching to their house.

A resident hand her waste to collection worker

5.10 Conduct regular monitoring

Monitoring is the most important process for successful garbage collection. It should be conducted during the collection work for the first two months at least after the introduction of garbage collection system. It will take time for people to adjust to the new system, so providing further information will help to remind them of the proper discharge manner. MEIDECC/MoH needs to accompany the collection work, and monitor the following points;

- Discharge manner
- Participation(Discharge) rate

- Efficiency of garbage collection work
- Number of trip/loads
- Segregation condition
- Total expenses (operation cost) and income generation from recycling
- Strengthen and motivate community VEVE Committee and community as a whole when necessary

6 Expansion Plan

HIKO VEVE Expansion Plan

J-PRISM (as of 27 April 2015)

	Total Pop.	No. Household	Target year FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	
	14,922	2,834	Pilot Project	Expansion stage 1	Expansion stage 2	Expansion stage 3	Expansion stage 1	Expansion stage 1	Expansion stage 2	Expansion stage 1	
Neiafu	5,774	1,087	1,476	1,266	2,731	0	0	0	140	161	5,774
Neiafu	4,051	771	**1,065**	1,000	1,986						
Makave	443	88			443						
Toula	411	83	411								
Utui	302	46			302						
Ofu IS	161	27								161	
Okoa IS	266	50		266							
Olo'ua IS	140	22							140		
Pangaimotu	1,325	244	0	661	218	132	311	3	0	0	1,325
Pangaimotu	661	125		661							
Utulei	132	26				132					
Nga'unoho	218	34			218						
Utungake	311	57					311				
Tapana Is	3	2						3			
Hahake	2,297	418	487	0	1,118	275	301	116	0	0	2,297
Ha'alaufuli	412	82			412						
Ha'akio	139	28				139					
Houma Vava'u	136	25				136					
Mangia	104	19					104				
Ta'anea	706	121			706						
Tu'anekivale	487	86	**487**								
Koloa	197	37					197				
Holeva	116	20						116			
Leimatu'a	2,436	466	1,105	490	388	453	0	0	0	0	2,436
Leimatu'a	1,105	218	1105								
Holonga	453	81				453					
Feletoa	388	65			388						
Mataika	490	102		490							
Hihifo	2,105	405	613	588	496	408	0	0	0	0	2,105
Longomapu	613	121	613								
Taoa	496	89			496						
Tefisi	588	113		588							
Vaimalo	95	20				95					
Tu'anuku	313	62				313					
Motu	985	214	0	0	0	0	0	307	306	372	985
Kapa	69	14						69			
Falevai	113	23						113			
'Otea	125	29						125			
Lape	24	6							24		
Matamaka	147	29							147		
Nuapapu	135	24							135		
Ovaka	85	21								85	
Taunga	39	9								39	
Hunga	229	52								229	
Foeata	6	1								6	
Vaka'eitu	0	0								0	
Mounu	3	2								3	
'Eueiki	2	1								2	
Mala	1	1								1	
Fofoa	7	2								7	
Target population per year			3,681	3,005	4,951	1,268	612	423	446	533	14,922
Target population (accum.)			3,681	6,686	11,637	12,905	13,517	13,940	14,386	14,919	14,919
Coverage rate (%)			24.7%	20.1%	33.2%	8.5%	4.1%	2.8%	3.0%	3.6%	
Coverage rate (%) (accum.)			24.7%	44.8%	78.0%	86%	91%	93%	96%	100%	
Total Population			14,922								

Pioneers
already implemented (Ripple effects)
Established communities

Household Waste Generation Rate (g/day/person) : 503

ANNEX 1.

Format of VEVE Committee List

List of VEVE Committee(Lisi 'oe komiti veve)

1. Name of the community:
(Hingoa 'oe kolo) _____

2. Date of the establishment:
('Aho na'e fokotu'u ai) _____

3. Name of VEVE Committee members:
(Hingoa 'oe kau memipa 'oe Komiti veve) _____

Size (Lahi)

Chair (Town Officer)
(Sea 'Ofisa kolo _____

Team members: ① _____
(Kau Memipa) ② _____
③ _____
④ _____
⑤ _____
⑥ _____
⑦ _____
⑧ _____
⑨ _____
⑩ _____

_____

_____

_____

_____

_____

_____

4. Contact information:
Fika Telefoni: _____

5. Signature
(Fakamo'oni)

Date:
Aho _____

ANNEX 2.

Format of Hiko VEVE Plan

HIKO VEVE Plan

1. Name of the community:
Hingoa 'o e kolo

2. Plan Date
Aho Palani

3. Contact information (mobile):
Fika Telefoni

4. Implementation Plan

No. of Household …(a)

Population …(b) (=(a) x 5)

Lahi 'o e ng. 'api

Tokolahi

Frequency of HIKO VEVE (Lahi (Monthly, Twice a month, Weekly)

Collection Day ('aho hikoveve)

First Collection Day ('Aho na'e kamata ai hiko veve)

Collection Time(Taimi hiko veve) (from to)

Collection Truck (Loli hikoveve)

Capacity of truck (lahi 'o e loli veve):

Owner's information:

Hiring Cost (TOP$)

No. of Platform to be built(Lahi 'oe palepale veve ke langa)

Finance (Me'a Fkpa'anga) (VEVE levy: /household, Fundraising/Community funds)

KAPA Collection (Io 'Ikai)

No. of Cage to be placed

Lahi 'oe ngaahi me'a fa'o'anga kapa ke fokotu'u

Date to be achieved

Schedule

1) Establish a VEVE Committee(Fokotu'u ha komiti veve)

2) Develop a HIKO VEVE PLAN (this plan)(Fa'u ha palani hiko veve)

3) Awareness rising for a whole community(Ako kihe kotoa 'o e kolo)

4) Built platforms by households for HIKO VEVE(Fa'u ha palepale hikoveve 'ehe ngaahi 'api)

5) Assemble cages for HIKO KAPA (Fokotu'u 'a e ngaahi fa'o'anga kapa)

5) Implement Hiko VEVE (fokotu'utu'u kihe hiko veve)

5. Signature of Town Officer
Fakamo'oni 'a e 'Ofisakolo

Date:
Aho

ANNEX 3.

Format of Questionnaire Survey

Ki he Tu'anekivale kotoa,

Tu'unga 'I he fengaue'aki fakataha 'a e Komiti Veve 'a e Fungamatoto, pehe ki he MoH mo e MLECCNR ki hono tanaki 'o 'etau veve mo hono fatu ha founga ke toe faka'aonga'I ki ai e veve kuo ta'e'aonga ma'a hotau komiunitii. 'E matu'aki tokoni 'aupito ho'o tali 'a e ngaahi fehu'i ni ki he fakahoko fatongia 'a e ngaahi uma ngaue ni.

■ NGAAHI FEHU'I

Q 1. 'Oku ke pehe 'oku totonu ke 'I ai ha fa'ahinga founga tanaki veve heni?

	Answer
1. 'Io	
2. 'Ikai	
3. Mahalo pe / 'Ikai fakapapau'i	

Q 2. 'E tu'o fiha hono tanaki ho'o veve?

	Answer
1. Tu'o ua he uike	
2. Tu'o taha 'I he uike	
3. Fakauike ua	
4. Tu'o taha he mahina	

Q 3. Ko e fe 'aho 'oku ke pehe 'e lelei taha ke tanaki ai ho'o veve?

	Answer
1. Monite	
2. Tusite	
3. Pulelulu	
4. Tu'apulelulu	
5. Falaite	
6. Tokonaki	

Q 4. Ko fe taimi lelei taha ke tanaki ai ho veve?

	Answer
1. Taimi pongipongi (9 - 12pm)	
2. Taimi efiafi (2 - 4pm)	
3. Fa'ahinga taimi pe	

Q 5. Koe ha lahi ‘oe veve taipa ‘oku ke tanaki ‘ihe ‘aho?

Answer

Q 6. 'E 'I ai e fanga ki'I fakamole ki hono tanaki 'o e veve.Te ke loto pe ke tokoni fakaseniti ke fua'aki e ngaahi fakamole ni?

	Answer
1. 'Io	
2. 'Ikai	
3. Mahalo pe / 'Ikai fakapapau'i	

Q 7. Ko e ha nai e lahi 'oku ke pehe te ke tokoni'aki ki hono tanaki ho'o veve?

TOP$	Answer
1. $0.5 – $0.9	
2. $1.0 – $1.9	
3. $2.0 – $4.9	
4. $5.0 – $10.0	
5. more than $10.0	

Malo 'aupito ho'o tokoni mai.

ANNEX 4.

Example of Collection Calendar (Tu’anekivale)

POLOKALAMA HIKO VEVE ‘A TU’ANEKIVALE

Koe Komiti “VEVE” ‘a TU’ANEKIVALE ‘e kamta ‘enau hiko ‘oe ngaahi veve mei he ngaahi ‘api ‘ihe mahina ko Sepitema 2013. Koia ai ‘oku ai ‘ae kole kemou kataki ‘o muimui pau kihe ngaahi tu’utu’uni ko’eni ‘oku ha atu kae lava ke fakalele lelei ‘etau polokalama hiko veve.

NGAAHI TU’UTU’UNI

- Taimi maau ai Veve: **kimu’a he 12am** (Kamata ‘ae hiko veve 12am)
- ‘Aho Hiko: **Tu’o taha he Mahina**

(Tokonaki faka’ofi ‘oe mahina kotoa pe)

(Kataki vakai kihe ‘aho ‘oku ha atu ‘i lalo)

- Kalasi Veve ‘oku fiema’u ke hiko: **“VEVE”**; Pelesitiki, Pepa, Nge’esihina, Vala, Taipa, moha toe veve kehe pe ‘o ‘IKAI ke kau ai ‘ae ngaahi veve ‘oku ha atu ‘e tapu ke tanaki mai.
- Founga tanaki teuteu kihe hiko ‘oe VEVE:

Kataki hiko ho’o veve ‘o fa’o ‘iha kato, puha pe tangai ‘o tuku kihe ve’e hala lahi. ‘Oku ai ‘ae faka’amu kihe ‘api kotoa kemou fa’u ha’amou ki’i palepale he ve’e hala lahi ke hili kiai ho’omou veve ke malu mei hano veteki he’e fanga monumanu.

‘E TAPU KE FAKAKAU MAI ‘AE NGAAHI VEVE KO’ENI !!

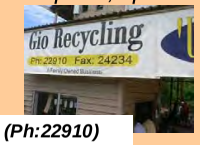
- **KEIKEINANGA ‘o kau kiai ‘ae;** *(kili’ime’akai,toumohomoho,nge’esi foimoa,etc)*

- **Nge’esi KAPA;** *(inu,pulu, ika, moa moe ngaahi me’a polonaise pe aione iiki)*

- **Veve fakaenatula;** *(‘akau,va’a,lau,musie,mohuku,kelekele/ oneone)*

Composting at backyard

- **KAPA lalahi / me’angaue faka ‘uhila** *(me’alele maumau, ‘aisi, sitou, computer, tipota ‘uhila, etc)*



Gio Recycling (Ph:22910)

Tohi Mahina moe ngaahi ‘aho ‘e fakahoko ai ‘ae hiko VEVE!!

Sepitema 2013						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23/30	24	25	26	27	28	29

‘Okatopa 2013						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Novema 2013						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

Tisema 2013						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23/30	24/31	25	26	27	28	29

Sanuali 2014						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Fepueli 2014						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

Ma’asi 2014						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

April 2014						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May 2014						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Meihe Komiti Veve ‘a Longomapu

Koe ngaue ko’eni ki hono hiko ‘oe veve fakamahina ‘oku fakahoko atu ia ‘ihe loto lelei ke fakapa’anga ‘ae ‘utu moe me’alele he’e kalapu ‘ae fonua ‘aia ‘oku fakafuofua kihe TOP$80 ‘ihe mahina pea koe to’utupu ‘oku nau fie tokoni pe kihe ‘aho ‘e taha kihe fakaheka ‘oe veve mo fetuku. ‘Ihe’etau hounga’ia ‘ihe tokoni mahu’inga ni ‘oku mau tuo pe temou tokoni mo poupou mai ‘aki ho’omou muimui pau kihe tu’utu’u ‘oku ha atu ‘i ‘olunga. Malo aupito!

Fie faka’eke’eke ta mai kihe (ph:7574727) ke talanoa kia Pilima Halatoa.

Tokoni ‘ae MoH, MLECCNR moe JICA

ANNEX 5.

Format of Monitoring Sheet

Monitoring sheet on VEVE and KAPA Collection

Aho fakahoko ai e hiko		
Hingoa 'o e kolo		
Tokolahi katoa e ngaahi 'api		
Tu'unga e'a		
Taimi Hiko	Taimi Kamata	Taimi 'Osi
Tokotaha ne tokangai e hiko		
Lahi moe mamafa 'o e loli hi	①( ) toni e loli hiko VEVE	②( ) toni e loli hiko KAPA

LAHI E NGAAHI 'API OKU NAU KAU KIHE HIKO VEVE	
ex) 卌	
	KATOA: / (%)
[VEVE] Lahi e loli oku fetuku pe ave mei he Kolo ki KALAKA	
	KATOA: uta (=trips)
[KAPA] Lahi e loli 'oku fetuku pe ave mei homou kolo ki he GIO	
	KATOA: uta (=trips)
Fakama'opo'opo moe fakakalakalasi 'o e Veve	

Lipooti Fakapa'anga			
Ngaahi Fakamole	**(TOP$)**	**Ngaahi Paanga Hu Mai**	**(TOP$)**
Lolo pe koe 'utu 'o e loli hiko		Pa'anga tanaki 'e he kolo	
Haea e Loli Hiko		Totongi 'e he 'api 'ene VEVE	
Meangaue (milemila pelesitiki, etc)		Pa'anga ma'u meihe GIO	
Ngaahi Naunau malu'I (kofunima,etc)			
Fakamokomoko ma'ae kau hiko veve			
Fakakatoa e fakamole		**Fakakatoa e Paanga Hu mai**	
		PALANISI 'OKU TOE	

Japanese Technical Cooperation Project
for Promotion of Regional Initiative
on Solid Waste Management in Pacific Islands (J-PRISM)
in Kingdom of Tonga

Solid Waste Management Plan for Vava'u

(Final draft)

Dec 2012

Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC)
Ministry of Health
Ministry of Internal Affairs (Governor's Office)
Vava'u Solid Waste Management Steering Committee

Table of Contents

Abbreviations

CDL	Container Deposit Legislation
CSP	Clean School Program
EIA	Environmental Impact Assessment
JICA	Japan International Cooperation Agency
J-PRISM	Japanese Technical Cooperation Project for Promotion of Regional Initiative on Solid Waste Management in Pacific Islands
MEIDECC	Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications
MIA	Ministry of Internal Affairs
MoE	Ministry of Education
MoH	Ministry of Health
MoI	Ministry of Infrastructure,
NGO	Non-Government Organization
POS	Public Opinion Survey
SWM	Solid Waste Management
3R	3R (Reduce, Reuse, Recycle/Return)
WACS	Waste Amount and Composition Survey
VEPA	Vava'u Environmental Protection Association

1 Current Situation of Solid Waste Management in Vava'u

1.1 Target waste of the Plan

The waste can be categorized by Generation Sources as shown in Table 1;

Table 1: Category of waste by generation source

Category	Generation source
1. Municipal Solid Waste	Household, shop, office, restaurant, market, school, public area cleaning, etc.
2. Industrial (Factory) waste	Factory, sewerage treatment plant, etc.
3. Medical (Healthcare) waste	Hospital, Healthcare center, etc.
4. Construction waste	Construction waste: Construction site, Demolition of buildings, etc.

The Solid Waste Management Plan for Vava'u targets "Municipal Solid Waste", which generates from households, shops, offices, restaurants, market, schools and public area cleansing, etc.

1.2 Baseline surveys

In order to grasp the current status of solid waste management in Vava'u, the project team for the Japanese Technical Cooperation Project for Promotion of Regional Initiative on Solid Waste Management in Pacific Islands (hereinafter referred as "the Project") conducted four baseline surveys as shown in Table 2.

Table 2: Baseline Surveys and Analysis for Development of a Waste Flow

Surveys	Purpose	Method	Implementation period
1. Waste amount and composition survey (WACS)	To know how much, and what kind of waste is discharged every day.	Collecting sampling of waste generated from residents and others, and measuring of amount and composition	On-season: Sep. 2011 – Oct. 2011 Off-season: Jan. 2012 – Feb. 2012
2. Final disposal amount survey (FDAS)	To know how much waste is disposed at final disposal site.	Observed the amount of waste which was disposed by vehicles, and filled in the sheet on site	Jul. 2011
3. Public Opinion Survey (POS)	To know how much waste is treated at generation source.	Questionnaire survey through door-to-door visit	Jul. 2011 – Aug. 2011
4. Recycling Activities Survey (RAS)	To know how much waste is collected for recycling.	Questionnaire survey for Gio recycling company	Nov. 2011 – Jan. 2012

1.3 Waste Generation Amount in Vava'u

According to the results of the baseline surveys, waste generation amount is estimated as shown in Table 3. Household waste generation rate was estimated at 1.21 kg per person per day based on a population of 5,787 in Neiafu area, for all waste generation sources. And, household waste generation rate of households was estimated as 503g per person.

Table 3: Waste generation amount

Item	Unit	Neiafu	Vava'u
Total Population (*Tonga Census 2006)	Person	5,787	15,505
Number of Household	Households	1,068	2,885
Area	Km^2		121.0
Total Waste Generation	ton/day	**7.1**	**21.5**
Total Waste Generation Rate	Kg/day/person	**1.21**	**1.39**
Household Waste Generation	ton/day	**5.9**	**15.7**
Household Waste Generation rate	g/day/person		**503**

1.4 Waste Composition

Waste composition in Vava'u is estimated as shown in Table 4. The ratio of kitchen waste is relatively low as most of residents feed kitchen waste to pigs and dogs. It is noticed that the total amount of waste generation can be decreased by half if organic waste is used for feeding of pigs and dogs and/or composing of green waste. This table also indicated the possibility of recycling, i.e, metal.

Table 4: Waste composition

	Neiafu		Vava'u
Category of Waste	Household	MSW	MSW
Kitchen waste	24.1	28.7	26.9
Green waste	23.5	18.4	18.2
Papers	6.5	20.6	23.3
Plastics	13.7	12.2	12.2
Glass	6.2	10.3	9.8
Metal	12.4	4.5	4.5
Textile/Ceramic	3.7	1.8	1.7
Others	10.1	3.7	3.6
Total	100.0	100.0	100.0

Waste composition varies by generation source as shown in Figure 1 and Figure 2.

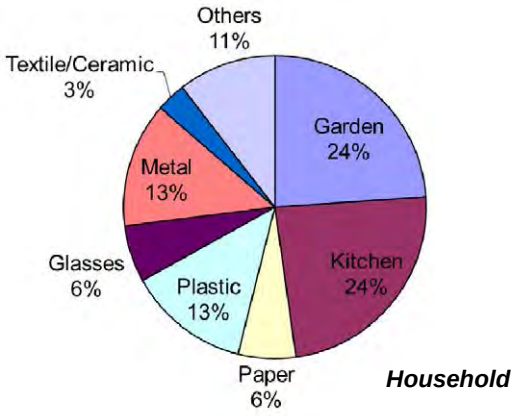


Figure 1: Waste composition (Households)

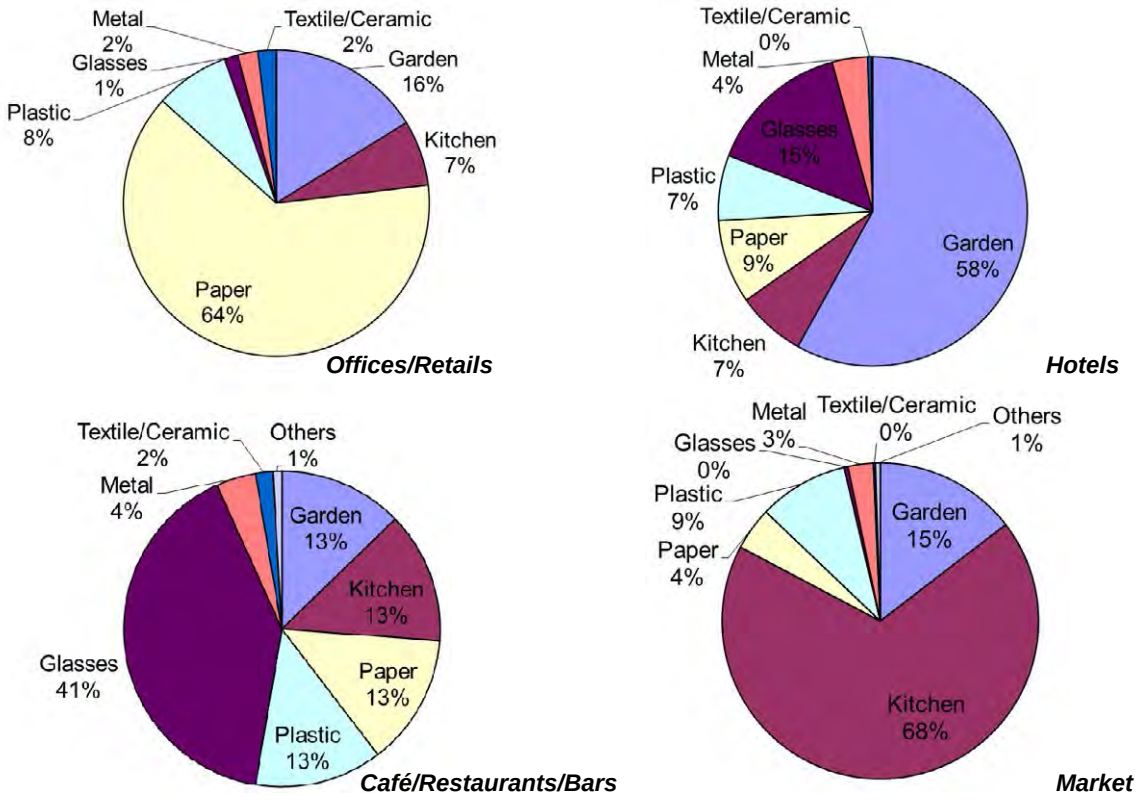


Figure 2: Waste composition (by business type)

1.5 Waste Flow for Neiafu Town

Waste flow for Neiafu Town is developed based on the results of baseline surveys (Table 3), and the following findings are identified.

- **Generation**: The waste generation amount is estimated as 7.0 ton/day by multiplying the population in 2006 (latest census) and a generation rate obtained by WACS. The generation rate is estimated by the generation rates given in WACS and the number of generation sources. The number of generation sources for business was obtained from the data of business licenses in XXX given by MoH Vava'u office.

- **Feeding pigs/dogs**: The waste amount fed by pigs and dogs is estimated as 0.76 ton/day (11.0 % of total generation amount) based on the results of a questionnaire survey conducted in the POS.

- **Composting:** The composting amount of kitchen waste and green waste is estimated as 0.09 ton/day (1.3 % of total generation amount) based on the results of questionnaire survey carried out in the POS.

- **Recycling through GIO:** The waste recycling amount is assumed to be 0.3 ton/day (4.4 % of total generation amount) based on the results of POS and Recycling Activities Survey (RAS).

- **Burn/Bury/Dump in bush:** The waste amount burned/buried/dumped in bush is assumed as 3.9 ton/day (55.3 % of total generation amount). More than half of the generated waste is burned or buried or dumped in the backyard.

- **Haulage:** The waste amount transported by households or businesses directly to the final disposal site is assumed only 1.97 ton/day, which accounts for 28.0 % of total waste generation amount. There is no garbage collection system existed in Vava'u as of the year 2011.

- **Recycling at final disposal site**: Caretaker of Kalaka final disposal site is collecting some recyclable items and takes them to GIO recycling. The recycling amount is assumed based on the Final disposal amount survey (FDAS) and the Recycling Activities Survey (RAS).

- **Final disposal (Kalaka)**: The total disposal waste amount at Kalaka landfill is estimated around 1.93ton per day, which accounts for 27.4 % of total waste generation amount.

- The total recycling rate in 2011 is only 5.1 % (= 4.4 % (GIO recycling) + 0.7 % (recycling activity at final disposal site))

- As there were some differences between the results of WACS carried out in the on-season and off-season, the generation rates adopted the average values.

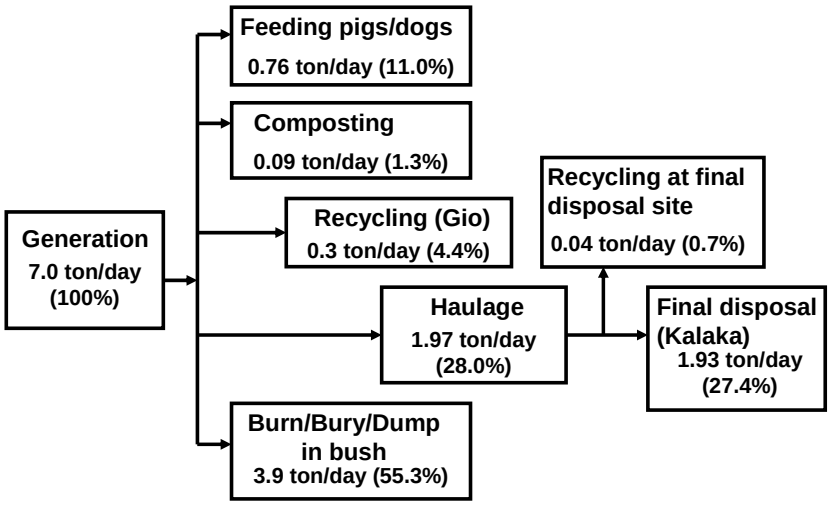


Figure 3: Waste Flow in Neiafu Town, Vava'u (2011)

1.6 Current SWM system in Vava'u

a. Storage / Discharge

(1) Household waste

Burning, burying and dumping waste in the bush are common methods for households in Vava'u due to lack of garbage collection service. Most kitchen waste is used for feeding pigs and dogs. Some people carry out composting but in a traditional and natural way such as covering on their plantation farm. A few communities such as Toula and Leimatu'a, have placed rubbish bins on streets in their area on their own initiative.

(2) Commercial waste

Most of businesses have own yard or space to storage for their waste. Some businesses store their waste separately by waste type.

b. Collection / Transportation

(1) Household waste

There is no garbage collection system for households, therefore, residents have no other choice than to haulage their waste to the final disposal at the landfill (Kalaka) site by themselves.

Toula community in Neiafu District, hires a truck by community and empties bins every Saturday. The operation cost is paid for primarily by foreign residents living in the area.

Also, Kava Club youth group of Leimatu'a community has taken initiative to carry out a garbage collection services. They also collect metals separately for recycling purpose. This activity was not conducted irregularly, but undertaken on their own initiative. There are some possibilities to apply similar system to other communities in Vava'u.

MoH provide waste collection service only for general waste generated from the Nqu hospital facility and staff compounds. MoH Vava'u office owns 3.0 ton open truck for waste collection, however, it is often broken down. MoH Vava'u used to empty public trash bins placed on the street and conducted cleaning in public area such as drainage cleaning, however, it was stopped due to insufficient human resources and budgets.

(2) Commercial waste

One private company has provided a garbage collection service on individualized contract basis. Service users are mainly business establishments like bars, restaurants and some foreign residents. As of June 2012, around 14 businesses are using the service. Collection fee is charged from TOP$30 - TOP$350 per month that depends on the frequency of collection, the amount of garbage discharged and the location of collection point.

The private company owns a 2.5 ton – truck and used for collection of commercial waste, however, the compaction function of truck is out of order.

c. Final Disposal

The current solid waste final disposal site for Vava'u, namely Kalaka dumpsite, is located near 'Okoa village, approximately 6 km east of Neiafu. It is situated at the lower end of sloping land boarded on one side by mangroves. The dumpsite has been in operated since 1981.

The Kalaka dumpsite had been a major concern for the environment in Vava'u, especially for the surroundings villages, like smoke from the burning waste at the dumpsite, water pollution and contaminated caused by leachate generated from waste. The MoH Vava'u and MEIDECC have received tons of complaints about the dumpsite.

Kalaka final disposal site is being managed within MoH's capacity. Incoming vehicles are guided by a caretaker to the designed place. MoH's health inspectors visit the site irregularly to inspect the site condition.

MoH Vava'u office does not own heavy equipment for landfill management like bulldozer, wheel loader and excavator. Therefore, MoH needs to hire machinery from private company or Ministry of Infrastructure for pushing disposed waste to create working space when the working space becomes full.

While the existing capacity is approximately 9,000 m3, the required landfill capacity is estimated to be 9,549 m^3 in 2021 As a result, the existing final disposal site might reach its capacity in 2021. The life span of the existing disposal site will be extended if waste minimization practices are effectively implemented.

d. 3R Activity

There is one recycling company in Vava'u, which is 'Uiha & Sons GIO Recycling Company, collecting metals, aluminium cans, tin cans E-waste, batteries. GIO is also collecting carton papers and glass bottles, however, these items were accumulated at their workshop due to lack of recycling market. There is no recycling facility in Vava'u, so GIO needs to send the collected items to the main

island, Nuku'alofa first, then sending to overseas, mainly to New Zealand for their business partner.

There are no 3R activities implemented by MEIDECC and MoH of its own initiative.

There is not much demand for making compost as the soil profile in Vava'u is fertile and not much kitchen waste discharged from households. Most of the farmers have never used compost.

e. Awareness and Education

MEIDECC conducted awareness activities on 3R targeting schools as a part of Environment Week events.

Environment education is mainly carried out by local environmental NGO, Vava'u Environmental Protection Association (VEPA), using their own funded programs like placing recycling bins on the street, TV programs.

MoH Vava'u has not owned a specific program for environment education, however, they carry out village inspections as a parts of health awareness program.

1.7 Institutional Situation

a. Laws and regulations

Ministry of Health (MoH) has a responsibility for solid waste management in outer islands, including Vava'u, under the Waste Management Act. SWM is enforced by MoH Vava'u based on the Waste Management Act and Public Health Act No29 of 1992, however, the legislations and regulations for SWM are not enacted. There is the difficulty in bringing about change people's mindset and behavior on dealing with waste. Enforcement of legislations is expected to compel people to engage and practice appropriate SWM.

b. Organizations

b.1 Ministry of Health, Nqu Prince Hospital in Vava'u

Two Health Inspectors under the Environmental Health Section are assigned at MoH Nqu Hospital in Vava'u. Their current main works are;

1) Issue and renewal of business licenses such as food premises,
2) Inspection of quarantine item at wharf,
3) Village inspection and vector control at villages, and
4) Management of Kalaka final disposal site.

b.2 Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC)

Only one officer is stationed in the MEIDECC Vava'u Office. She is originally from Vava'u District, and has own network to all the communities including outer islands in Vava'u. She is only the one officer who is looking after all programs related to the Ministry, like climate change, energy, biodiversity, etc. One clerk is working for administration work in the office.

MEIDECC Vava'u Office has budget allocation for basic administration works only, and there is no specific budget allocation for SWM in Vava'u.

b.3 Steering Committee for Vava'u Solid Waste Management

The Steering Committee for Solid Waste Management involving relevant government organizations and key stakeholders, has been established to oversee SWM in Vava'u since the year 2011. The Committee is charred by Governor of Vava'u including District officers, Town officers, leaders of women's group, recycling company, private garbage collector, NGOs, schools and relevant Ministries and Departments. The expected roles and responsibilities of the Steering Committee are;

- Planning for SWM
- Monitoring of implementation of SWM Plan
- Management of data and information related to SWM

1.8 Financial Situation

The sufficient amount of budget for SWM is not always allocated depending on the Ministry's policy and priority. As of the year 2011, residents and businesses are not charged any waste/garbage fee. Also, tipping fee system is also not introduced at Kalaka final disposal site.

The revenue and expenditure for SWM is recorded by the accounts section of Vava'u MoH Nqu Hospital. The average SWM expenditure in FY 2009/2010 and FY 2010/2011 are TOP$1,500 and TOP$500 respectively as shown in Table 4. The SWM expenditure, excluding personnel cost for health inspectors and caretaker for disposal site, accounts for 5.0% of total one, and that is mostly used for management of final disposal site.

Table 5: Financial situation on Solid Waste Management (MoH Vava'u)

Item	Unit	2009 Actual	2010 Actual	2011 Actual
Total Revenue of MoH Vava'u (Nqu Hospital)	TOP$	1,111,260.00	1,218.,500.00	1,277,613.00
Total Expenditure of MoH Vava'u (Nqu Hospital)	TOP$	1,114,250.00	1,218,495.00	1,277,597.00
Total Budget for Kalaka dumpsite management	TOP$	4,875.00	1,500.00	500.00
Total Expenditure for Kalaka dumpsite management	TOP$	4,850.70	1,499.97	499,99
Total Expenditure for administration	TOP$	53,959.00	54,649.00	57,281.00
Total Expenditure for SWM	TOP$	58,809.70	56,148.97	57,780,99
Ration of Total Expenditure for SWM to Total Expenditure of MoH Vava'u	%	5.0	5.0	4.7

1.9 Issues identified

According to the results of overviewing the current situation of solid waste management in Vava'u, the following issues are identified.

1) Lack of awareness and education about waste
2) Lack of collection system (illegal dumping, open burning)
3) Kalaka dumpsite is uncontrolled.

4) Kalaka dumpsite will become full by 2021.

5) Recycling rate is low, 5.1 % only

6) Commercial waste is generated a lots.

7) Insufficient capacity of government (MoH, MEIDECC)

8) Lack of coordination among stakeholders

9) Lack of enforcement of laws and regulations on SWM

10) Lack of sustainable financial sources for SWM

2 Solid Waste Management Plan

2.1 Aim

Waste management system is a mix of complementary factors such as waste collection and final disposal, waste minimization, financial and organizational aspects, and others. The Solid Waste Management Plan for Vava'u is a document that establishes goals and programs for the handling of solid waste in a manner that meets local needs and is consistent with Vava'u solid waste management priorities.

2.2 Vision

"Establish an effective Solid Waste Management system in Vava'u by the year 2021 to keep great Vava'u clean and healthy."

2.3 Key factors

To achieve the above vision, the following key factors need to be required;

- Involvement of community to change mindsets and behaviour
- Start at household/community level
- Everybody's responsibility for waste management

2.4 Basic Policy of the Solid Waste Management Plan

Basic Policy of the SWM Plan for Vava'u is;

1) Only after the effort of waste reduction, reuse or recycling, waste is properly collected, treated, and finally disposed of in a proper manner without negative environmental impacts.

2) Such a SWM system will be established by requiring the governmental sector, private sector and general public to bear adequate responsibilities under a transparent and fair rule.

2.5 Target Year

The above vision will be achieved step by step. The target of the Vava'u Solid Waste Management Plan is shown by each phase as below.

Phase	Year
Phase 1 (Short and Medium term)	**Frist 5 years** (during J-PRISM project term) **FY 2011 – FY 2016**
Phase 2 (Long term)	**Second 5 years** (after the completion of the J-PRISM Project) **FY 2016 – FY 2021**

2.6 Numerical Target of the Vava'u Solid Waste Management Plan

The numerical targets are shown in the Table 6.

Table 6: Numerical Target of the M/P

Items	Present (2011)	Mid-term (2016)	Final year (2021)
Collection Rate	3.4%	80.0%	100.0%
Recycle rate of MSW to the waste generation	5.1%	10.0%	15.0%
Final Disposal	Open dump	Controlled Landfill	

3 Implementation Plan

The strategy to address issues identified are shown in Figure 4. These strategies are consistent with each issues identified in Section 1.9 (pp. 8-9).

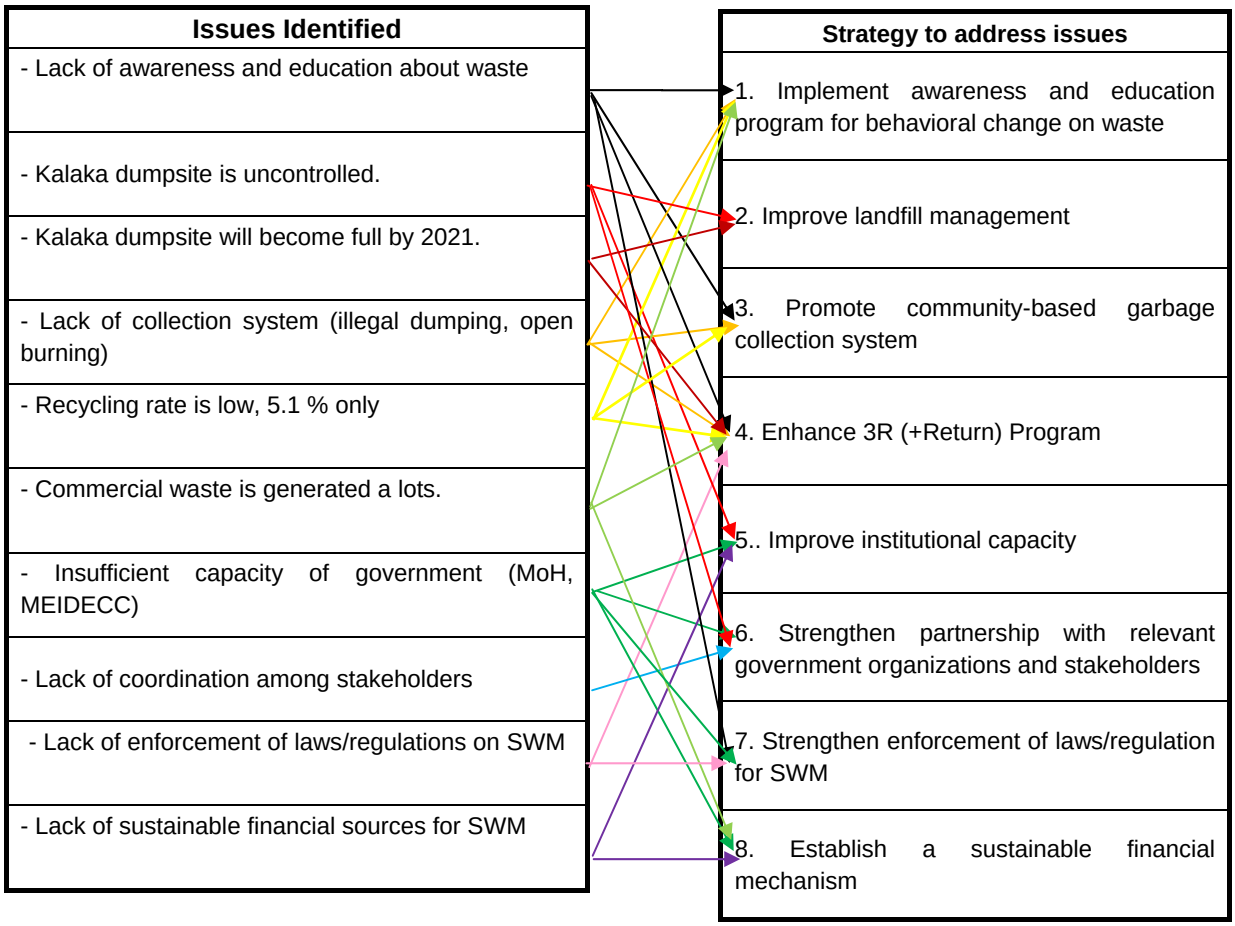


Figure 4: Linkage between Issues identified and Strategy

To achieve the vision of the Vava'u Solid Waste Management Plan, the following eight (8) actions will be implemented, These actions are in no specific order of priority:

1. Implement awareness and education program for behavioral change on waste
2. Improve landfill management
3. Promote community-based garbage collection system
4. Enhance 3R (+Return) Program
5. Improve institutional capacity
6. Strengthen partnership with relevant government organizations and stakeholders
7. Establish necessary laws and regulation for SWM and its system for enforcement
8. Establish a sustainable financial mechanism to ensure proper SWM system

3.1 [Action Plan 1] Implement awareness and education program for behavioral change on waste

a. Goal *(What do you want to achieve?)*

- Communities and Schools understand the status and issues of SWM in Vava'u
- Communities and Schools establish a proper waste management system.
- Communities and Schools can take necessary actions to solve waste issues at home, school and communities.

b. Indicator *(How do you evaluate the progress?)*

- Education and Awareness Program on the subject of waste is implemented to all villages and schools by 2021.
- All communities establish a proper waste management system by 2021.
- All schools in Vava'u establish a proper waste management system by 2021.

c. Implementation agency/organization

1) Lead agency	2) Partnerships and other related organization
– MEIDECC – MoH – Ministry of Internal Affairs (incl. District/Town Officers) / Governor's Office – Ministry of Education (CSP)	– VEPA – GIO Recycling

d. Action/Activity *(The goal will be achieved by implementation of following activities)*

	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
・ Planning of awareness strategy	■										
・ MoH conducts village inspections on a regular basis	■	■	■	■	■	■	■	■	■	■	■
・ MEIDECC conduct a survey to grasp waste management system in schools	■										
・ CSP is introduced on a pilot scale		■	■								
・ CSP is implemented to all schools in Vava'u.				■	■	■	■	■	■	■	■
・ CSP is incorporated in MoE's school curriculum									■	■	■
・ Media awareness program (radio, TV) is conducted	■	■	■	■	■	■	■	■	■	■	■

e. Budget

Item	Annual cost (TOP$)
・ Village inspections by MoH (fuel cost) (TOP$100/month)	1,200
・ CSP implementation (monitoring, judging, awarding, etc)	3,120
・ Media awareness program (radio, TV)	1,500

3.2 [Action Plan 2] Improve landfill management

a. Goal *(What do you want to achieve?)*

- The existing Kalaka dumpsite is rehabilitated.
- The rehabilitated Kalaka landfill is operated in accordance with operation manuals.
- The new landfill is secured before the end of the year 2021.

b. Indicator *(How do you evaluate the progress?)*

Number of fire/smoke and complaint from the surrounding villages is decreased.

c. Implementation agency/organization

1) Lead agency	2) Partnerships and other related organization
- MoH - Ministry of Infrastructure and Tourism	- MEIDECC - Ministry of Internal Affairs (incl. District/Town Officers) / Governor's Office

d. Action/Activity *(The goal will be achieved by implementation of following activities)*

	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
・Conduct site investigation at the existing dump site	■										
・Develop a plan, design and construction for the improvement of the site		■									
・Undertake Environmental Impact Assessment		■									
・Conduct water quality monitoring at Kalaka landfill and nearby environment.			■	■	■	■	■	■	■	■	■
・Undertake rehabilitation of existing dumpsite			■	■							
・Development of the operation manual for Vava'u rehabilitated disposal site				■							
・Conduct training for site operation & maintenance		■	■	■	■						
・Operate the rehabilitated disposal site				■	■	■	■	■	■	■	■
・Preparation work for new landfill (secure candidate sites, Feasibility study, EIA procedure, planning, etc)									■	■	■

e. Budget

Item	Annual cost (TOP$)
・Operation cost for Kalaka landfill (*see the "Operation and Maintenance Manual for Kalaka final disposal site" for more details)	13,500
・Feasibility study for new landfill	*(depends)*
・EIA Study for new landfill	*(depends)*

3.3 [Action Plan 3] Promote community-based garbage collection system

a. Goal *(What do you want to achieve?)*

- All households in Vava'u can access to the garbage collection system
- Communities can operate and maintain the garbage collection system with a minimum support from the government.
- Less open burning and illegal dumping of waste

b. Indicator *(How do you evaluate the progress?)*

- Garbage collection is implemented by community according to the Garbage Collection Plan in Vava'u
- 100 % of total households in Vava'u have access to garbage collection system by 2020

c. Implementation agency/organization

1) Lead agency	2) Partnerships and other related organization
- MEIDECC - MoH - Ministry of Internal Affairs (incl. District/Town Officers) / Governor's Office	- NGO (VEPA) - Ministry of Education

d. Action/Activity *(The goal will be achieved by implementation of following activities)*

	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
・ Review current garbage collection system	■										
・ Conducting of waste characterization study for collection service planning	■										
・ Develop a garbage collection plan	■	■	■								
・ Conduct pilot project of community-based garbage collection			■								
・ Promote a community-based garbage collection system according to the garbage collection plan				■	■	■	■	■	■	■	
・ Monitor an implementation of community-based garbage collection			■	■	■	■	■	■	■	■	■

e. Budget

Item	Annual cost (TOP$)
・ T-shirt for VEVE committee	TOP$28 for each
・ Gloves for VEVE committee	TOP$8 for each
・ Monitoring (fuel cost) (TOP$100/month)	1,200
・ Training/Workshop for VEVE Committee (for 50 people)	1,500

3.4 [Action Plan 4] Enhance 3R (+Return) Program

a. Goal *(What do you want to achieve?)*

- People are aware of "what is 3R".
- People are actively practicing 3R.
- Appropriate collection system of recyclable items is established
- Container Deposit Legislation system is introduced

b. Indicator *(How do you evaluate the progress?)*

- Recycling rate is increased to 10.0 % (by 2016) and to 15.0 % (by 2021).

c. Implementation agency/organization

1) Lead agency
- MEIDECC
- MoH
- GIO Recycling
- Ministry of Internal Affairs (incl. District/Town Officers) / Governor's Office
- Ministry of Education

2) Partnerships and other related organization
- Custom Department
- NGO (VEPA)

d. Action/Activity *(The goal will be achieved by implementation of following activities)*

	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
・ Current recycling practices are reviewed	■										
・ Existing recycling industry (GIO) is strengthened through Okinawa Mottainai Project		■	■	■							
・ Community-based recyclable collection system is introduced		■	■	■	■	■	■	■	■	■	■
・ 3R system is introduced through CSP.		■	■	■	■	■	■	■	■	■	■
・ MEIDECC/MoH introduce 3R system for business and yatties.						■	■	■	■	■	■
・ MEIDECC conduct a Feasibility Study for introduction of CDL system in Vava'u						■	■	■			
・ Container Deposit Legislation (CDL) is established in Vava'u									■	■	■

e. Budget

Item	Annual cost (TOP$)
・ Eight (8) cages for collection of cans (KAPA) (average number for one community with approx. 100 households)	1,000
・ Consultant fee for Feasibility Study for CDL	*(depends)*
・ Capital investment for CDL	*(depends)*

3.5 [Action Plan 5] Improve institutional capacity

a. Goal *(What do you want to achieve?)*

- MoH and MEIDECC have sufficient knowledge and experience for Solid Waste Management and proper landfill operation to achieve the goal of Master Plan.
- MoH and MEIDECC have sufficient human resources, equipment and budgets to implement the Solid Waste Management Plan.

b. Indicator *(How do you evaluate the progress?)*

- The capacity in individual, institutional and social aspect with their ownership of MoH/MEIDECC is increased.
- Solid Waste Management is implemented according to the implementation schedule.

c. Implementation agency/organization

1) Lead agency	2) Partnerships and other related organization
- MoH - MEIDECC	- Ministry of Internal Affairs (incl. District/Town Officers) / Governor's Office - Ministry of Finance - Ministry of Education - Donors (JICA, etc)

d. Action/Activity *(The goal will be achieved by implementation of following activities)*

	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
・ Assess current capacity of MoH and MEIDECC.	■										
・ Technical capacity of MoH/MEIDECC staff is developed by J-PRISM(JICA).	■	■	■	■	■						
・ MoH/MEIDECC allocate sufficient number of staff for SWM						■	■	■	■	■	■
・ MoH/MEIDECC procure necessary equipment for SWM						■	■	■	■	■	■
・ MoH/MEIDECC secures sufficient budget for SWM						■	■	■	■	■	■

e. Budget

Item	Annual cost (TOP$)
・ Travel allowance, etc	*(depends)*
・	
・	

3.6 [Action Plan 6] Strengthen partnership with relevant government organizations and stakeholders

a. Goal *(What do you want to achieve?)*

- Proper SWM system is sustained in collaboration with the relevant government organizations (Ministries/Departments), private sector and general public.
- Vava'u Solid Waste Management Steering Committee is functioned as a core role for decision making on SWM in Vava'u.

b. Indicator *(How do you evaluate the progress?)*

- Meeting/Workshop for Vava'u Solid Waste Management Committee is held annually at least.

c. Implementation agency/organization

1) Lead agency	2) Partnerships and other related organization
- Ministry of Internal Affairs (incl. District/Town Officers) / Governor's Office - MEIDECC - MoH	- All Ministries/Departments

d. Action/Activity *(The goal will be achieved by implementation of following activities)*

	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
・ Establish a committee involving key stakeholders to oversee the management of solid waste in Vava'u	■										
・ Organize workshops for development of solid waste management plan for Vava'u on an annual basis	■	■	■	■	■						
・ Organize meetings for monitoring of solid waste management plan implementation in Vava'u						■	■	■	■	■	■
・ Revise Solid Waste Management Plan and its implementation plan if necessary		■	■	■	■	■	■	■	■	■	■
・ Review for development of Solid Waste Management Plan for Vava'u (2022-2032)											■

e. Budget

Item	Annual cost (TOP$)
・ half-day Workshop for 50 people	1,500
・	
・	

3.7 [

Action Plan 7] Strengthen enforcement of laws/regulation for SWM

a. Goal *(What do you want to achieve?)*

- People in Vava'u understand laws and regulations related to SWM (Waste Management Act, Public Health Act, Village Act, etc)
- People in Vava'u are fully engaged and practiced appropriate SWM under the legal system.

b. Indicator (How do you evaluate the progress?)

- Less illegal waste dumping and open burning
- Increase participation rate of community-based garbage collection

c. Implementation agency/organization

1) Lead agency	2) Partnerships and other related organization
- MoH - MEIDECC - Ministry of Internal Affairs (incl. District/Town Officers) / Governor's Office	- Department of Laws

d. Action/Activity *(The goal will be achieved by implementation of following activities)*

	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
・ Review existing laws and regulations related to SWM	■										
・ Strengthen enforcement of existing laws and regulations		■	■	■	■						
・ Draft the following legislations; - Waste Fee - Community-based garbage collection - Environment fee - CDL									■	■	■
・ Enact the above legislations											■

e. Budget

Item	Annual cost (TOP$)
・	
・	
・	

3.8 [Action Plan 8] Establish a sustainable SWM Financial System

a. Goal *(What do you want to achieve?)*

- Financial sources are secured for implementation of all SWM activities in accordance with the Solid Waste Management Plan for Vava'u.
-

b. Indicator (How do you evaluate the progress?)

Activities in SWM Plan for Vava'u are implemented as scheduled without financial constraints

c. Implementation agency/organization

1) Lead agency	2) Partnerships and other related organization
- MoH - MEIDECC - Ministry of Infrastructure and Tourism	- Ministry of Finance - Ministry of Internal Affairs (incl. District/Town Officers) / Governor's Office

d. Action/Activity *(The goal will be achieved by implementation of following activities)*

	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
- Review the current financial status on SWM											
- Draft a financial plan for SWM											
- MoH allocates TOP$ 5,000 annual budget for SWM in Vava'u											
- MoH introduces a waste fee for businesses (hotels, restaurants, shops, etc)											
- Ministry of Infrastructure and Tourism introduces an environment fee for tourists.											
- Establishment of special accounts for SWM in Vava'u											

e. Budget

Item	Annual cost (TOP$)
-	
-	
-	

4 Monitoring and Evaluation

4.1 Monitoring and Measuring Performance

A performance monitoring mechanism is adopted for the Solid Waste Management Plan for Vava'u —requires:

- MoH/MEIDECC Vava'u OIC to prepare progress reports of activities on an annual basis.
- Ministry of Internal Affairs through Governor's Office to organize a Vava'u Solid Waste Management Steering Committee Meeting at the end of every fiscal year. MoH/MEIDECC Vava'u OIC report the progress reports. The plan for the next year is discussed and confirmed; and
- MoH/MEIDECC Vava'u OIC to submit progress reports and report the outcomes of the meeting to the main office of MoH/MEIDECC respectively.

Annual progress reports should include the progress of achievements in the indicator of each Action Plan, record the activities implemented and the plan for the next year. The main office of MoH/MEIDECCC shall follow up the issues raised by OIC Vava'u, and provide instructions/advice and extra budget allocation to meet requirements as necessary.

4.2 Mid-term Evaluation

The Solid Waste Management Plan for Vava'u shall undergo a participative mid-term review in 2016 coordinated by Ministry of Internal Affairs through Governor's Office, with the active involvement of Vava'u Solid Waste Management Steering Committee and other stakeholders. The main purpose of the mid-term review is to verify and evaluate the relevance of Solid Waste Management Plan for Vava'u. The mid-term review shall also identify necessary corrective actions and strategic recommendations for the second half of the plan period (FY2016-2021).

ANNEX 1. SWM Financial Plan for Vava'u

Appropriate Solid Waste Management (SWM) system requires costs, includes;

- Management of final disposal site
- Operation of garbage collection
- Administration and management

a. SWM Expenditure

(1) Management of final disposal site (Kalaka landfill)

As described in the "Operation and Maintenance Manual for Kalaka final disposal site", the necessary annual budget is shown in the Table i.

Table i: Annual necessary budget for Kalaka landfill management

Works		Cost (TOP$)
i. Management of incoming waste	Pushing and compaction of incoming waste (two hours for every time, every two months)	(a) Hiring of Wheel Loader : TOP$300/hour (b) Yearly: TOP$3,600 (=(a) x 2 hours x 6 times a year)
ii. Maintenance of facility	Leachate treatment facility, Drains, Access road, Soil covering (two (2) times a year)	(a) Hiring of Excavator : TOP$350/hour (b) Hiring of Trailer and Truck for the transportation of Excavator : TOP$1,400for a round trip (c) Total cost for one time: TOP$3,150 (= (a) x 5 hours + (b)) (d) Yearly: TOP$6,300 (=(c) x 2 times)
iii. Administration costs (including the cost for inspection)	Safety and protection gears for caretaker, Landscaping (grass cutters, etc), Facility expenses such as water tank, Fuel cost for inspection, etc	(a) Monthly: TOP$300 Total cost : TOP$3,600 (= (a) x 12)
TOTAL		**T$13,500 (annually)**

(2) Operation of garbage collection

In the Solid Waste Management Plan for Vava'u, the community-based garbage collection system is promoted as an optimum technical system for Vava'u. However, there will be some difficulties to introduce the community-based garbage collection system to urban area, namely Lotu Neiafu including Talau, as community social structure is not well-united. Therefore, it is recommended that government (MoH or Waste Authority Ltd.) or a contracted private company provides a garbage collection service on a weekly basis. The expense of garbage collection is estimated as follows;

Table ii : Estimated expenses for garbage collection in Lotu Neiafu

Item		
(a) Population in Lotu Neiafu (census 2011)	People	4,051
(b) No. of Household in Lotu Neiafu (census 2011)	Households	771
(c)Estimated waste generation amount per week in Lotu Neiafu (= Population x 503 g/day/person x 7 days)	Ton/week	14.3
(d) Estimated waste discharge amount per week in Lotu Neiafu (= (c) x 40%)	Ton/week	5.72
(e) Labor cost (1 driver + 2 workers) (= TOP$5.0 per hour x 5 hours x 3 people x 4 times per month)	TOP$	300.00
(f) Fuel cost (= (d) x TOP$ 36/ton x 4 times per month)	TOP$	823.68
(g) Maintenance cost for collection truck (= 5% of fuel cost)	TOP$	41.18
(h) Total cost (monthly) (= (d) + (e) + (f))	TOP$	1,164.86
(i) Total cost (yearly) (= (g) x 12))	**TOP$**	**13,978.32**

(3) Administration and management.

According to the Table 3 Financial situation on Solid Waste Management (MoH Vava'u), the average administration and management cost is TOP$60,000.

b. Future SWM revenue

In order to ensure sustainable finance system on SWM in Vava'u, the revenue should cover all the costs involved (Figure i). MoH Vava'u has currently very limited budget allocation on SWM, therefore,,so it needs to secure further financial sources, like;

- Increase MoH's budget on Solid Waste Management,
- Introduce Waste Fee system for businesses,
- Introduce garbage collection fee, and
- Introduce Environment Fee for tourists

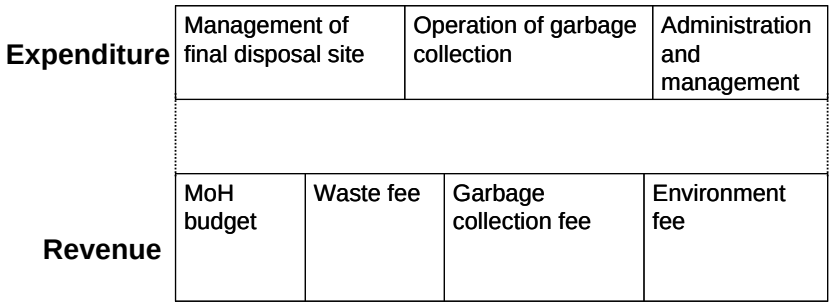


Figure i: SWM Expenditure and Revenue

(1) Increase MoH's budget on Solid Waste Management

Ministry of Health shall make all possible efforts to increase annual budget on Solid Waste Management for Vava'u. The health inspectors of the Environmental Health Section of MoH Vava'u need to submit a budget plan for next financial year according to the actual expenses and

implementation plan.

Table iii : MoH's budget allocation on SWM

	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'
・ MoH's budget on SWM	1,000	1,000	1,000	5,000	5,000	5,000	10,000	10,000	10,000	10,000	10,000

(2) Introduce waste fee for businesses

Landfill management requires a cost. In order to secure a certain amount of money for landfill management in a sustainable way, there are two options, namely (a) Waste fee and (b) Tipping fee. Each option has advantages and disadvantages both.

In a very basic sense, it is common to introduce a tipping fee collection system based on a transparent user pay principle in order to make landfill financially sustainable. However, considering Vava'u situation, there is a concern that the number of illegal waste dumping will be increased as most of people hesitate to pay the fee. Also, it seems difficult for caretaker(s) to manage the collected fee at administration office located at landfill.

Table iv : Comparison between Waste Fee and Tipping Fee

Option	Timing of payment	Pay to whom	Advantages	Disadvantages
(a) Waste fee	Every beginning of the year	MoH, or authorized agency	- ensure a certain amount of revenue - encourage public to use landfill (preventing from illegal dumping)	- Need a By-low to enforce people to pay - No incentive for waste minimization
(b) Tipping fee	When waste is disposed at landfill	MoH's caretaker stationed at landfill	- Fair charge based on user pay principle. - Good incentive for waste minimization	- Need training for caretaker to fee management - Discourage public from using landfill - Need enforcement against open burning and illegal dumping

Instead of introduction of tipping fee, waste fee will be one of suitable options for Vava'u to introduce. All business establishments discharge large amount of waste compared to household waste, therefore, waste fee will be charged to businesses. All businesses are required to pay a business license fee to MoH Vava'u every year, so the waste fee will be charged in addition to the license fee. Waste fee should be levied according to waste generation amount. The revenue from waste fee is estimated as shown in Table v .

Table v : Estimated revenue from Waste Fee

	(a) Number of unit	(b) Waste fee *(tentative)* (TOP$)	Annual revenue (= (a) x (b)) (TO$)
Hotels	12	100	1,200
Restaurants/Bars	13	100	1,300
Supermarkets/Offices (Falekoroa)	50	100	5,000
		TOTAL (yearly)	**7,500**

(3) Introduce garbage collection fee from service users

If government (MoH or Waste Authority Ltd.) or a contracted private company provides a garbage collection service for Lotu Neiafu area on a weekly basis, the operation cost is estimated as TOP$13,978.32 per year in total. Therefore, the operation and maintenance cost for garbage collection can be covered if each household in Lotu Neiafu pay around TOP$20.00 per year , which is TOP$15,420 for 771 households in Lotu Neiafu.

Table vi : Estimated garbage collection fee for each household in Lotu Neiafu

Item		
(a) Population in Lotu Neiafu (census 2011)	People	4,051
(b) No. of Household in Lotu Neiafu (census 2011)	Households	771
(c) Total operation cost of garbage collection (yearly)	TOP$	13,978.32
(d) Garbage collection fee to be charged to each household (= (c) / (b))	**TOP$**	**18.13**

(4) Introduce environment fee for tourists - Vava'u' Sustainable Environmental Fund (VSEF) – tentative.

Vava'u has been growing in popularity for beautiful environment such as whale watching and dream destination for yachties. An average of 8,500 people by air and 450 yachties[1] a year visits Vava'u.

Increased tourism means that the nature and cultural environment in Vava'u is becoming more exposed to deterioration and disturbance. One of the greatest challenges we currently face in Vava'u is to manage the increase in generation amount of waste.

To ensure sustainable management of the unique natural areas and cultural environments, an environmental/waste fee should be introduced for tourists including yachties.

MoH Vava'u has conducted a questionnaire survey targeted yachties who visited Vava'u from June 2012 to December 2012, and received 188 answers, in summary;

- 77.1% of them are willing to pay to support the concept

(while 15.4% said "No", N/A: 7.4 %)

- Average of affordable fee per boat: TOP$28.60

Based on the above questionnaire survey, it is found that 62% of yachties stay less than 1 month and 38% of them are long-stay tourists who stay more than 1 month. The revenue from environment fee is estimated as shown in the Table vii.

[1] Information source: Ministry of Tourism, Vava'u

Table vii: Revenue from environment fee

	No. Yacht/Visitors		Fee	Expected revenue
Yacht	454	Short-stay: 281 (62 %)	TOP$20/yacht	TOP$ 5,620
		Long stay: 173 (38 %)	TOP$50/yacht	TOP$ 8,650
			(a) sub-total	TOP$ 14,270
Air	8,432	Short-stay: 8,000	TOP$5/person	TOP$ 40,000
		Long stay: 432	TOP$10/person	TOP$ 4,320
			(b) sub-total	TOP$ 44,320
		TOTAL	**(= (a) + (b))**	**TOP$58,590**

For the detailed system, the following matters as shown in Table viii should be examined before implementation.

Table viii Matters to be examined for introduction of Environment fee

Item	Note
(1) Fee	Depends on length of stays? or Apply a single-price? Charging to local visitors and residents?
(2) Payment timing	When do visitors have to pay the tax? And, Who will collect the fee? (When visitors purchasing airline tickets or registering of yacht by airlines and yacht management companies? During inspection by Health Inspectors? When visitors leave Vava'u? When they book environment tour? etc.)
(3) Management system	- Which organization should be authorized for management of the fund? (Related Ministries or Departments? Governor's Office? Independent agency/board? NGO?)
(4) Utilization of the fund	- Effective way to use the collected money - Need to ensure transparent accounting system
(5) Bye-law or regulations	The above matters to be clearly described as a legal document.

Also, regulation relating to an environment fee for visitors to Vava'u should be pursuant to the existing current legal system. The collected fee will be kept in a special account in Vava'u.

c. Future financial plan

As shown in Table ix , sustainable SWM finance system is ensured as long as the above revenue system can be established.

Table ix : SWM Financial Plan

Item	FY2011	FY2021
Expenditure		
(a) Management of final disposal site (Kalaka landfill)	1,000	13,500
(b) Garbage collection (for Lotu Neiafu)	0	14,000
(c) Administration and management	57,781	60,000
(1) Total Expenditure (= (a)+(b)+(c))	58,781	87,500
Revenue		
(1) MoH budget	58,781	65,000
- Management of final disposal site	1,000	5,000
- Administration	57,781	60,000
(2) Waste Fee for businesses	0	7,500
(3) Garbage collection fee (TOP$20/household)	0	15,420
(4) Environment fee	0	58,590
(2) Total Revenue (= (1)+(2)+(3)+(4))	58,781	146,510
Balance (TOP$) (= (2) – (1))	**0**	**59,010**

The remaining balance can be used to initiate and stimulate activities with the purpose of protecting Vava'u environment like;

- Management of final disposal site (Allocate one more staff for Kalaka for recording of incoming waste, etc)
- Public area cleansing such as road sweeping and drain cleaning
- Awareness and education program (in collaboration with VEPA)
- Promotion of waste minimization/3R (working with Gio Recycling)
- Subsidy for community-based garbage collection system which is promoted in villages
- Unscheduled expenses such as repairs of garbage collection trucks

All the above revenues related to SWM, should be kept in the special account for SWM in Vava'u. And, its accounting system to be established should be fair and transparent one.

For this special account, the specific committee involving key stakeholders should be established to oversee a special account for SWM. And, all statements of account should be informed among stakeholders on a regular basis. Transparent accounting system specific for the whole SWM expenditure should be also established.

Project Photos

(1) Fiji

First year (in 2014)

The 10th joint regular meeting (Aug. 2014, Rakiraki)

Site visit to the Sigatoka landfill under rehabilitation work after the 11th joint regular meeting (Oct. 2014, Sigatoka)

Separate collection of recyclables implemented by NTC (Jun. 2014)

Communal collection point established by LCC (Mar. 2015)

Landfill rehabilitation work at Sigatoka landfill (Oct. 2014)

Separate collection of market waste at Suva municipal market (Jun. 2014)

The 12th joint regular meeting (Jan. 2015, Nadi)

The 4th JCC (Mar. 2015, Suva)

Second year (in 2015)

Launching ceremony for home composting subsidy program and CSP financial assistance (Apr. 2015)

Technical workshop for home composting and CSP (Apr. 2015)

The 13th joint regular meeting (Jul. 2015, Lautoka)

Interview for capacity assessment (Aug. 2015)

Scene of terminal evaluation study (Sep. 2015)

Monitoring inspection implemented by DoE C/P (Oct. 2015)

The 14th joint regular meeting (Dec. 2015, Suva)

The 5th JCC (Dec. 2015, Suva)

(2) Kiribati

First Year (in 2014)

Storage of fallen trees at Betio Landfill (June, 2014)

Shredder operation and storage of wood chips at Berio Landfill (June, 2014)

Storage of firewood at Betio Landfill (June, 2014)

Explanation of organic waste recycling and promotion of firewood at Betio Town Council office (September, 2014)

Compost production at Betio Town Council office (September, 2014)

Compost training for teachers at Tebanimaneka Primary School (September, 2014)

CSP workshop at Tebanimaneka primary school (February 2015)

Fourth JCC meeting at the boardroom of ECD (February, 2015)

Second Year (in 2015)

Organic waste recycling site at Betio Town Council office (August, 2015)

Vegetable garden at Betio Town Council office (August, 2015)

Production of leaf mold from wood chips and leaves (November, 2015)

Third opinion survey (June, 2015)

Delivery lecture at Abaunamoub Primary School (waste separation and categorization game) (November, 2015)

Site visit to Nanikai landfill (explanation of final disposal management by ECD officer) (November, 2015)

Site visit to a material recovery facility of Kaoki Mange Program (a container deposit system) (November, 2015)

CSP activity at Temwanoku Primary School (separation of recyclables) (June, 2015)

(3) Tonga

First year (in 2014)

A small ditch for drainage of rain Water, developed by MoH C/P (Sep. 2014)

Review of Kalaka operation manual by MoH C/P and the Expert (Oct. 2014)

Community meeting for promotion of community-based garbage collection (Sep. 2014)

Garbage collection carried out by community (Oct 2014, Longomapu)

Workshop for community-based garbage collection in collaboration with Okinawa Mottainai Project (Oct. 2014)

Study visit by J-PRISM Solomon Gizo team (Jan. 2015)

The 5th Vava'u Solid Waste Management Committee Workshop (Feb. 2015)

The 4th JCC (Feb. 2015, Vava'u)

Second year (in 2015)

School visit to Kalaka landfill as a part of CSP activity (Apr. 2015)

Soil covering at Kalaka landfill (Nov. 2015)

Fence along the landfill boundary constructed by MoH (Nov. 2015)

Garbage collection work carried out by community (Jul. 2015)

Picking up rubbish during collection work by the VEVE Committee (Jul. 2015)

The 4th Workshop for community-based garbage collection and the Clean School Program (CSP) (Jul. 2015)

Site visit to Kalaka landfill by JCC members (Nov. 2015)

The 5th JCC (Nov. 2015)