

**South Pacific Regional Environment Programme
and the
European Union**

**Waste Awareness Baseline Survey
for
Suva, Apia, and South Tarawa**

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in Association with
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CONTENTS

1. Executive Summary	5
2. Findings and Recommendations	7
2.1 Suva	7
2.1.1 Findings	7
2.1.2 Recommendations	8
2.1.3 Priority Areas	8
2.1.4 Proposed Approaches	10
2.1.5 Target Groups, Target Areas and Channels	11
2.2 Apia	12
2.2.1 Findings	12
2.2.2 Recommendations	13
2.2.3 Priority Areas	13
2.2.4 Proposed Approaches	15
2.2.5 Target Groups, Target Areas and Channels	17
2.3 South Tarawa	18
2.3.1 Findings	18
2.3.2 Recommendations	20
2.3.3 Priority Areas	20
2.3.4 Proposed Approaches	22
2.3.5 Target Groups, Target Areas and Channels	24
2.4 Waste Link: Suva, Apia, Tarawa	25
3. Introduction	26
4. Overview of Existing Solid Waste Management and Waste Awareness in Fiji, Samoa, and Kiribati	27
4.1 Fiji	27
4.2 Samoa	30
4.3 Kiribati	32
5. Waste Awareness Baseline Survey	37
5.1 Introduction	37
5.2 The Study Team	37
5.3 Methodology	38
6. Results: Suva, Apia and Tarawa	39

7. Discussion	70
7.1 Suva	70
7.1.1 Personal Data	70
7.1.2 General Level of Awareness	70
7.1.3 Knowledge and Understanding of Solid Waste Issues	70
7.1.4 Sources of Understanding of Solid Waste Issues	71
7.1.5 Key Waste Issues and Concerns	72
7.1.6 Causes and Contributory Factors	74
7.1.7 Solutions and Waste Minimisation	75
7.1.8 Policy and Planning	77
7.2 Apia	77
7.2.1 Personal Data	77
7.2.2 General Level of Awareness	78
7.2.3 Knowledge and Understanding of Solid Waste Issues	78
7.2.4 Sources of Understanding of Solid Waste Issues	79
7.2.5 Key Waste Issues and Concerns	80
7.2.6 Causes and Contributory Factors	82
7.2.7 Solutions and Waste Minimisation	82
7.2.8 Policy and Planning	84
7.3 South Tarawa	85
7.3.1 Personal Data	85
7.3.2 General Level of Awareness	85
7.3.3 Knowledge and Understanding of Solid Waste Issues	85
7.3.4 Sources of Understanding of Solid Waste Issues	87
7.3.5 Key Waste Issues and Concerns	87
7.3.6 Causes and Contributory Factors	90
7.3.7 Solutions and Waste Minimisation	90
7.3.8 Policy and Planning	93

8. An Assessment of Current Resources Available	94
8.1 Fiji	94
8.2 Samoa	106
8.3 South Tarawa	113

Appendix A - Terms of Reference	124
Appendix B - Study Methodology	126
Appendix C - Questionnaire	132
Appendix D - Bibliography	135

Acronyms and Abbreviations

SPREP	South Pacific Regional Environment Programme
EU	European Union
WASTE	Pacific Regional Waste Awareness & Education Programme
FSP	Foundation of the Peoples of the South Pacific
TUC	Teinainano Urban Council
BTC	Betio Town Council
MESD	Ministry of Environment and Social Development
MHARD	Ministry of Home Affairs and Rural Development
PUB	Public Utility Board
TOR	Terms of Reference
SKM	Sinclair Knight Merz
PET	Polyethelene terephthalate
PRB	Public Rental Board
DLSE	Department of Lands, Survey, and Environment (Samoa)
DEC	Division of Environment and Conservation (Samoa)
CBO	Community Based Organisation
NGO	Non-Government Organisation
SVB	Samoa Visitors Bureau
NBC	National Beautification Committee
IBS	Integrated Bio-Systems
SWM	Solid Waste Management
CEO	Chief Executive Officer
KEEP	Kiribati Environmental Education Program
SAPHE	Sanitation, Public Health, and Environment (Project)

1. Executive Summary

The Waste Awareness Baseline Survey was carried out in Suva, Apia, and South Tarawa as part of the Pacific Regional Waste Awareness and Education Program.

The objective of the survey was to assess the level of awareness regarding solid waste issues, identify key waste issues and their causal factors, describe potential solutions to the problems, ascertain sources of understanding, and assess the level of resourcing available.

The general level of waste awareness for Suva is relatively high. For Apia it can be described as average or just below average and for Tarawa it is relatively low. Regarding knowledge of specific areas of waste, the spread of answers indicates a lack of understanding of hazardous waste, adverse effects of uncontrolled waste disposal, and waste as a resource.

For Suva the most common sources of waste information about solid waste issues are television and radio, for Apia television and radio, and for Tarawa radio and newspapers.

Other sources of solid waste information, such as education through seminars and workshops, are significantly low in the three cities. The results indicate that not enough is being done in education at the community level using a face to face approach.

In all the three cities, a very small number of people had attended a workshop, seminar or training on waste. The results show that very few agencies are active at a community level. There is obviously a need for agencies promoting better waste management to combine an awareness and education campaign with small participatory waste projects at the community level.

Waste disposal has become a serious problem in Suva and some of those surveyed feel the situation is deteriorating. The types of waste that are of serious concern are papers, plastics, and tins and cans.

In Apia the waste problem was also characterised as serious by majority of the respondents. The types of waste that are of concern are plastics, garden waste, and papers.

In Tarawa the majority of the respondents characterised waste as a 'slight problem'. The perception of the solid waste problem is unique on South Tarawa. It is related to the concept of social conscience and collective responsibility. Waste is perceived as a problem if a person's home and yard is filthy. If any other place is filthy, it is not considered a problem.

In the three cities the five most serious waste problems that require immediate attention were identified as:

1. littering and illegal dumping;
2. inadequate services and facilities;
3. adverse social effects of uncontrolled waste disposal;
4. stray animals and dogs; and
5. environmental effects of specific pollutants.

The solutions to these problems, in order of importance, were identified as:

1. awareness, education and training;
2. improved services and facilities;
3. legislation and enforcement services;
4. waste minimisation initiatives; and
5. community participation.

The top priority is perceived to be awareness building and education. However, results from the survey indicate that when information and education is channelled through mass media it is not very effective in changing the attitude and behaviour of people. Waste education has to move more towards being specific, contact-oriented, activity related and community based. However, professionally produced mass media messages aired at prime time will still be a useful tool in raising awareness about waste issues.

The changing of human behaviour is a complex issue. Awareness and education is a necessary component of this change process but is not sufficient on its own. The prerequisites for behavioural change are a hierarchy of connected factors such as:

- ? motivation through awareness and education;
- ? availability of practical viable alternatives for dealing with waste;
- ? incentives;
- ? awards and recognition; and
- ? legislation and enforcement.

If viable alternatives for dealing with waste are not available, people will not change their behaviour.

In order to improve the solid waste management situation in these three countries, it is therefore imperative that awareness building and education should proceed together with improvements in services and facilities, legislation and enforcement services, waste minimisation initiatives, and community participation.

The specific topics for education and the priority areas of action, proposed approaches, target groups and areas, and preferred channels of communication are mentioned next in the Findings and Recommendations Chapter.

2. Findings and Recommendations

2.1 Suva

2.1.1 Findings

The general level of awareness of waste is relatively high in Suva. However there is need for waste awareness and education programs to focus on specific areas. These specific areas, amongst others, include hazardous waste, waste as a resource, and adverse effects of uncontrolled waste disposal.

In the recent past approach to waste education has been of general nature using mass media as the main channel of communication. From this general approach waste education has to become more specific, contact oriented, activity related, and community based.

There is a need for agencies promoting better waste management to combine awareness and education campaign with small participatory waste projects at community level.

Waste disposal has become a serious problem in Suva and some feel the situation is deteriorating. The types of waste that are of great concern include papers, plastics, and tins and cans.

The most serious problems that require immediate attention include littering and illegal disposal, lack of facilities, inadequate services, and social discomfort (bad odour and bad appearance, etc.).

The causes of the above mentioned problems have been identified as lack of awareness and education, human factors, and lack of legislation and its enforcement.

The solutions to these problems, in the order of priority, are education and training, improved services, better facilities, legislation and enforcement, and waste minimisation.

In Suva the most common method of waste disposal is via the waste collection service.

It appears that compost making could become a viable venture in Suva. There is a small amount of compost making occurring at home. Centralised composting by an agency is recommended.

About 50% of the respondents agreed to the question of forming a separate body for managing waste in Suva. A waste authority covering Suva, Nasinu, Nausori, Lami, and Navua could be an option for Suva City Council to consider.

2.1.2 Recommendations

The recommendations cover priority areas on which to focus, proposed approaches, target groups and areas and channels of communication.

2.1.3 Priority Areas

The following priority areas have been identified.

☞ Awareness Education and Training

Waste awareness and education need to sharpen the focus on the following areas:

? Waste a Resource

The concept that waste is not a waste, as generally thought, but a resource that can be put to several uses needs promotion. This requires a new and useful way of looking at waste. The way to go about is to segregate waste into various types and show how each type can be used to our benefit.

? Effects of Uncontrolled Waste Disposal

The understanding of adverse effects of uncontrolled waste disposal is skewed in favour of one or two diseases and water pollution. The message content should deal with the entire range of adverse consequences, i.e. social, health, economic, and environmental effects.

? Agents of Dispersal and Scattering of Waste

This is an important concept that needs explanation and understanding. Hopefully, when people understand and appreciate this concept, something will be done about it. Like seed dispersal, there are a number of agents that disperse rubbish. These agents include dogs, wind, wave action, children, scavengers, and passing vehicles which scatter rubbish everywhere aggravating the waste problem.

? Plastics

Plastic use in modern life is a new phenomenon and its polluting potential is immense. People need to understand various aspects of plastics. What is plastic? What are the different grades of plastics and how to identify them? Create awareness about how various forms of plastic enter waste stream and cause environmental problems and ways in which plastic can be reused and recycled.

? Waste Segregation and Minimisation

There are a number of important concepts in this priority area, which need to be popularised. The concepts include, among others, waste segregation, sorting waste at source, transfer station, and waste minimisation. Waste minimisation in turn requires an understanding and appreciation of avoidance, reduce, reuse, and recycling concepts.

? Legal Instruments and Implications

People in general and in particular all generators, operators, and regulators of waste activities should be made aware of all the existing Acts and legal instruments that address

waste. There is adequate legislation but it is enforcement that is lacking. The awareness campaign should proceed stepwise. Take one aspect of legislation, educate, allow time for change, and then move on to another aspect.

? **Waste Resource Material**

A simple and well illustrated waste resource kit dealing with basic concepts, ideas, and practices that can be used as a resource material for awareness building and skill imparting to youth groups, women's groups, and community based groups.

Another option is to develop a teacher resource book, which covers all aspects of waste management. It can include a number of interesting activities for students to carry out at different levels. It would be good to include some information on how to dispose expired or used laboratory chemicals.

⚡ **Hazardous Waste**

What is hazardous waste? Where is it produced? How can it be handled, stored, transported and disposed. Its adverse effects on human health, its role in pollution and contamination of water and soil, and detrimental effect on aquatic and marine resources need explanation.

⚡ **Obligations of Waste Collectors**

Waste collectors/contractors/ workers need to be educated about their obligations. The meaning and consequences of late collection, irregular collection, inadequate service, inept handling, etc. should be clearly explained. Contractual obligations and legal requirements, wherever applicable, should be quoted. On the job training and supervision may be required.

⚡ **Responsibility of Waste Generators**

Waste generators could be individuals, households or corporate bodies. Each one should know their rights as well as their responsibilities. The focus should be on the mandatory requirements for bins, right timing of placement, right day of placement, restraining pets and dogs, etc. People should be encouraged to complain if they have some problem. (This would require setting up a help desk facility.)

⚡ **Littering and Illegal Disposal**

Individuals, households, and corporate bodies should be informed about the specific consequences of illegal dumping. Focus should be on illegal acts and corresponding penalties. Illegal disposal and littering could be related to adverse effects of uncontrolled waste.

⚡ **Use of Proper Equipment and Safety Devices**

This can be approached from various perspectives such as efficiency of service, personal safety, and requirements of Occupational Health and Safety Act. The area of education relates mostly to waste contractors and waste workers. .

☞ **Composting**

Compost making can become a viable project for Suva. A business venture approach should be adopted. Link it to waste minimisation and its immense benefit.

☞ **Plastic as pollutant**

Plastic use in modern life is a new phenomenon and its polluting potential is immense. It is a priority area for education, and as a polluting agent it requires immediate attention. The way forward would be to consider reuse and recycling opportunities locally, regionally or globally.

2.1. 4 Proposed Approaches

Under this section broad principles and approaches are discussed. Target groups, target areas and more specific approaches are summarised in the table that follows.

☞ **Awareness Education and Training**

The approach would be to put more emphasis on specific, contact oriented, activity related and community based education. Towards this end, agencies involved in waste management should combine education with small participatory waste projects at community level.

☞ **Hazardous Waste**

Proper handling, storage, transportation, and disposal of hazardous waste need to be undertaken separately from other classes of waste.

☞ **Obligations of Waste Collectors**

SCC should take initiative in educating, training, supervising, and enforcing by-laws and contractual obligations with contractors and waste workers. On the job supervision may be required with random inspections later.

☞ **Responsibility of Waste Generators**

SCC should make people aware of their rights and responsibilities and standards and specifications they are required to follow. Compliance should be insisted after reasonable period of awareness building.

☞ **Littering and Illegal Disposal**

Invoke all legal instruments and provisions. Explain the provisions to the general public and specific generators of waste. Allow time for change. Appoint city rangers, enforce the provisions and penalise the defaulters.

☞ **Use of Proper Equipment and Safety Devices**

The approach would be to make use of the Occupational Health and Safety Act, contractual obligations and personal health and safety considerations.

☞ **Composting**

Adopt an approach of making compost a commercial venture. Suva City Council could do this independently or in association with private sector. Adopt a centralised composting system to overcome land problem in urban Suva. Use other sources of organic waste to blend with compost.

☞ **Plastic as pollutant**

Recycling initiatives with monetary reward for recyclable materials such as PET containers and other grades of plastic. Involve other producers/users of plastic products in a 'Mission Pacific' type of initiative (see Coca Cola in Resources Available chapter).

2.1.5 Target Groups, Target Areas, and Channels

Having discussed the broad approach, it is important to identify the target group or area and the appropriate channels for each of the priority areas.

Priority Area	Target Group/ Area	Channel
Awareness & Education	Schools, community based groups, general public, Industrial, commercial, and business operators	Curricular and co-curricular activities, prime time T V spot, community based meetings & discussion, talk back radio programme., video screening, regular column in vernacular papers. Use health promotion unit of Min of Health.
Hazardous Waste	Those who produce & handle hazardous waste, medical institutions, general public.	On-site training, workshops, information leaflets, videos.
Obligations Waste Collectors	Suva City Council, Contractors, waste workers and their supervisors.	Workshop, on the job supervision, video and audio application
Responsibility Waste Generators	Households, industrial, commercial, and business operators, residents of densely populated areas such as PRB flats, Housing Authority Blocks, and Squatter areas.	Information leaflets, Local Area workshops, radio and T V spots, competition and award. Make use of Tenants Association and Rules of residence
Littering & Illegal Disposal	School, Community Based Groups, General public	Curricular & co-curricular activities, Neighbourhood Waste Scheme, radio talk back programme, Updates in police program, clean up campaigns.
Proper Use Equipment & Safety Devices	SCC, contractors, waste workers	Workshop, on-site training, video screening of machinery and equipment in operation.

Composting	Schools, Household, SCC, private sector	School gardening program, Households - waste sorting education through information leaflet, radio and T V, community based demonstration.
Plastics as Pollutant	Schools, Youth groups, church groups, shops, retail outlets, businesses producing or using PET and other grades of plastic, general public.	Information leaflets, Promoting reuse and recycle scheme with target groups through personal contact, involve businesses through personal discussion, inform public through prime time radio and T V spots.

2.2 Apia

2.2.1 Findings

In Apia 11% of the respondents had primary level of education and 20 % did not have any formal education.

The general level of awareness of waste in Apia can be described as average or just below average. A large proportion of respondents (48 %) did not know the correct answer to some basic questions. There is obviously a need for a basic information campaign informing the public about the new zones of collection, day/time of collection, nominated contractors, a number to call in case of complaint, etc.

A significant proportion of the respondents did not know enough about hazardous waste. People are not fully aware of the wide range of uses that waste can be put to. There is need to create awareness that waste is a resource. The spread of answers does not indicate a sound understanding of adverse effects of uncontrolled waste disposal.

Television and radio are the most popular sources of information. Other sources of information involving personal contact are significantly small. Awareness and education efforts are spread thin and wide in the community. There is need to sharp focus waste education on specific issues, areas, and target groups.

Results show that few agencies are active at community level. There is a need for agencies promoting better waste management to combine awareness and education campaign with small participatory waste projects at community level.

90 % of the people interviewed felt that waste disposal is a problem in Apia City. The types of waste that are of concern, in order of priority, are plastics, garden waste, and papers.

The most serious problems that require immediate attention include plastics, littering and illegal dumping, stray animals, and inadequate waste collection services and facilities.

The causes of the above mentioned problems have been identified as human factors, lack of awareness and education, and lack of resources.

The solutions to these problems, in the order of priority, are public awareness and education, community participation, legislation and enforcement, and improved facilities and services.

In Apia the most common method of waste disposal by households is via the collection service (88 %). The other method of disposal of some importance is 'compost' (5 %).

Respondents in Apia were favourably disposed towards the idea of compost making (72 %). It appears that compost making can become a viable venture in Apia.

Respondents were divided on the question of a separate body for managing waste in Apia. 68 % agreed to the proposal. However, under the existing circumstances, it would be better for DLSE to improve the standard of services and facilities provided.

2.2.2 Recommendations

The recommendations cover priority areas on which to focus, proposed approaches, target groups, target areas and preferred channels of communication.

2.2.3 Priority Areas

The following priority areas have been identified.

☞ Awareness, Education and Training

Waste awareness and education need to sharpen the focus on the following areas:

? Basic Information Campaign

There is a need for disseminating basic information on waste management and services provided including new zones of collection, day/time of collection, nominated contractors, and a number to call in case of complaint.

? Waste a Resource

The concept that waste is not a waste, as generally thought, but a resource that can be put to several uses needs promotion. This requires a new and useful way of looking at waste. The way to go about is to segregate waste into various types and show how each type can be used to our benefit.

? Adverse Effects of Uncontrolled Waste Disposal

The understanding of adverse consequences of uncontrolled waste disposal is skewed in favour of one or two diseases and water pollution. The message content should deal with the entire range of adverse consequences, i.e. social, health, economic, and environmental effects.

? **Vandalism of Bins**

People living in nearby areas come in the night or early morning to dump waste in the bins in the town area. Even dead animals and offal have been found in personal bins. This indicates inadequate coverage of collection service and lack of adequate facilities.

? **Plastics**

Plastic use in modern life is a new phenomenon and its polluting potential is immense. People need to understand various aspects of plastics. What is plastic? What are the different grades of plastics and how to identify them? Create awareness about how various forms of plastic enter waste stream and cause environmental problems and ways in which plastic can be reused and recycled.

? **Legal Instruments and Implications**

People in general and in particular all generators, operators, and regulators of waste activities should be made aware of all the existing Acts and legal instruments that address waste. There is adequate legislation but it is enforcement that is lacking. The awareness campaign should proceed stepwise. Take one aspect of legislation, educate, allow time for change, and then move on to another aspect.

? **Waste Sorting/Minimisation**

There are a number of important concepts in this priority area, which need to be popularised. The concepts include, among others, waste segregation, sorting waste at source, transfer station, and waste minimisation. Waste minimisation in turn requires an understanding and appreciation of avoidance, reduce, reuse, and recycling concepts.

? **Agents of Dispersal and Scattering of Waste**

This is an important concept that needs explanation and understanding. Hopefully when people understand and appreciate this concept, things will change for the better. Like seed dispersal, a number of agents disperse rubbish. These agents include dogs, wind, wave action, children, scavengers, and passing vehicles which scatter rubbish everywhere aggravating the waste problem.

? **Waste Resource Material**

A simple and well illustrated waste resource kit dealing with basic concepts, ideas, and practices that can be used as a resource material for awareness building and skill imparting to youth groups, women's groups, and community based groups.

Another option is to develop a teacher resource book, which covers all aspects of waste management. It can include a number of interesting activities for students to carry out at different levels. It would be good to include some information on how to dispose expired or used laboratory chemicals.

⚡ **Hazardous Waste**

What is hazardous waste? Where is it produced? How can it be handled, stored, transported and disposed. Its adverse effects on human health, its role in pollution and

contamination of water and soil, and detrimental effect on aquatic and marine resources need explanation.

⌘ **Littering and Illegal Disposal**

Individuals, households, and corporate bodies should be informed about the specific consequences of illegal dumping. Focus should be on illegal acts and corresponding penalties. Illegal disposal and littering could be related to adverse consequences of uncontrolled waste.

⌘ **Plastics/Recycling**

Plastic use in modern life is a new phenomenon and its polluting potential is immense. It is a priority area for education, and as a polluting agent it requires immediate attention. The way forward would be to consider reuse and recycling opportunities locally, regionally, and globally. .

⌘ **Composting/Garden Waste**

Compost making can become a viable venture for Apia. A business venture approach should be adopted. Link it to waste minimisation and its immense benefit.

⌘ **Responsibility of Waste Collectors**

Waste collectors/contractors/ workers need to be educated about their obligations. The consequences of late collection, irregular collection, inadequate service, inept handling, etc. should be clearly explained. Contractual obligations and legal requirements, wherever applicable, should be cited. Use of appropriate equipment, gears, and safety devices should be insisted.

⌘ **Responsibility of Waste Generators**

Waste generators could be individuals, households or corporate bodies. Each one should know their rights as well as their responsibilities. The focus should be on the mandatory use of bins, right time of placement, right day of placement, restraining pets and dogs, etc. People should be encouraged to complain if they have some problem. This would require setting up a help/complain desk facility.

⌘ **Improving Services and Facilities**

Education should proceed together with the provision of improved services and facilities. This can only happen if funds are available. This may require implementing the 'user pay' principle in a form appropriate to Apia. Services that require improvement include more bins in town areas, skips for those living in the vicinity of Apia, better service coverage within town area, and use of modern machinery, equipment, and gears.

⌘ **Improving Community Participation**

Waste management is a joint effort between community, government, and private sector. Apia has a very cohesive social network that can be used to encourage community participation in waste management. It has a traditional social structure in the form of village chiefs and 'pulenuus' (mayor). The youths are well organised into various

Christian camps. There are other community-based organisations such as women's groups. They all can be utilised to improve community participation.

2.2.4 Proposed Approaches

Under this section broad principles and approaches are discussed. Target groups, target areas and more specific approaches are summarised in the table that follows.

☞ Awareness Education and Training

The approach would be to put more emphasis on specific, contact oriented, and activity related waste education. Towards this end, agencies involved in waste management should combine education with small participatory waste projects at community level.

☞ Hazardous Waste

Proper handling, storage, transportation, and disposal of hazardous waste need to be undertaken separately from other classes of waste.

☞ Littering and Illegal Disposal

Invoke all legal instruments and provisions. Explain the provisions to the general public and specific generators of waste. Allow time for change. Appoint city rangers or use existing health inspectors to enforce the provisions.

☞ Plastics/Recycling

Start recycling initiatives with monetary reward for recyclable materials such as PET containers and other grades of plastic. Involve other producers/users of plastic products in a 'Mission Pacific' type of initiative (see Coca Cola, Recyclers (Fiji) Ltd, and Pepsi: Tropical Bottling Co. Ltd. in Resources Available Chapter).

☞ Composting/Garden Waste

The approach would be to promote compost making at community level. Make use of the initiatives already underway with Siosiomaga Society, Women in Business Foundation, and Crops Division of Ministry of Agriculture. Use CBOs such as youth groups to start composting at community level.

☞ Responsibility of Waste Collectors

DLSE should take initiative in educating, training, supervising, and enforcing by-laws and contractual obligations with contractors and waste workers.

☞ Responsibility of Waste Generators

DLSE and National Beautification Committee should make people aware of their rights and responsibilities and standards and specifications they are required to follow. Compliance should be insisted after reasonable period of awareness building.

⚡ **Improving Services and Facilities**

Better services and facilities means more expenditure on waste management. Government may not be able to subsidise the service forever. Gradually introduce the 'user pay' principle.

⚡ **Improving Community Participation**

Make use of the good social network that exists in the Samoan society. Involve community based organisations such as youth groups, women's groups, girl guides, scouts, village chiefly system and pulenuus. Ministry of Youth, Sports and Culture can be very useful in mobilising the youths.

2.2.5 Target Groups, Areas, and Channels

Having discussed the broad approach, it is important to identify the target group or target area and the most appropriate channel for each of the priority areas.

Priority Area	Target Group/ Area	Channel
Awareness & Education	Schools, community based groups, general public, Industrial, commercial, and business operators, contractors, waste workers.	Curricular and co-curricular activities, prime time T V spot, community based meetings & discussion, talk back radio programme., video screening, regular column in vernacular papers. Use primary health care workers and health promotion unit of Min of Health.
Hazardous Waste	Those who produce & handle hazardous waste, medical institutions, general public.	On-site training, workshops, information leaflets, and video.
Littering & Illegal Disposal	School, Community Based Groups, General public	Curricular & co-curricular activities, Neighbourhood Waste Scheme, radio talk back programme, regular clean up campaigns with wide publicity.
Plastics/ Recycling	Schools, Youth groups, church groups, shops, retail outlets, businesses producing or using PET and other grades of plastic, general public.	Information leaflets. Promote reuse, recycle scheme with target groups through personal contact, involve businesses through personal contact and discussion, inform public through prime time radio and T V spots.
Composting/ Garden waste	Women in Business, Siosiomaga Society, Agriculture at Nu'u, Community Based Groups, Households	Personally contact key agencies, waste sorting information and education through leaflet, radio and community meetings, community based demonstration of actual process.

Responsibility of Waste Collectors	West End Company Ltd., Aldan Company Ltd., Blue Bird Transport Co., Silva Transport Co., waste workers and their supervisors.	Workshop, on the job supervision, and random inspection on the field.
Responsibility of Waste Generators	Households, industrial, commercial, and business operators, market vendors, restaurants, wayside sellers, and general public.	Posters and leaflets, area localised workshop, radio and T V spots, competition and award.
Improving Community Participation	Traditional Social Network, Community Based Organisation, Church Groups, Households.	Community Based Workshops, Personal contact with traditional leaders, Group meetings and discussion, Clean up campaign, Neighbourhood waste scheme.

2.3 South Tarawa

2.3.1 Findings

On South Tarawa 29 % of the respondents had primary level of education and 5.4 % had no formal education.

The general level of awareness on South Tarawa is relatively low; 48 % did not know the correct answer to Question 7, 73 % to Question 8 and 34 % to Question 9. There is obviously a need for a basic information pamphlet clearly delineating, amongst other information, the collection zones, the routes, and the frequency and time of collection.

It is interesting to note that 33 % of the respondents said that waste could be thrown into the river, sea, or coastal areas (Table 8).

The spread of answers indicates that people have a poor understanding of hazardous waste, waste as a resource, and adverse effects of uncontrolled waste, especially economic and environmental effects.

Public education should focus more on hazardous waste and waste as a resource. Handling and disposal of hazardous waste is especially critical in an atoll environment. Regarding adverse consequences of uncontrolled waste, awareness and education efforts should focus more on economic and environmental effects.

Radio and newspapers are the most popular sources of information. Though there are indications of personal approach to community education, it is not enough.

The results indicate that waste awareness and education should sharpen the focus on specific issues, areas, and community based target groups.

A very small number of people had attended some sort of workshop, seminar or training on waste. The results show that very few agencies are active at community level.

There is a need for agencies promoting better waste management to combine awareness and education campaigns with small participatory waste projects at community level.

69 % of the people interviewed said that waste disposal is a problem on South Tarawa; 51 % characterised it as 'slight problem', 11 % as 'serious problem', and 3 % as 'very very serious' problem. About 4 % of the interviewees felt that waste is not a problem

The perception of waste problem is unique on South Tarawa. It has to do with the concept of social conscience and collective responsibility. Waste becomes a problem if a person's home or yard is littered, if any other place is littered, it's not a problem.

The types of waste that are of great concern are plastics, cans/tins and glasses.

The most serious problems that require immediate attention are the social effects of uncontrolled waste disposal (bad odour, bad appearance, etc.), littering and illegal disposal, pollution problem in general, and specific pollutants (plastics, kimbees, batteries, bottles, cans, etc.).

The causes of the above mentioned problems have been identified, in the order of priority, as human factors, lack of enforcement, and lack of awareness and education. .

Human factors including attitude may be altered with *waste awareness and education on South Tarawa but unless services and facilities improve and viable alternatives are found, it will be difficult to change human behaviour.*

The solutions identified to these problems, in the order of priority, are legislation and enforcement services, improvements in services and facilities, waste segregation and minimisation initiatives, and awareness, education and training.

On South Tarawa respondents have placed emphasis on legislation and enforcement, and on improving services and facilities, not so much on awareness and education.

Most people on South Tarawa are disposing their household waste via a number of methods. These methods are composting; burn, bury, or dump in the backyard; collection services; and dumping on the beach, sea, and drain.

People on South Tarawa are favourably disposed towards the idea of compost making (90 %). Considering the existing practice of compost making, the nature of atoll soil, and the promotion of food gardening, it would be prudent to promote composting at the household level.

The majority of the respondents (93 %) agreed to setting up a separate body for managing waste on South Tarawa. This reflects the level of service provided by the Councils. Setting up another authority would demand capital expenditure and duplicate an existing agency in a small place. A better option would be to improve the existing services and facilities.

79 % agreed to pay for improved services. Of those who agreed for improved services and gave a figure, the mean for 278 respondents is \$3.66 per month. The standard deviation is \$2.62.

Majorities of the respondents were willing to pay \$1 to \$3 per month.

2.3.2 Recommendations

The recommendations cover priority areas on which to focus, proposed approaches, target groups and areas and channels of communication.

2.3.3 Priority Areas

The following priority areas have been identified.

✎ Awareness, Education and Training

Waste awareness and education need to sharpen the focus on the following areas:

? Basic Information on Waste Management

There is a need for disseminating basic information on waste management and services provided by the two Councils. The information should include, among other things, collection zones, day and time of collection, routes, nominated dumpsites, etc.

? Acceptable Waste Disposal Methods

Many people on South Tarawa feel that it is all right to throw rubbish into the sea, lagoon, beachfront, and on open ground. In the past it did not matter much because the population was small and waste was largely of traditional nature. Now this notion of tossing rubbish into the sea, lagoon, and beachfront has to change for the better.

? Social and Collective Responsibility

This is a very important concept to deal with. The perception of waste problem is unique on South Tarawa. It has to do with the concept of social conscience and collective responsibility. Waste becomes a problem if a person's home or yard is filthy, if any other place is filthy, it's not my problem. The idea of collective responsibility and the concept of larger environment, other than one's home and compound, directly impacting our lives need vigorous promotion.

? Agents of Dispersal and Scattering of Waste

This is an important concept that needs explanation and understanding. Hopefully when people understand and appreciate this concept, things will change for the better. Like seed dispersal, a number of agents disperse rubbish. These agents include dogs, wind,

wave action, children, scavengers, and passing vehicles which scatter rubbish everywhere aggravating the waste problem. All these agents can be seen operating on South Tarawa.

? **Waste and Formal Education**

There is need, especially in Kiribati, to develop resource material on waste management for curriculum writers, for orientation of teachers, and for classroom teaching (refer to CDU, Kiribati, in Chapter on Resources Available).

? **Waste a Resource**

The concept that waste is not a waste, as generally thought, but a resource that can be put to several uses needs promotion. This requires a new and useful way of looking at waste. The way to go about is to segregate waste into various types and show how each type can be used to our benefit.

? **Adverse Effects of Uncontrolled Waste Disposal**

The understanding of adverse consequences of uncontrolled waste disposal is skewed in favour of one or two diseases and water pollution. The message content should deal with the entire range of adverse consequences, i.e. social, health, economic, and environmental effects.

? **Legal Instruments and Implications**

People in general and all operators and regulators of waste activities should be made aware of all the existing Acts and legal instruments that address waste. There is adequate legislation around but it is enforcement that is lacking. The awareness campaign should proceed stepwise. Take one aspect of legislation, educate, allow time for change, and then move to another aspect.

≠ **Hazardous Waste**

What is hazardous waste? Where is it produced? How can it be handled, stored, transported and disposed. Its adverse effects on human health, its role in pollution and contamination of water and soil, and detrimental effect on aquatic and marine resources need explanation.

≠ **Landfill Management**

On South Tarawa there are a number of temporary landfill sites. Environmental considerations are hardly taken into account while locating the dumpsite. Space consideration (creating 'new' land) overrides the environmental consideration. This practice has created a number of environmental problems that need immediate attention.

≠ **Littering and Illegal Disposal**

Individuals, households, and businesses should be informed about the specific consequences of illegal dumping and littering. The consequences should cover both the legal and environmental implications. Focus should be on illegal acts and corresponding penalties. Illegal disposal and littering could be related to adverse consequences of uncontrolled waste.

☞ **Specific Pollutants (plastics, kimbees, batteries, bottles, cans)**

Specific pollutants such as plastics, kimbees, and batteries are often mentioned as creating environmental problems. People in daily life use these items; they have become part and parcel of modern living. They are a priority area for education, and as polluting agents they require immediate attention.

☞ **Composting**

Compost making needs careful consideration on South Tarawa. A few initiatives are underway including composting toilet by FSP. Since problems of solid waste are linked to human waste, all aspects of composting should be considered. It should be related to waste minimisation and its immense benefit to atoll soil.

☞ **Responsibility of Waste Collectors**

Waste collectors/contractors/ workers need to be educated about their obligations. The consequences of late collection, irregular collection, inadequate service, inept handling, etc should be clearly explained. Contractual obligations and legal requirements, wherever applicable, should be cited. Use of appropriate equipment, gears, and safety devices should be insisted.

☞ **Responsibility of Waste Generators**

Waste generators could be individuals, households or businesses. Each one should know their rights as well as their responsibilities. The focus should be on the mandatory use of bins , right time and day of placement, restraining pets and dogs, etc. Because of the unique socio-economic situation on South Tarawa, this may not sound right or appropriate. The question is can we afford to wait in view of the pressing waste problem?

☞ **Improving Services and Facilities**

Education should proceed together with improved services and facilities. Unless this happens waste management may not see a change for the better on South Tarawa. Primarily the services and facilities provided by BTC and TUC need improvement. For this to happen, the Councils will need to improve on a number of things. These are, among others, capacity building of the Council staff, management information system, planning and management of waste operations, and improving on revenue collection.

2.3.4 Proposed Approaches

Under this section broad principles and approaches are discussed. Target groups, target areas and more specific approaches are summarised in the table below.

☞ **Awareness Education and Training**

The approach would be to put more emphasis on specific, contact oriented, and activity related waste education. Towards this end, agencies involved in waste management should combine education with small participatory waste projects at community level.

Since human and other forms of resources are scarce on South Tarawa the approach to education has to be rationalised and resources pooled. An agency that has the capacity for waste education should take the lead role.

⌘ **Hazardous Waste**

Proper handling, storage, transportation, and disposal of hazardous waste need to be undertaken separately from other classes of waste. Education on hazardous waste should go hand in hand with training and practical solutions. Create a separate facility for disposing hazardous waste.

⌘ **Landfill Management**

At present several landfill sites are operated by the two Councils. The approach would be to design a sanitary engineered landfill that will be able to take care of waste disposal on South Tarawa. Since land and other resources are scarce, the life span of the landfill will have to be increased through waste minimisation activities.

⌘ **Littering and Illegal Disposal**

Invoke all legal instruments and provisions. Explain the provisions to the general public and specific generators of waste. Allow time for change. Use Council inspectors to enforce the provisions.

⌘ **Specific Pollutants**

The approach here would be to adopt a wide range of measures to deal with the polluting items. For plastics, bottles, and cans, reuse and recycling opportunities should be explored locally, regionally, or globally. A mix of measures could be adopted to deal with kimbees such as education, encouraging cotton nappies, and pricing policy. The Government can use selective tariff measures to discourage polluting items and encourage those that are environmentally friendly.

⌘ **Composting**

People on South Tarawa are favourably disposed towards the idea of compost making. Considering the existing practice of compost making, the nature of atoll soil, and the food gardening initiatives underway, it will be prudent to promote composting at household level.

⌘ **Responsibility of Waste Collectors**

The two Councils with the assistance of Urban Management Committee should take initiative in educating, training, and supervising all grades of waste workers. MESD should oversee that the Councils comply with environmental safeguards.

⌘ **Responsibility of Waste Generators**

MESD with the assistance of FSP and Local Area Committees should make people aware of their rights and responsibilities and standards and specifications they are required to follow. Compliance should be insisted after reasonable period of awareness building.

≈ Improving Services and Facilities

Majority of the respondents agreed to the question to setting up a separate body for managing waste on South Tarawa. Setting up another authority would demand capital expenditure and duplicate an existing agency in a small place. A better approach would be to improve the existing services and facilities provided by BTC and TUC.

2.3.5 Target Groups, Areas, and Channels

Having discussed the broad approach, it is important to identify the target group or area and the most appropriate channel for each of the priority areas.

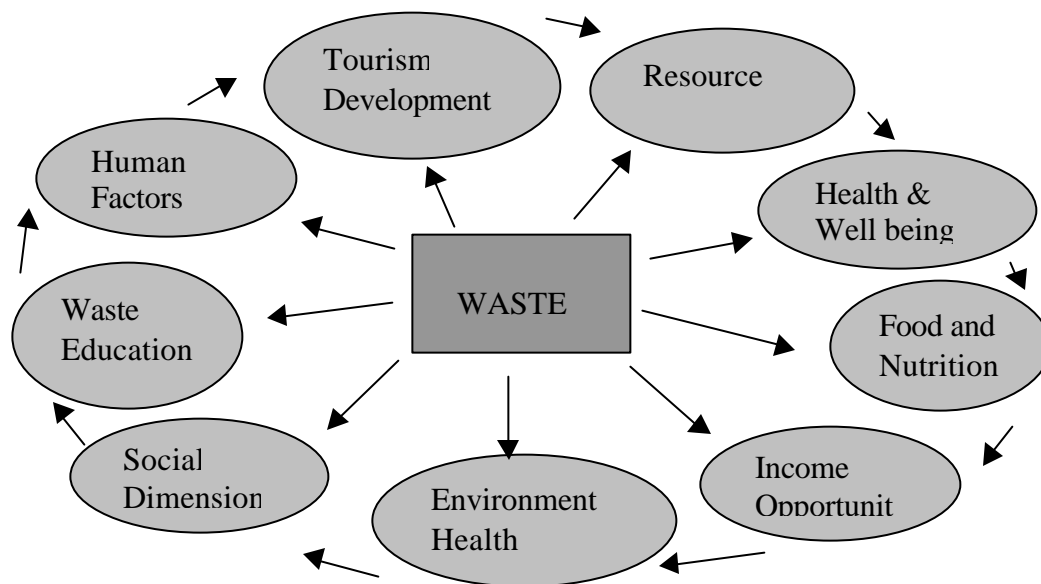
Priority Area	Target Group/ Area	Channel
Awareness & Education	Schools, community based groups, general public, Industrial, commercial, and business operators, BTC, TUC. .	Curricular and co-curricular activities, community based meetings & discussion, talk back radio programme., video screening, regular column in vernacular papers. Use professional drama groups- MAMIRA & ITIBWEBWERI- and FSP.
Hazardous Waste	Those who produce & handle hazardous waste, hospitals, clinics, general public.	Workshop with target groups, information pamphlet on basics of hazardous waste, On-site training and supervision. .
Littering & Illegal Disposal	School, Community Based Groups, Utility operators, garages, manufacturers, businesses, general public	Curricular & co-curricular activities for schools, Neighbourhood Waste Scheme for community, radio talk back programme for general public , clean-up campaigns for all. Personal contact with trade groups
Specific Pollutants	Schools, youth groups, church groups, shops, retail outlets, consumer groups, businesses producing or using PET and other grades of plastic, general public.	Information leaflets, Promoting reuse, recycle scheme with target groups through personal contact, involve businesses through personal discussion, inform public through prime time radio spots. Use professional drama groups for community education.
Composting	Households, youth groups, and community based groups.	Use FSP/ Agriculture for community based demonstrations, personally contact key agencies. Waste sorting awareness through information leaflet and radio.
Responsibility of Waste Collectors	Betio Town Council, Teinainano Urban Council, waste workers and their supervisors. .	Workshop, on-job supervision, video and audio application

Responsibility of Waste Generators	Households, industrial, commercial, and business operators, garage owners, market vendors, restaurants, wayside sellers, and general public.	Information leaflets, area localised workshop, meeting and discussion with trade groups, prime time radio spots, competition and award.
Landfill Management	Relevant staff of TUC and BTC and their supervisors and regulators.	Information and education through workshop and personal contact with target groups. Take advantage of SAPHE project to build local capacity for landfill management.

2.4 Waste Link for Suva, Apia, and Tarawa

WASTE LINK approach for awareness, education, and motivation. At the moment waste has no life and respect. To give it life and respect, so that it can take care of itself, waste has to be linked (WASTE LINK) to various facets of our lives. The schematic diagram below explains the concept.

WASTE LINK: TO GIVE WASTE LIFE AND RESPECT



3. Introduction

This report was financed by the European Communities from a grant by the European Development Fund and is represented by A-N-D Consultants and Sinclair Knight Merz for the consideration of the Government of Fiji, Government of Samoa, and the Republic of Kiribati. It does not necessarily reflect either the opinion of the latter or the European Commission.

A-N-D Consultants in association with Sinclair Knight Merz was commissioned in June 2000 by the South Pacific Regional Environment Program (SPREP), to carry out the Solid Waste Awareness Survey in three Pacific ACP countries including Samoa, Fiji and Kiribati.

This is the final report for Fiji, Samoa and Kiribati and is based on findings of the field work carried out by Indra Deo and Maleli Naiova between 7th August and 30th September 2000.

The aim of the report is to:

- ? assess the level of solid waste awareness
- ? identify key solid waste issues in the community
- ? identify causal factors
- ? describe solutions to the problems
- ? ascertain sources of understanding and
- ? gauge the level of resources available.

The TOR for this project is attached Appendix A.

4. Overview of Existing Solid Waste Management and Waste Awareness in Fiji, Samoa, and Kiribati

4.1 Fiji

4.1.1 Introduction

The capital city of Fiji, Suva, with a population of about 77,000 or 12, 800 households has the largest municipal centre. The annual income of the Suva City Council is about \$16 million per annum and approximately 1% (\$178, 000) of this is spent on waste management. The private contractor cost per year is about \$901, 500. This is paid to private contractors for rubbish collection services and for cleaning streets, drains and other public amenities such as parks. Solid waste in Suva originates from households, schools, businesses, factories, and heavy and light industries.

4.1.2 Landfill

The Suva City Council currently uses the Lami dump, which is located just outside the perimeter of the city and caters for domestic, commercial and industrial wastes. The dump is located next to the Tamavua-I-Wai River on flat land, adjacent to mangrove swamps. There is no segregation of waste at the landfill and all types of waste are accepted.

Normally one bulldozer is in operation at the dumpsite. The newly dumped waste is shifted, compacted and is occasionally covered with topsoil. Although the dump is sprayed occasionally, bad odour emanates from the site due moist conditions and lack of soil cover. The landfill has a problem with scavengers who frequent the dumpsite. Scavengers collect scrap metal, textiles and other goods.

Suva City Council, in association with the Department of Energy, has recorded the weight and type of refuse being deposited at the Lami dump. This data is presented in the Table below. The data applies to 12- month period between June 1995 and May 1996.

Table 4.1.1 - Refuse Type and Mass entering Lami Dump 1995/96 (SCC/Dept of Energy)

Contractor		Comm- ercial	Food Factory	Green Waste	Refuse Types					
					Builder Rubble	House- hold	Market Refuse	Mixed Refuse	Garm -ent	Tyres
Carpenter Disposal	Waste	5 810	366	34	8	-	4	50	184	22
Industrial Transport Ltd	Disposal	2 801	129	25	-	-	-	9	237	-
Lami Town Council		6	-	324	28	912	-	14	-	3
Nakasi Private Contractor		3	-	28	-	572	-	4	-	-
Others		3 630	189	1 853	9 246	127	1	3 133	7	62
Suva City Council Fleet		183	7	1 219	4 275	11 206	1 618	1 595	-	-
Suva City Council Contractor		92	-	7 482	46	143	14	54	-	2
Suva Rural Authority	Local	6	-	32	-	3 930	-	22	-	-
Total (Tonnes)		12 531	691	10 997	13 603	16 890	1 637	4 881	428	89

The landfill has a gatehouse that is manned between 7am – 4pm Monday – Saturday. The gatehouse records all loads of vehicles entering to dump refuse. Fees are collected and recorded. The fees for refuse from within Suva City is as follows:

Table 4.1.2 Suva City Garbage Dumping Fees

Type of Garbage	City Boundary – Per Load
Cars/vans	\$3.33
3 tonne truck	\$6.66
7 tonne truck	\$13.31

4.1.3 Collection Service

In most part of Suva, household rubbish is collected three times per week in 7 tonne compactor or covered trucks. In the City Central, commercial and industrial areas, waste is collected daily except Sundays. In addition to these services, Suva City Council also operates a garden waste collection day and for rubbish, such as roofing iron, building materials, and odd household items on a quarterly basis.

The council has approximately six compactor vehicles with a collection team of more than 24 people working around Suva. Even though the council believes it has a high level of domestic service to the ratepayers, the community at large believes they still need to improve the system. Some details of refuse services and staffing is shown below.

Table 4.1.3 Details of Services and Staffing

Services & Staffing	Details
Number of staff at the Lami Dump	59
Collection Staff	36
No. of vehicles	6
Vehicle Type	7tonne compactor
Loads / truck	Approx .max of 3 per day
Collection Frequency	3-6/week

The Suva City Council hires skips from Waste Care Ltd. to cover areas throughout the city that accumulate a lot of refuse. Skips of various sizes from 1.5 m³ - 4.0 m³. They charge \$30/skip. They are mainly used by the Suva Market, supermarkets, hotels, offices, and large industries or commercial properties.

The Suva City Council does not have a specified rate fraction allocated to garbage services. The Health Department within the Council is merely granted a budget with which to run the refuse services.

4.1.4 Littering and Illegal Dumping

Littering and illegal dumping in the city and on the outskirts of Suva is common especially along foreshore of Nasese and Suva Point.

The Council is under-resourced to carry out sufficient enforcement of the Litter Decree 1991. This Act covers litter prevention, offences and procedures for prosecuting alleged offenders, and enables public authorities to appoint litter prevention officers. The lack of manpower is an issue, and improvements must be made in training of staff in implementation of the Act with existing resources, and better efficiencies in the area of enforcement.

Clean up of streets, parks and beaches are often carried out by businesses or community groups such as Shell, Department of Environment, Town and Country Planning, SPACHEE, local radio stations, schools, as well as the staff of the Suva City Council.

4.1.5 Education

The Suva City Council has a Health and Education Unit, which conducts waste management and environmental educational programs through the local media or by community visits.

The unit also visits schools within the Suva City boundary to make presentations on concepts of waste minimization such as reduction, recycling, and reuse of solid wastes.

There is a moderate level of awareness in the general public of waste management issues, but littering and illegal dumping of waste is still significant.

The Department of Environment have designed and implemented a number of programmes over the last 5 years. Among others these include Radio Ads on Littering & Clean Up; School Calendar competition; Environmental Awareness Comic or Fun Pages; TV Commercials; Clean Up Fiji Shopper Sack; Plastic Pollution and Cinema Advertisements.

4.1.6 Recycling Initiatives

Coca-Cola is involved in PET bottle collection and recycling (to Australia) in the Suva area, although the success of this scheme could be improved. There is beer bottle recycling at the Carlton Brewery which operates successfully, probably because they pay a refund for each bottle returned.

There is scrap metal recycling for most metals, including copper, aluminium, brass, zinc, lead, stainless steel, also batteries (part of the battery), air conditioners and radiators. There are three scrap metal businesses operating in Suva: Scrap Metal (Fiji) Ltd, Waste Recyclers Ltd and IA Traders. Ferrous metals are collected but are stored at present as the market price of steel is too low to make export viable.

Waste paper and cardboard is being collected and recycled by Waste Recyclers Ltd, of Suva for baling and shipping to Australia.

Waste oil recycling is available at Fletcher Steel, Walu Bay and caters mainly for big factories, ships and some oil companies such as Mobil. However, this is not widely utilised at present.

4.1.7 Legislation

As well as the Litter Decree described above, the Draft Sustainable Development Bill has a comprehensive section on waste management.

The municipal authorities have by-laws dealing with waste management issues. The by-laws stipulate that every owner or occupier of a house, resident or shop is required to provide proper garbage pans with lids, or garbage bags (not shopping bags) for storage of rubbish at roadsides to be collected. The by-laws also prohibit the indiscriminate dumping of waste within the city boundaries.

The Fiji Public Health Act has several sections relevant to solid waste including issues such as “garbage pans and accumulations”, inspections to be carried out by health inspectors, duties of sanitary inspectors, etc. The Public Health Act is the main legislation for waste management in Fiji.

The Rivers and Streams Act and Ports Authority of Fiji Act also have aspects relating to pollution of waterways and foreshores.

The Mining Act has provisions for regulating mining activities and the Occupational Health and Safety Act protects employees from hazards associated with the workplace including those that may arise from wastes and pollution.

4.2 Samoa

4.2.1 Introduction

The Samoa group of islands consists of four inhabited and five uninhabited islands which are volcanic in nature. Samoa is located 13 degrees N and 14 degrees S and 173 degrees W and 168 degrees E in the middle of the South Pacific.

Samoa has a population of approximately 165 000 people with 70% living on Upolu and 21% residing within Apia. There is similar number of Samoan nationals living in New Zealand, Australia, USA and other countries around the world.

The economy is predominantly agricultural with commodities such as bananas, coconut and copra being exported. Samoa relies heavily on imported items and remittances from relatives living abroad.

4.2.2 Landfill and Collection Services

The Department of Environment and Conservation (DEC) provide waste collection services in Apia free of charge. At least four companies are contracted by the DEC to carry out rubbish collection services in Apia.

There are five major collection areas that extend from Vaialele in the east to Vaitele in the west and southwards to Tiapapata in the mountains.

Of these, the town area is being serviced daily, whilst the other four areas have their refuse collected either twice or three times weekly. Green/garden waste is collected together with the rest of the refuse.

Domestic refuse is normally collected in plastic shopping bags and rubbish bins. Some of the houses in Apia use bin stands/platforms to prevent domestic animals from scattering the waste.

Some of putrescible waste is fed to pigs, disposed off through burning in the open or composting on site.

4.2.3 Education

Education and SWM awareness exercises in the community and villages can be very effective if well organised. A school waste separation workshop was held for the Malifa school compound involving four schools using separate bins for collection of paper, plastic and metal waste. The project was unsuccessful because all the segregated waste was dumped into the same truck and not recycled.

In the late 1990's a NZODA funded project was carried out called "Samoa Environment and Conservation Support" (worth \$NZ 700,000). This project had a multi-media environmental education component with waste minimisation themes.

An awareness program initiated by the Samoa Visitors Bureau called the "Tourism Education /Awareness Roadshow Proposal" was also prepared. DEC, NGO's and other organisations, which deal with environmental issues, participated in this awareness campaign which targeted groups in rural and urban areas.

The implementation of educational program is hindered by a lack of funds.

4.2.4 Legislation and Illegal Dumping of Wastes

Wastes in Apia are disposed of by open burning, backyard burial, reclaiming of land on the foreshore and dumping into the sea and rivers.

Littering occurs in Apia town within areas serviced by the DEC. Additionally litter from un-serviced rural areas also finds its way into private and public bins in the city. .

A study by Sinclair Knight Merz in 1999 revealed that general waste from the Malietoa Hospital and a number of government departments are being dumped illegally in old quarry pits.

Samoa has a Land, Survey and Environment Act, 1989. The legislation itself is not specific on issues such as containers or rubbish bins to have lids, the frequency of collection or, the handling of hazardous wastes.

As experienced in other South Pacific island countries, lack of funds hinders the effective enforcement of the existing legislation to control illegal dumping and littering.

4.2.5 Recycling Initiatives

There are a number of companies involved in the recycling of glass, bottles, aluminium cans, and other metals. These are:

1. Vailima Brewery
2. Tropical Island Company Ltd
3. Samoa Recycling & Waste Management and
4. West End Company Limited.

Tropical Island Company Limited uses PET bottles for its drinks (Pepsi Cola and other products). The company used to refund 5 sene per empty bottle when it first introduced the PET bottles, but have now reduced this to 2 sene per bottle. PEPSI is liable for the exportation of empties but does not do so.

Selprize Ltd, a company that manufactures plastics for packaging has offered to introduce biodegradable plastic bags (shopping and garbage) if the Government subsidises part of the cost. The company is also offering to set up a machine for recycling of plastics, PET bottles and other recyclable containers.

There are a number of excellent recycling initiatives available in Samoa. The Department of Environment and Conservation needs to coordinate the initiatives and to develop a policy on assistance for new projects as well as educating the public on the environmental and economic benefits of recycling.

4.3 Kiribati

4.3.1 Introduction

On South Tarawa, there has been vast change of lifestyle from traditional subsistence to a Western oriented lifestyle. This has generally brought about an increase in imported goods, which ultimately require some form of disposal at the end of its use.

The general waste situation has deteriorated since the early 90s because of an influx of imported goods and associated packaging, the indiscriminate dumping of junk vehicles, machinery, construction equipment and waste material from households.

The problem is further aggravated by the shortage of suitable land for siting proper rubbish disposal sites and the proximity of groundwater and marine resources to potential sites.

Furthermore, South Tarawa is undergoing rapid population growth because of high birth rates and immigration from outer islands. The population is expected to reach about 50,000 by 2010. The high population density of South Tarawa is resulting in over exploitation of resources and more serious pollution, sanitation and public health problems than ever before.

4.3.2 Landfill

Much of the material at all three dumps is of organic origin. Other material present at the dumps is cardboard and paper, plastics, aluminium cans, fabric, tins, engine parts, etc.

Rubbish is in contact with high tidal waters and as a result a significant amount of newly-dumped rubbish is actually being swept away from the dump. It was also noted that a smaller proportion of the rubbish has been transported along the beaches, resulting in these beaches being polluted.

The main impacts of these dumps is visual effects, possible health risks associated with toxic materials, glass and other sharp objects, and the breeding of pests such as mosquitoes, flies, rats and cockroaches. There are also impacts associated with possible contamination of freshwater lenses by leachate from the dumps.

No odour could be detected at the dumps, and once again this is attributed to the absence of putrescible organic matter in the waste stream because much of the waste food and any edible peelings are fed to pigs.

It was also noted that housing was encroaching onto the dumps. The shortage of land and the high population growth rate means that this is unavoidable.

4.3.3 Collection Service

The two councils that are responsible for the collection and disposal of municipal waste on South Tarawa are Betio Town Council (BTC) at Betio and Teinainano Urban Council (TUC) covering an area from Bairiki to Bonriki.

The two councils currently use tractors and open trailers that have holding capacity of between 3.75m³ and 4.5m³. TUC has four tractors and trailers and BTC has two tractors and trailers. The rubbish is disposed of at surface dumps by the two councils at six major locations around South Tarawa: TUC uses four of these and BTC uses the other two.

The collection staff usually consists of a driver and two or three loaders with a shovel and rake for removal of refuse. Collection is on a weekly basis.

Less than three-quarters of the population is covered by the municipal collection service.

Some households, government houses and private businesses use 44-gallon drums as refuse receptacles. The drums are difficult to handle for the waste collectors, and without covers, are open to vermin, dogs, flies and mosquitoes. Households without rubbish bins pile up their rubbish on the roadside for collection.

In TUC areas, most of the refuse collected is dumped in small landfills that are sited on causeways and often on request on private land that is being reclaimed on either the ocean or lagoon side.

Most of these dumpsites are unprotected, are often on fire and refuse is washed in to the lagoon, beaches and the sea. At Red Beach dump there is already signs of leachate seeping beneath the dump wall onto the seafront.

Both Councils have a service charge for waste collection and disposal. Charges in the two Councils are generally similar. The TUC charges Government Ministries \$600/year, private businesses \$400/year, stores \$50/year, and civil servants living in Government quarters \$1.85 per fortnight.

For BTC, households pay \$17 for a local type house, \$29 for permanent houses. The total annual income of TUC is about \$300,000 per annum of which waste management service fees account for about 25%.

4.3.4 Littering and Illegal Dumping

In addition to solid waste the island is also littered with scrap metals such as derelict vehicles, mechanical equipment and World War II relics. This waste is a hazard, occupies valuable space, and should be dealt with in an appropriate manner.

At present there is no proper system to deal with used batteries. In 1999, Kiribati is expected to import more than 1 million small batteries (projected from figures in Customs, Republic of Kiribati, 1999). In addition there are millions of batteries that have already been used and discarded all over the country.

Batteries make up 0.8 % by weight of the household waste and were also noted in significant quantities around the landfill. According to the locals, this problem is more prominent in the outer islands where there is no electric power.

At present medical wastes, needles and syringes are put in small containers or boxes with dressings, clothes, etc. to be burnt on site or buried in the hospital grounds or on other islands. This practice is unacceptable and all medical waste should be incinerated.

4.3.5 Education

FSP Kiribati is coordinating a wide range of activities to improve the environmental management capabilities of the people of South Tarawa. Most of the activities are undertaken under the Kiribati Environment Education Programme (KEEP).

These activities focus on raising knowledge and awareness in the community of environmental problems currently threatening South Tarawa as well as environmental solutions that can be implemented at the community level.

The project is funded by AusAID, British DFID, NZODA and SPREP. FSP Kiribati is liaising closely with the Environment Unit and other partners such as the municipal councils in coordinating and implementing the program.

FSP Kiribati also has excellent resources for conducting training in participatory techniques of project formulation, implementation, monitoring and evaluation.

4.3.6 Recycling Initiatives

The residents of South Tarawa practice reuse and recycling to a limited extent. For example, glass bottles are often reused to store red toddy (*kamwaimwai*) and some plastic items (such as ice cream containers) and aluminium cans are used to store water or are used for in decorations. Some plant material is composted and used in swamp taro (*bwabwai*) culture and for mulching.

There are two private businesses involved in the recycling of aluminium cans and other non-ferrous metals in South Tarawa. They both offer \$A0.35/kg. Although recycling is not their core business, both companies seem to be doing reasonably well in this area and are able to capture a small but significant proportion of the cans available for recycling.

In 1994 the Ministry of Finance & Economic Planning in Kiribati commissioned the Snowy Mountains Engineering Corporation Limited (SMEC) of Australia to undertake a feasibility study for the South Tarawa Environmental Recycling Project. This national project was funded by the European Union with the Ministry of Environment being the Executing Agency. The main objective of the Project was to collect, process and recycle the large number of abandoned vehicles and machinery that were present in South Tarawa.

The SMEC consultants recommended that a scrap metal merchant be appointed, following a competitive tender process, to dispose of the scrap metal. This company would recover the loading, shipping and inward port costs from the re-sale of both ferrous and non-ferrous metals. The SMEC consultants estimated that the above-mentioned EU Project would need to spend an additional \$A8,000 for the tender process and \$A15,000 for a technician to visit the site and provide installation supervision, commissioning, operator and mechanical training for the major items of machinery.

4.3.7 Legislation

In November 2000, the Kiribati Environment Bill was passed. Subsequently, the Environment Unit became the Environment and Conservation Division, which now has the role of regulating and enforcing the Environment Act.

The Local Government Act 1984 empowers Local Council to make provision for sanitary services dealing with rubbish and details the prohibition of acts detrimental to the sanitary condition of the area.

The Ministry of Health is supposed to advise Local Councils on the location of rubbish dumps, particularly in relation to distances from dwellings and the threat of pollution to groundwater. This advice process is not working properly. For example most of the rubbish dumps are sited adjacent to the sea, with significant pollution of the marine environment.

At present in Kiribati rubbish dumping takes place on any private property as long as the land owner has agreed to this. However, under the Foreshore and Land Reclamation Ordinance, the ownership of the foreshore and the seabed is vested in the Government. The laws define the foreshore as the area alternatively covered and uncovered by the sea at high and low tide.

Under the Public Health Regulations:

- ✍ it is an offence to deposit a receptacle at any public place or allow receptacles to remain upon any premises;
- ✍ all premises and land must be kept clean;
- ✍ rubbish must be burnt if possible, and if not, put in bins ready for daily collection.

The Public Highways Protection Act 1989 prohibits the depositing of litter or rubbish on the public highway. A conviction could lead to a fine of \$200 and three months imprisonment.

The Betio Town Council (Public Health) By-laws 1975 prohibits the littering of villages and public places and the sea. The owner or occupier of land can be ordered to remove unsanitary refuse.

A number of other pieces of legislation and regulations have provisions which apply to waste management, such as the Harbours Act(Chapter 40), Kiribati Ports Authority Act(1990), Merchant Shipping Act and Merchant Shipping Order (1975). Some of these Acts are outdated, contradictory and are not enforced.

The fragmented and out dated nature of solid waste management legislation creates co-ordination and administration problems. This is further compounded by the lack of expertise and resources to enforce any existing laws.

In Kiribati there is a need for the formulation of specific waste management policies that would give clear direction and focus to waste management issues.

5. Waste Awareness Baseline Survey

5.1 Introduction

The waste awareness baseline survey was carried out in the three capital cities, namely, Suva, Apia, and Tarawa. The dates of the survey for each city are given below.

Suva: From 3rd August to 15th August 2000

Apia: From 22nd August to 29th August 2000

Tarawa: From 6th September to 11th September 2000

Field work was carried out on week days and on Saturdays but not on Sundays.

5.2 Study Team

The study team consisted of the following persons:

Supervisors

The field operations and training of survey assistants were supervised and carried out by Indra Deo, Team Leader, and Maleli Naiova, Environmental Scientist.

The survey in each city was co-ordinated through the following persons:

Suva Co-ordinator

Taito Waqa, Health Educator, Suva City Council (with the assistance of the Town Clerk).

Apia Co-ordinator

Laavasa Malua, Senior Planning Officer, Department of Lands, Survey and Environment

Tarawa Co-ordinator

Taulehia Pulefou, Pollution Control Officer, Min. of Environment & Social Development

The following survey assistants carried out the interviews in each of the cities.

Survey Assistants- Suva

Ravuama Namata

Tubanaika Sole

Joeli Cava

Asena Vatoga

Simione Turaga

Mataca Delana

Anuradha Singh

Aman Prasad

Survey Assistants- Apia

Violet Wulf
Nia I Belcher
Merina Ieremia
Jana Siaosi
Vainuupo Jungblut
Lameko Tesimale

Survey Assistants- Tarawa

Fatima Bauro
Nini B Kirata
Teeari Etuati
Noketi Karoua
Tokaa Tiitii
Florence Tioti

5.3 Methodology

The methodology adopted for the survey was in conformity with what was proposed for the three cities except for minor adaptations to suit the local conditions. However, it must be noted that those changes improved the quality of the survey.

The details of the methodology adopted are appended to the report as Appendix B.

6. Results

Section A

Tables 1, 2, 3,4, and 5 are all derived from personal data of the respondents.

Table 1	TOTAL RESPONDENTS BY CITY AND GENDER						
	CITY	MALE		FEMALE		TOTAL	
		number	%	number	%	number	%
	Suva	396	48.8	415	51.2	811	100
	Apia	161	45.4	194	54.6	355	100
	Tarawa	155	49.4	159	50.6	314	100

Table 1 shows the distribution of respondents by gender.

Table 2 shows the distribution of respondents by age groups.

Table 3 shows the distribution of respondents by employment status.

Table 4 shows the distribution of respondents by educational attainment.

Table 5 shows the distribution of respondents by residence type.

The data is disaggregated by city.

Tables 2, 3, 4, and 5 are shown on the next page.

Table 2 TOTAL RESPONDENTS BY CITY AND AGE GROUPS (YEARS)																	
	CITY	15-20		21-30		31-40		41-50		51-60		>60		NO ANSWER		TOTAL	
		no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%
		Suva	86	10.6	200	24.7	231	28.5	169	20.8	84	10.4	40	4.9	1	0.1	811
Apia	35	9.9	107	30.1	89	25.1	51	14.4	44	12.4	29	8.2	0	0	355	100	
Tarawa	60	19.1	60	19.1	57	18.2	60	19.1	38	12.1	39	12.4	0	0	314	100	

Table 3: RESPONDENTS BY CITY AND EMPLOYMENT STATUS																
City	Student		Homemaker		Casual/Unemployed		Wage earner		Salaried/S.employed		Retired		No answer		Total	
	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%
Suva	138	17	291	35.9	92	11.3	62	7.6	175	21.6	47	5.8	6	0.7	811	100
Apia	35	9.9	107	30.1	89	25.1	51	14.4	44	12.4	29	8.2	0	0	355	100
Tarawa	61	19.4	98	31.2	42	13.4	44	14	26	8.3	41	13.1	2	0.6	314	100

Table 4 RESPONDENTS BY CITY AND EDUCATIONAL ATTAINMENT													
CITY	Primary		Sec./Cert.		Ter./Dip		No formal edu.		No answer		Total		
	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	
Suva	144	17.8	443	54.6	209	25.8	2	0.2	13	1.6	811	100	
Apia	39	11	170	47.9	63	17.7	74	20.8	9	2.5	355	100	
Tarawa	90	28.7	175	55.7	28	8.9	17	5.4	4	1.3	314	100	

Table 5 RESPONDENTS BY CITY AND RESIDENCE TYPE											
CITY	High/Posh		Middle		Low cost/PRB/Squatter		Other		Total		
	no.	%	no.	%	no.	%	no.	%	no.	%	
Suva	175	21.6	418	51.5	155	19.1	63	7.8	811	100	
Apia	26	7.3	229	64.5	76	21.4	24	6.8	355	100	
Tarawa	110	35	113	36	64	20.4	27	8.6	314	100	

Section B

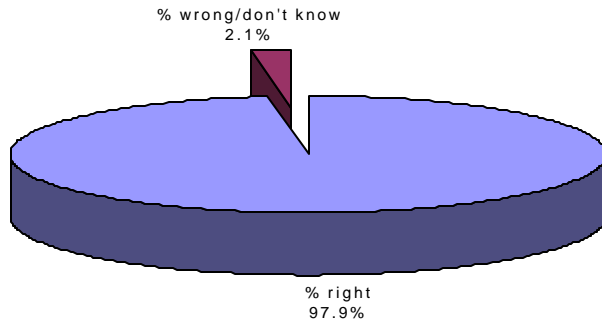
Table 6 shows the percent of respondents who gave the right answer to questions 7, 8, and 9.

Table 6						
B. GENERAL LEVEL OF AWARENESS						
Percentage of right and wrong responses by city and questions 7,8 and 9.						
Q.7 Which agency collects solid waste or rubbish in your area?						
Q.8 How many times in a week rubbish is collected in your area?						
Q.9 To which waste dump your household waste is carted to?						
	SUVA		APIA		TARAWA	
	Right	Don't	Right	Don't	Right	Don't
	answer	Know	answer	Know	answer	Know
Q7	99.5	0.5	36	64	52.5	47.5
Q8	98.6	1.4	63.4	36.6	26.8	73.2
Q9	95.7	4.3	58	42	65.9	34.1
mean	97.9	2.1	52.46	47.53	48.4	51.6

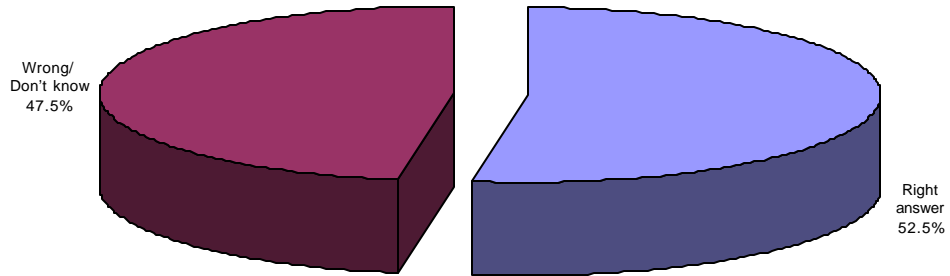
Graph 6 illustrates the mean percentage of right/wrong answers depicted in Table 6.

Graph 6

Mean percentage of right/wrong response for questions 7,8 and 9 for Suva city



Graph 6b
Mean percentage of right/wrong answer for questions 7, 8 and 9 for Apia



Graph 6c
Mean percentage for right/wrong answer for questions 7, 8 and 9 for Tarawa

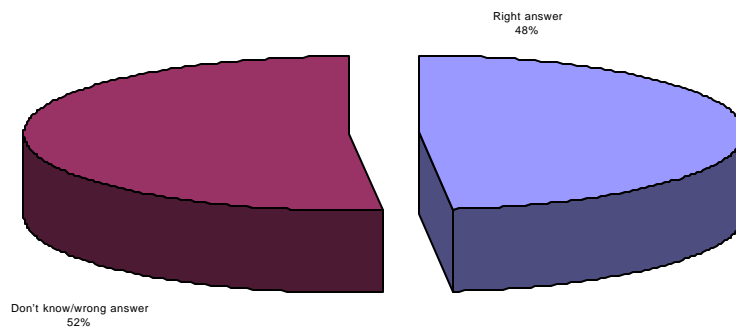
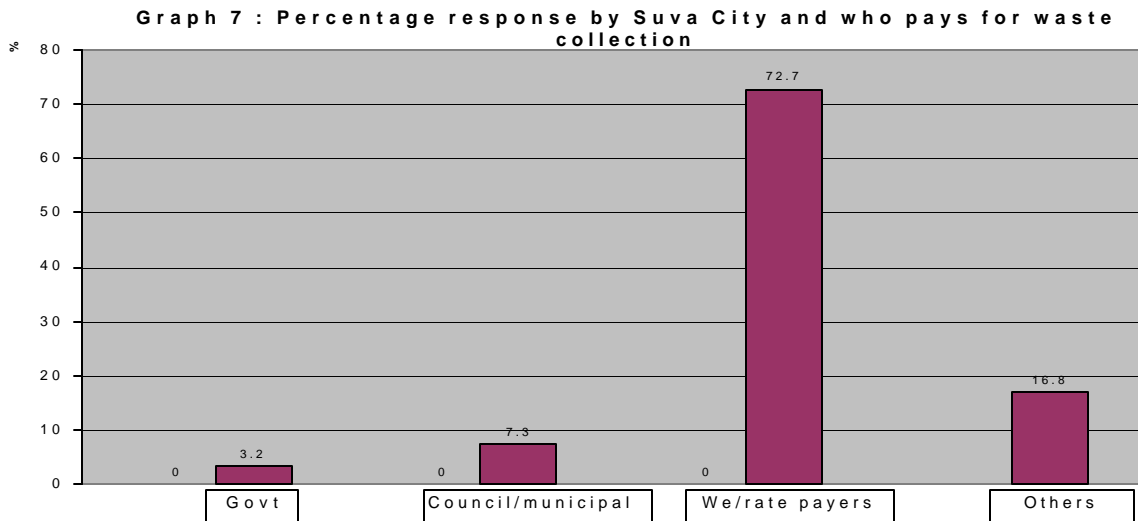


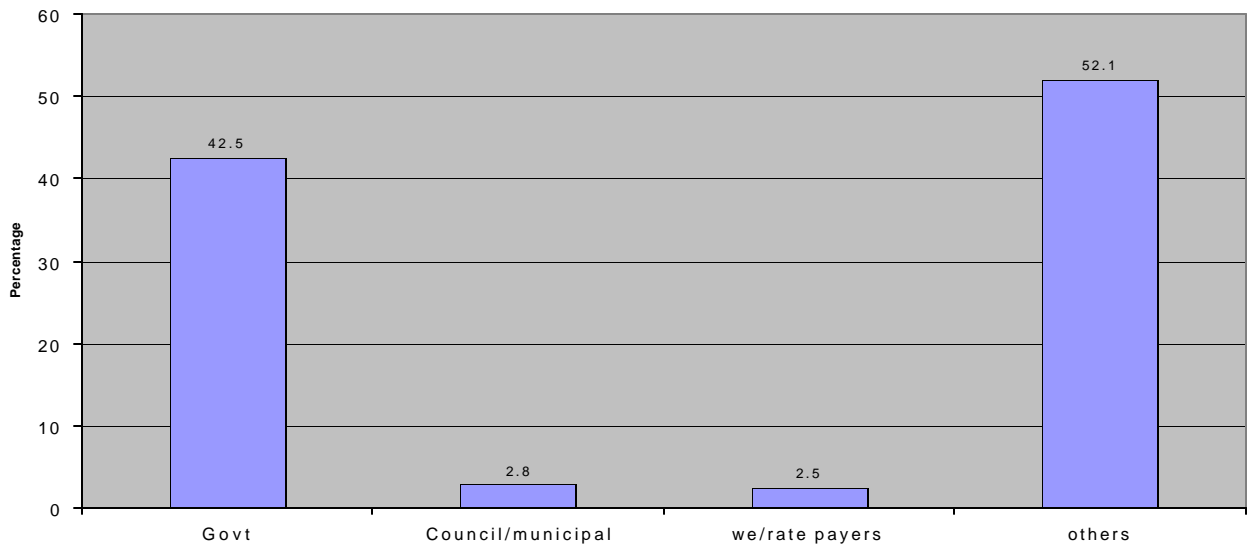
Table 7 shows the distribution of response to question 10: Who pays for waste collection service?

Table 7: Q.10 RESPONDENTS BY CITY AND WHO PAYS FOR WASTE COLLECTION										
City	Govt		Council/Municipal		We/rate payers		Others		Total	
	no.	%	no.	%	no.	%	no.	%	no.	%
Suva	26	3.2	59	7.3	590	72.7	136	16.8	811	100
Apia	151	42.5	10	2.8	9	2.5	185	52.1	355	100
Tarawa	10	3.2	100	31.8	117	37.3	35	11.1	314	100

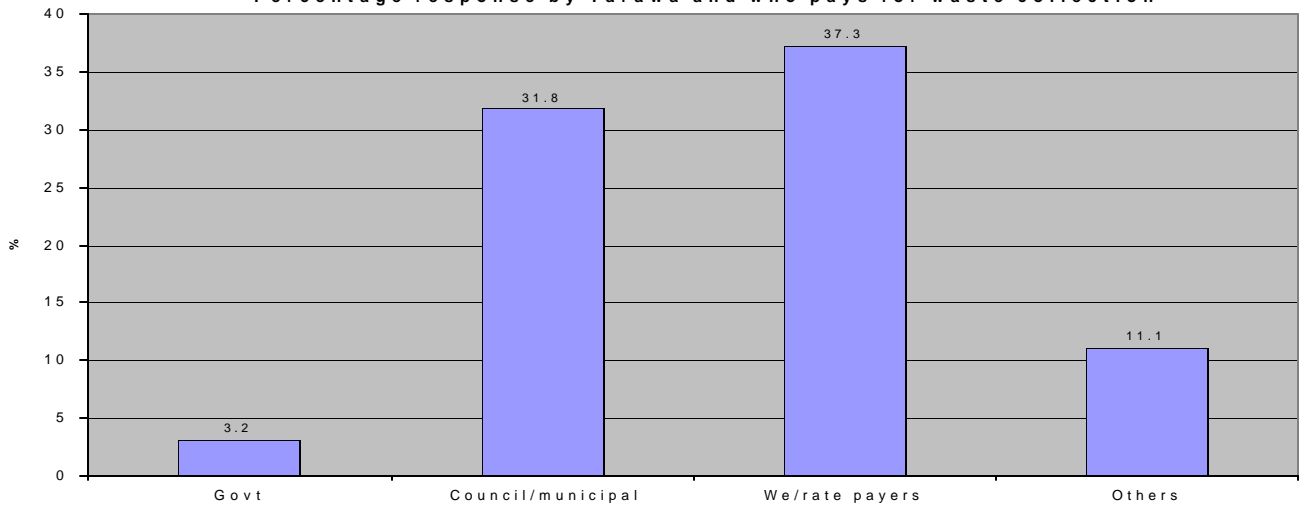
The figures in Table 7 are depicted in Graph 7 for the three cities.



Graph 7b
Percentage response by Apia and who pays for waste collection



Graph 7c
Percentage response by Tarawa and who pays for waste collection

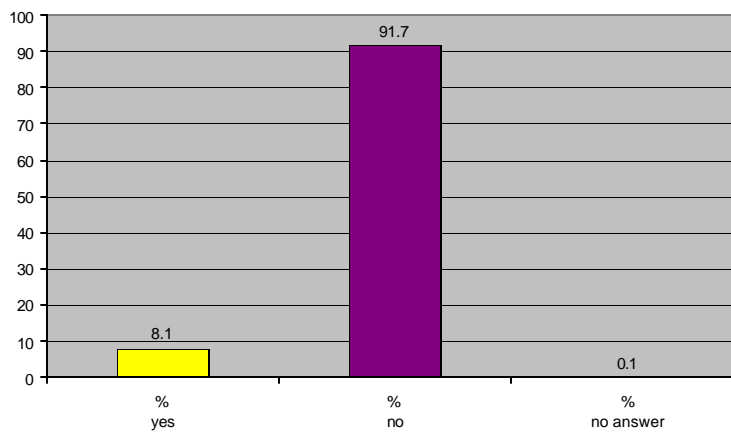


Section C

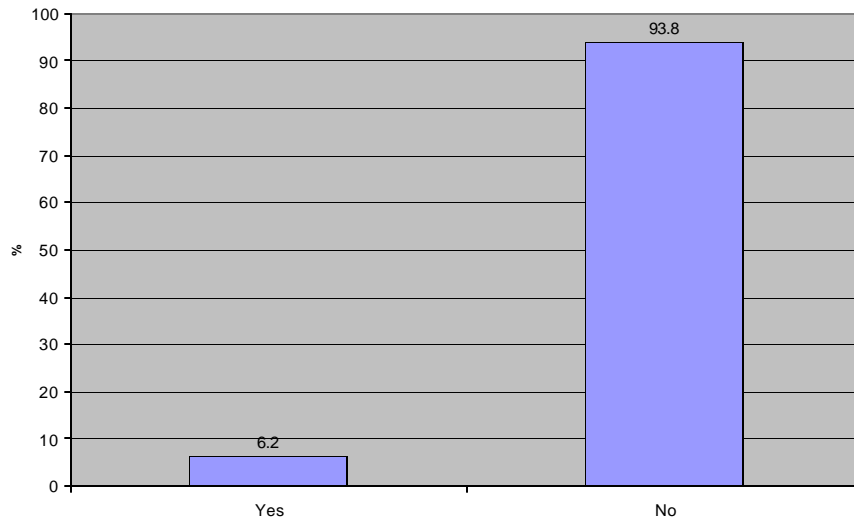
Table 8 and Graph 8 depict the response to question 11: Do you think waste can be thrown into river, sea, or coastal area?

Table 8 C. KNOWLEDGE AND UNDERSTANDING OF S.W.I.									
TOTAL RESPONDENTS BY CITY AND RESPONSE OPTIONS FOR QUESTION 11									
Do you think waste can be thrown into river, sea or coastal areas?									
City	Yes		No		No answer		Total		
	no.	%	no.	%	no.	%	no.	%	
Suva	66	8.1	744	91.7	1	0.1	811	100	
Apia	22	6.2	333	93.8	0	0	355	100	
Tarawa	104	33.1	207	65.9	3	1	314	100	

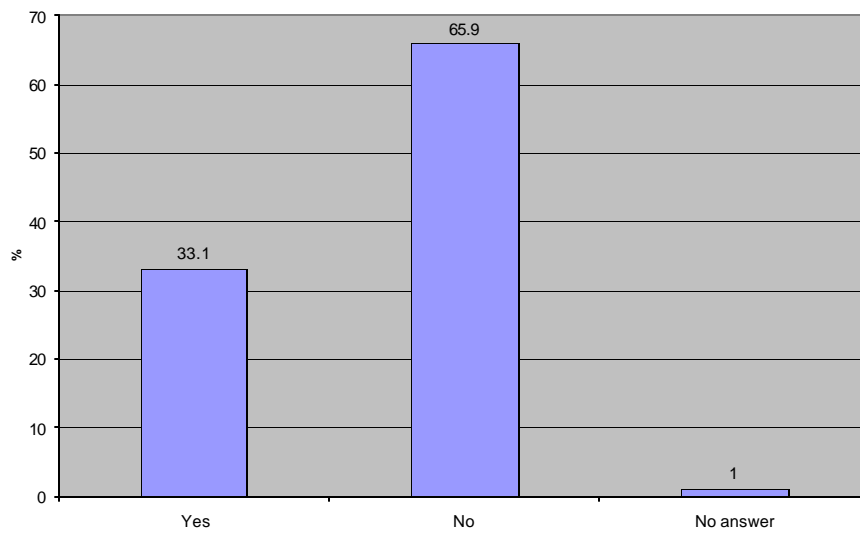
Graph 8: Response options (Q11) by Suva City



Graph 8b
Response options (Q11) by Apia



Graph 8c
Response options (Q11) by Tarawa



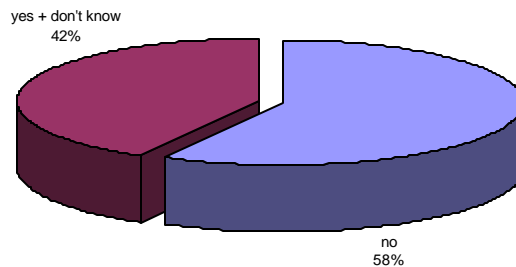
Tables 9, 10, and 11 assess the respondents' understanding of hazardous waste.

Table 9: Q.12 Do you know what is hazardous (dangerous) waste?	Yes	No	Total
	%	%	%
Suva	73.2	26.8	100
Apia	60.8	39.2	100
Tarawa	76.1	23.9	100

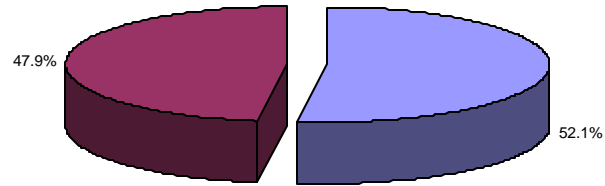
Table 10 Q.13 Respondents giving examples of hazardous waste (%)						
RESPONSE OPTIONS						
City	Chemicals	Sharp objects	Pesticides/paints/ batteries	Others/ no answer	Medical waste	Total
Suva	11.3	37.2	20.5	30.9	0	100
Apia	19.7	22.5	16.6	40	1.1	100
Tarawa	48.7	8.3	6.4	36.6	0	100

Table 11 Q 14.Should hazardous waste be disposed at the dump site?								
Response Options								
City	No.		Yes		Don't know		Yes + don't know	
	no.	%	no.	%	no.	%	no	%
Suva	470	58	135	16.7	205	25.3	340	42
Apia	185	52.1	105	29.6	56	18.3	161	47.9
Tarawa	230	73.2	55	17.5	29	9.3	84	26.8

Graph 11: Responses to the question "should hazardous waste be disposed at the dump site" for Suva City



Graph 11b
Responses to the question "should hazardeous waste be disposed at the dump site" for Apia



Graph 11c
Responses to the question "should hazardeous waste be disposed at the dump site" for Tarawa

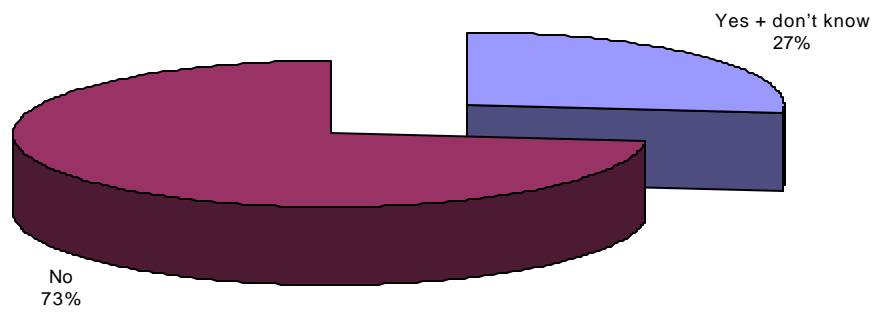


Table 12 and Table 13 depict respondents' understanding of waste as a resource. How waste can be used to our benefit.

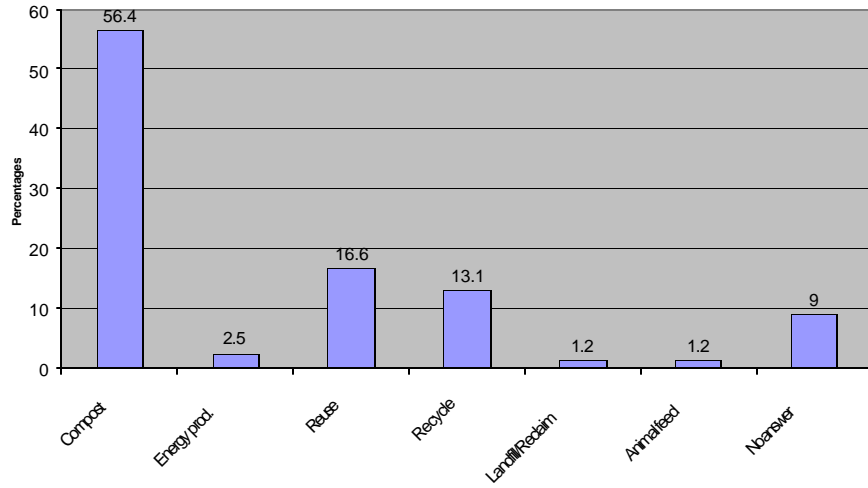
Table 14 shows the distribution of responses to Q 18: health effect of uncontrolled waste disposal.

Table 12 Q.15 Do you think waste can be put to some useful purposes?							
	City	Yes		No/don't know		Total	
		no.	%	no.	%	no.	%
	Suva	710	87.5	101	12.4	811	100
	Apia	288	81.1	67	18.9	355	100
	Tarawa	284	90.4	30	9.6	314	100

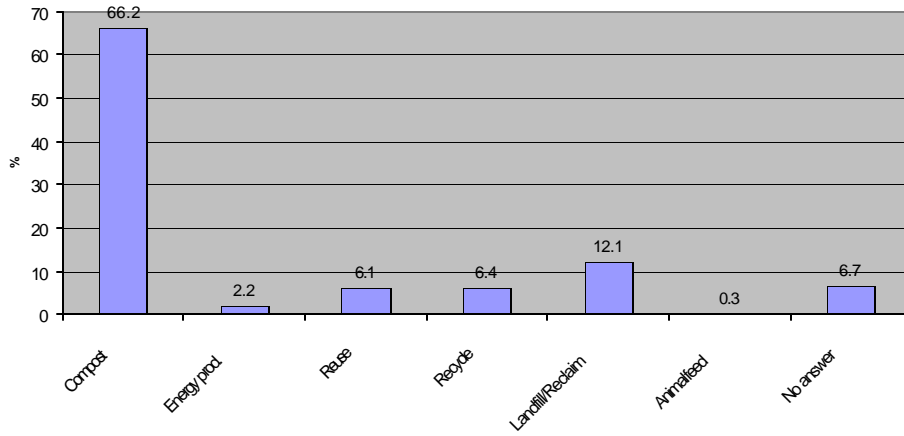
Table 13							
What are the ways we can use waste to our benefit? (%)							
City	Compost	Energy prod.	Reuse	Recycle	Landfill/Reclaim	Animal feed	No answer
Suva	56.4	2.5	16.6	13.1	1.2	1.2	9
Apia	30.4	2.3	42.8	7.3	2.5	0.3	14.4
Tarawa	66.2	2.2	6.1	6.4	12.1	0.3	6.7

Table 14						
Can you name one disease caused by uncontrolled waste disposal"? (%)						
City	Don't know	Dengue/Malaria	Typhoid/Cholera	Diarrhoea	Flu	Total
Suva	4.8	65.1	6.7	14.9	8.5	100
Apia	17.2	45.9	27	5.4	4.5	100
Tarawa	15	14.3	21.3	26.1	23.2	100

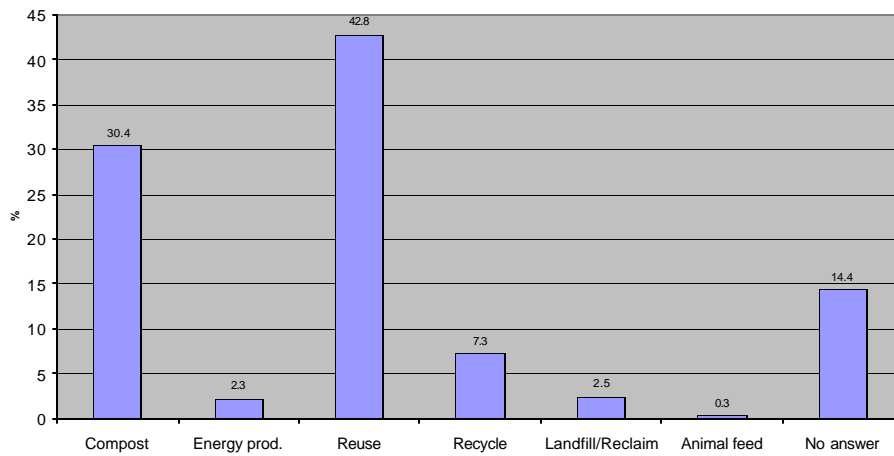
Graph 13: Ways by which we can use waste to our benefit for Suva city



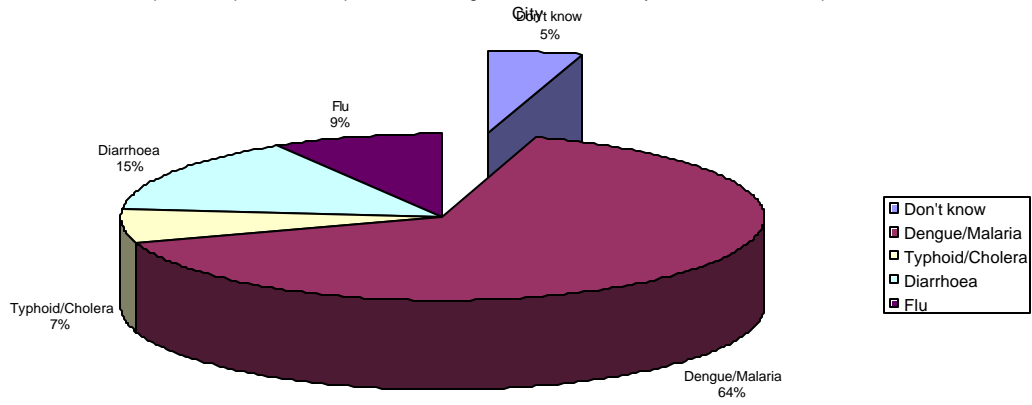
Graph 13c
Ways by which we can use waste to our benefit- Tarawa



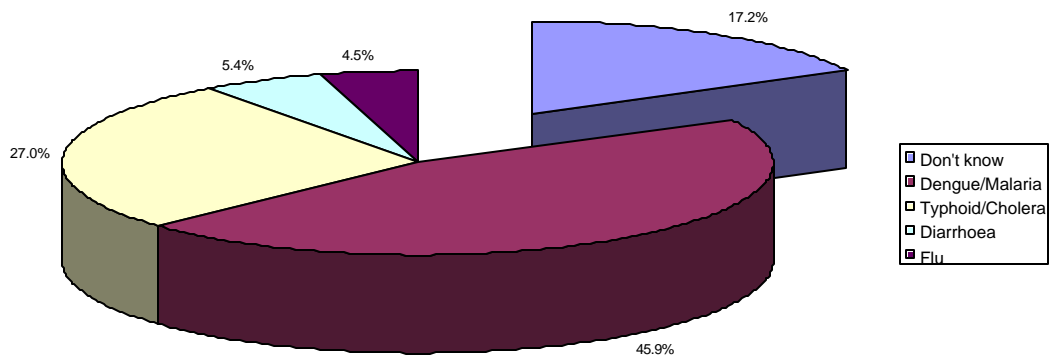
Graph 13b: Ways by which we can use waste to our benefit for Apia



Graph 14: Responses to the question of naming one disease caused by uncontrolled waste disposal for Suva



Graph 14b
Responses to the question of naming one disease caused by uncontrolled waste disposal for Apia



Graph 14c
Responses to the question of naming one disease caused by uncontrolled waste disposal for Tarawa

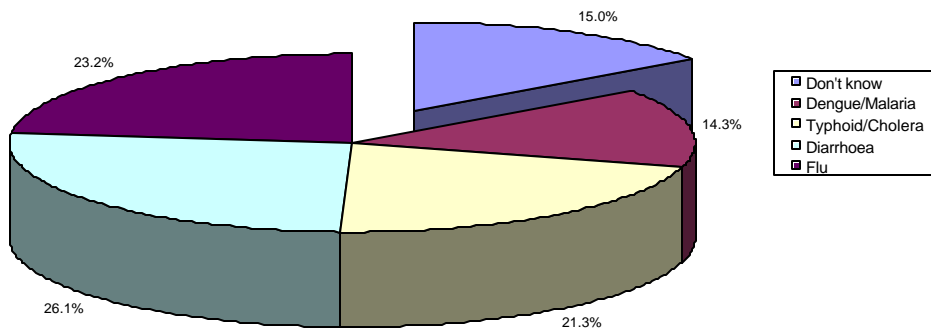


Table 15 shows the distribution of response to Q 19: How does uncontrolled waste disposal affect our economy?

Table 16 shows the distribution of response to Q 20: In which ways does uncontrolled disposal affect our environment?

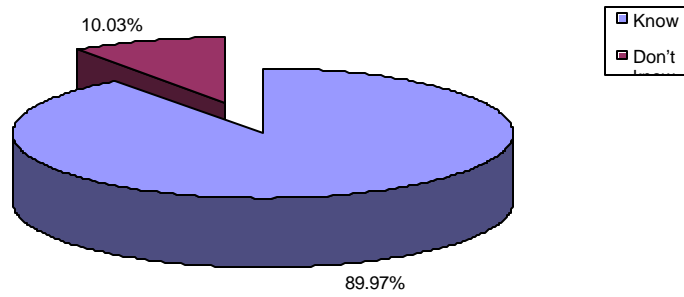
Table 17 summarises the statistics of question 18, 19, and 20.

Table 15						
Q.19 How does uncontrolled waste disposal affect our economy?(%)						
City	Don't know	Property value loss	Tourist decline	Productivity fall	Others	Total
Suva	19.1	20.1	30.9	19.4	10.5	100
Apia	20.8	19.2	41.7	16.6	1.7	100
Tarawa	47.1	19.4	21.3	9.2	2.8	100

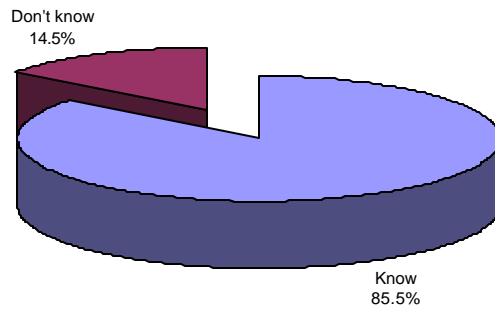
Table 16						
Q.20 In which ways uncontrolled waste and littering can affect our environment?(%)						
City	Don't know	Water pollution	Air pollution	Land/soil pollution	Others	Total
Suva	6.2	64.1	15.5	13.9	0.3	100
Apia	7.3	65.6	19.7	4.8	2.6	100
Tarawa	35.4	41.1	8	15	0.3	100

Table 17						
Question	Suva		Apia		Tarawa	
	Know	Don't know	Know	Don't know	Know	Don't know
Health effect	95.2	4.8	83.4	16.6	85	15
Economy effect	80.9	19.1	79.4	20.6	52.9	47.1
Environment effect	93.8	6.2	93.8	6.2	64.6	35.4
Mean	89.96	10.03	85.53	14.46	67.5	32.5

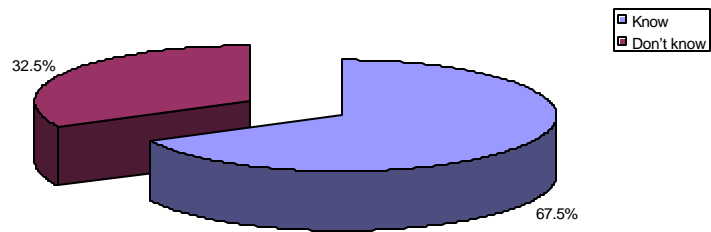
Graph 17: Mean percentage of Q 18, 19 and 20 for Suva City



Graph 17 b
Mean percentage for Q. 18, 19 and 20 for Apia



Graph 17c
Mean percentage of Q.18, 19 and 20 for Tarawa



Section D: Sources of Understanding - SWI

Tables 18 and 19 deal with sources of understanding: Where did the respondents get their information about solid waste management?

Tables 20 and 21 depict the names of agencies that are active in conducting workshop, seminar or training on waste management?

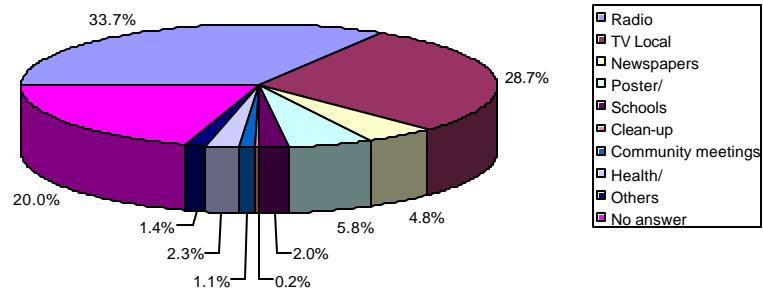
Have you come across any information or messages about waste management?						
City	Yes		No		Total	
	no.	%	no.	%	no.	%
Suva	541	66.7	270	33.2	811	100
Apia	242	68.2	113	31.8	355	100
Tarawa	156	49.7	158	50.3	314	100

Q.22 SOURCES OF INFORMATION (%)										
City	Radio	TV Local	News papers	Poster/ Handouts	Schools	Clean-up campaign	Community meetings	Health/ municipa	Others	No Ans.
Suva	33.7	28.7	4.8	5.8	2	0.2	1.1	2.3	1.4	20
Apia	30.7	45.4	0.3	0.6	0.8	0.8	0.3	0	0	1.7
Tarawa	25.2	5.1	7.3	2.9	2.9	1	1.6	1.3	1.3	51.6

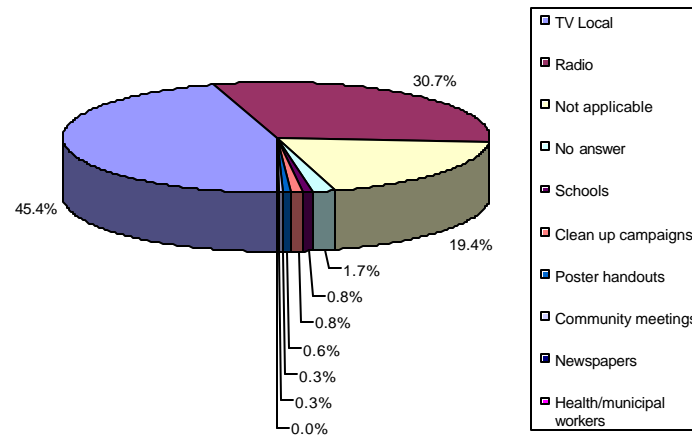
Q.23 During the last 12 months, have you or any members of your family attended any workshop, seminar or training on waste?						
City	No		Yes		Total	
	no.	%	no.	%	no.	%
Suva	802	98.9	9	1.1	811	100
Apia	337	94.9	18	5.1	355	100
Tarawa	310	98.7	4	1.3	314	100

Which agency organised the training and what was the subject dealt with?		
City	Agency	Subject matter
Suva	SCC	Waste handling
	SCC	Food handling and cleanliness
	SCC	Food handling and cleanliness
	SCC	Food handling and cleanliness
	School	Picking rubbish around street
	USP-Chemistry dept	Chemical waste
	FIT	Waste disposal workshop
	School	Pollution

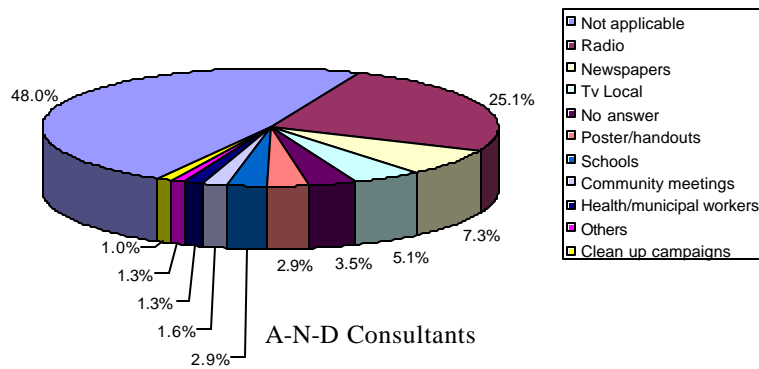
Graph 19a
Sources of information (Suva City)



Graph 19b
Sources of Information (Apia)



Graph 19c.
Sources of Information(Tarawa)



Section E: Key Waste Issues and Concern

Table 22 summarises the response to the question: Is uncontrolled waste disposal becoming a problem in your city?

Table 23 and Graph 23 depict the manner in which respondents scale the seriousness of the waste problem.

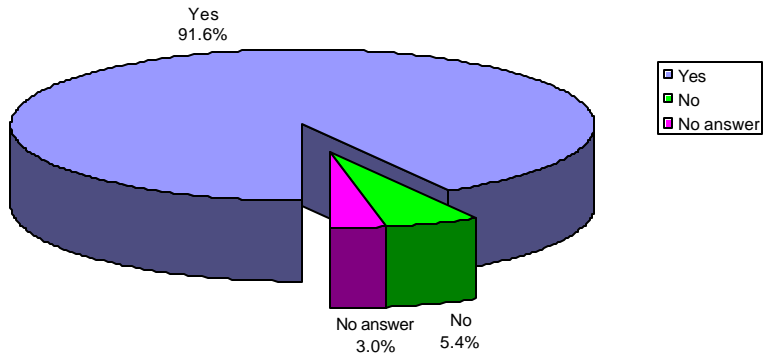
Table 24 shows the types of waste that are of great concern to the people.

Table 25 summarises the serious waste problems that require immediate action in each of the three cities.

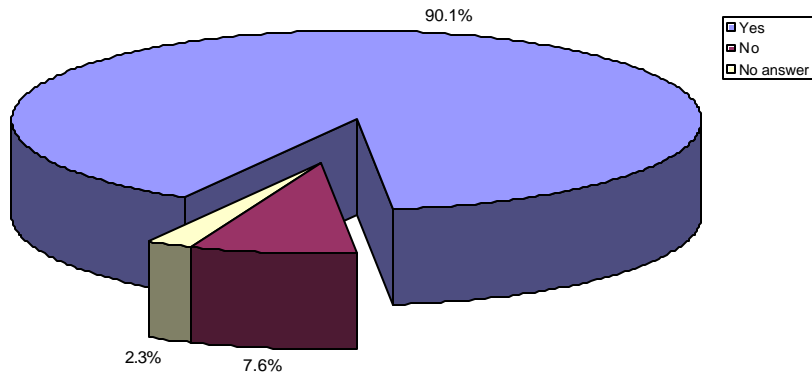
Table 22 Q 25 Is Uncontrolled waste disposal becoming a problem in your city or town? (%)					
	City	Yes	No	No answer	Total
	Suva	91.6	5.4	3	100
	Apia	90.1	7.6	2.3	100
	Tarawa	68.8	29.0	2.2	100

Table 23 Q.26 Scaling the seriousness of the problem.(%)							
City	No problem	Slight Problem	Serious problem	Very serious	Very very serious	No answer	Total
Suva	0.9	7.3	44.4	24.5	18.2	4.7	100
Apia	0.8	20.8	43.4	15.2	11.5	8.3	100
Tarawa	2.2	51	11.1	0.6	2.9	32.2	100

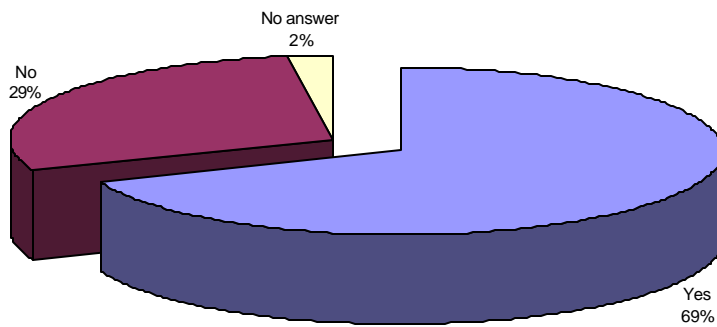
Graph 22: "Is uncontrolled waste disposal becoming a problem in Suva city"?



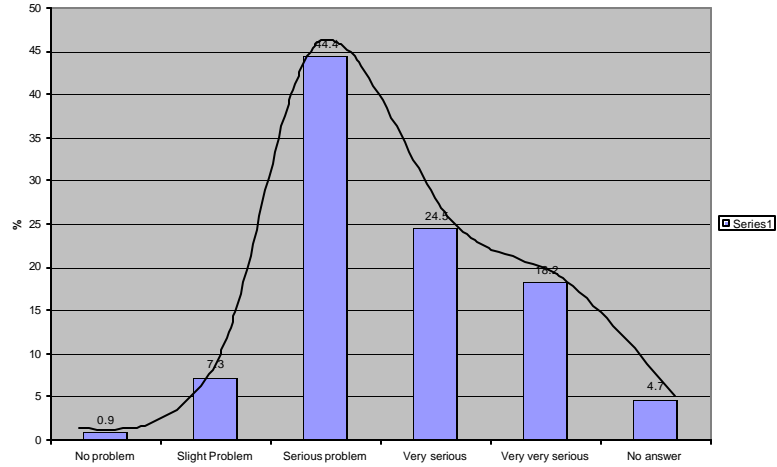
Graph 22b
Is uncontrolled waste disposal becoming a problem in Apia?



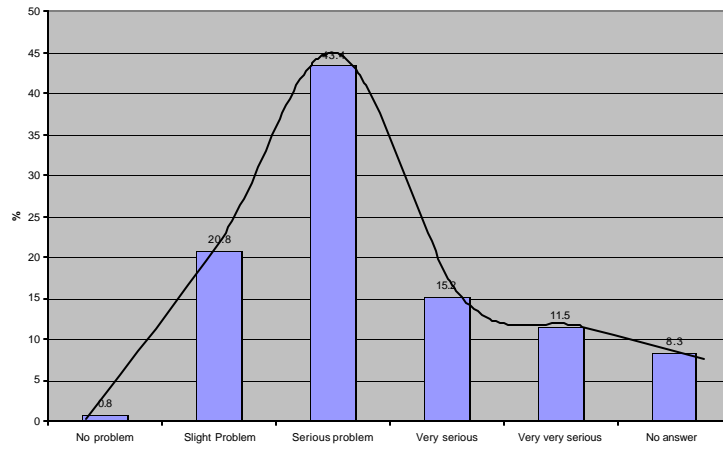
Graph 22c
Is uncontrolled waste disposal becoming a problem in Tarawa



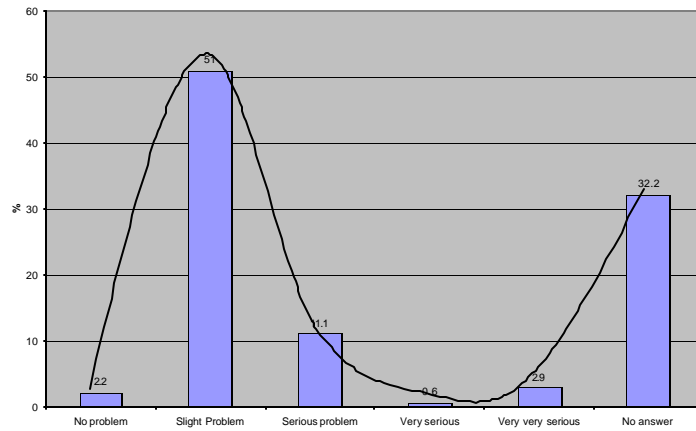
Graph 23: Seriousness of the problem-Suva City



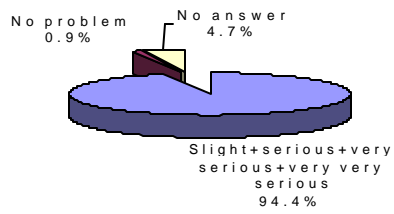
Graph23b:Seriousness of the problem-Apia



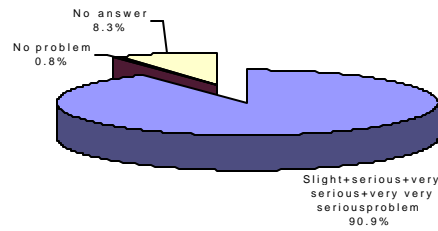
Graph 23:Seriousness of the problem(Tarawa).



Graph 23a.b.
Scaling the seriousness of the problem(Suva City).



Graph 23b.b
Seriousness of the problem(Apia).



Graph23c.b
Seriousness of the problem(Tarawa)

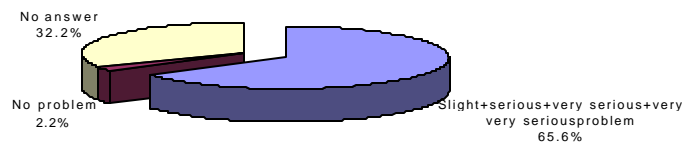


Table 24a	
Q.27 What types of wastes are of great concern to you and the people of your city? (%)	
TYPES	FREQUENCY
	Suva
Papers	55.5
Plastics	28.6
Cans/tins	6.2
Glasses	3.3
Food scraps	2.6
No answer	1.6
Garden waste	1
Clothes/leather	0.6
Other	0.6

Table 24b	
Q.27 What types of wastes are of great concern to you and the people of your city? (%)	
TYPES	FREQUENCY
	Apia
Plastics	45.6
Garden waste	14.9
Papers	11.8
Cans/tins	10.1
Glasses	7.3
Other	5.9
No answer	3.4
Clothes/leather	0.6
Food scraps	0.3

Table 24c	
Q.27 What type of wastes are of great concern to you and the people of your City? (%)	
TYPES	FREQUENCY
	Tarawa
Plastics	43.3
Cans/tins	14.3
No answer	9.9
Glasses	9.2
Other	7.6
Food scraps	6.1
Garden waste	5.1
Papers	4.1
Clothes/leather	0.3

Table 25a	
Q.28 What, according to you, are three most serious problems that require immediate action? (%)	
	Suva
Littering	32.1
Lack facilities	29.6
Bad smell and eye sore	8.1
Illegal disposal(by people)	7.5
Stray animals	6.2
Drain blockage	4.6
Human factors	4.3
Collection service inadequate	4.1
Garden waste/ grass cutting	1.7
Other	0.6

Table 25b	
Q.28 What, according to you, are three most serious problems that require immediate action? (%)	
	Apia
Plastics	26.5
Littering	13.2
Illegal dumping	9.9
No response	9.8
Stray animals and dogs	9
Collection services inadequate	7
Other	6.5
Insects/vector borne diseases	5.4
Blocked drains	5.1
Lack facilities	4.2
Vandalism of bins	3.4

Table 25c	
Q.28 What, according to you, are three most serious problems that require immediate action? (%)	
	Tarawa
No response/No problem/Don't know	23.9
Bad smell/discomfort/eyesore	18.2
Illegal dumping/littering	16.9
Pollution problem	12.1
Kimbees, plastics, bottles, battereies, cans	8.9
Breeding ground/vector borne disease	8
Scattering of rubbish/stary animals	4.5
Health hazard	3.8
Inadequate service/facilities	2.2
Space consideration:not enough and restricting	1.3
Other	0.3

Section F: Causes and Contributory Factors

Table 26 depicts the causes of the problems mentioned in section E and those causes have been sorted in descending order.

Table 26a Suva City	
Q.29What causes these problems you have just mentioned?	
CAUSES	FREQUENCY
Lack awareness/education	33.9
Human factors	31.4
Lack legislation/standards	10.5
Lack training	8.9
Others	4.7
Lack enforcement	4.6
Lack resources	3.8
No answer	2.2

Table 26b Apia	
Q.29What causes these problems you have just mentioned?	
CAUSES	FREQUENCY
Human factors	48.7
Lack awareness/education	40
No answer	3.7
Lack resources	2.8
Others	2
Lack legislation/standards	1.4
Lack enforcement	0.8
Lack training	0.6

Table 26c Tarawa	
Q.29What causes these problems you have just mentioned?	
CAUSES	FREQUENCY
Human factors	22.3
No answer	18.5
Lack enforcement	17.8
Lack awareness/education	14.6
Lack training	12.7
Others	8.9
Lack legislation/standards	2.9
Lack resources	2.2

Section G: Solutions/Waste Minimization

Table 27 shows what respondents said could be done to keep the city clean. The responses have been sorted in descending order.

Table 27	
Q.30 What could be done about waste or keeping the city clean?	
Suggestions	Suva
Awareness education training	40.3
Improved services	21.9
Better facilities	18.1
Standards, legislation and enforcement	5.3
Waste minimization initiatives	6.0
Clean up campaigns, competitions, award and recognition	5.2
Use of media	0.9
Other	0.9
Introducing waste sorting	0.4

Table 27c	
Q.30 What could be done about waste or keeping the city clean?	
Suggestions	Tarawa
Improved services	15.6
Awareness education and training	15.0
Better facilities	15.0
Introducing waste separation/sorting	14.6
Use of media	14.3
Clean up campaigns, competitions, award and recognition	12.4
Standards, legislation and enforcement	8.3
Waste minimization initiatives	2.2
No answer	1.9
Other	0.6

Table 27b	
Q.30 What could be done about waste or keeping the city clean?	
Suggestions	Apia
Public awareness and education	28.2
Encourage community participation	27.0
Legislation and enforcement	14.4
Improve facilities	11.3
Improve collection service	8.7
No response	4.2
Waste minimization/reduction	2.3
Introduce waste sorting and separation	1.7
Other	1.4
Collect household gadgets separately	0.8

Table 28 shows whether the facilities and services provided by the government/councils are adequate to manage waste. Table 29 shows what facilities and services can improve waste handling in the city.

Table 28				
Q.31 Do you think the facilities and services provided by Govt./Council are adequate? (%)				
City	Yes	No	No answer	Total
Suva	37.9	59.9	2.2	100
Apia	64.2	33.5	2.3	100
Tarawa	26.4	71.7	1.9	100

Table 29a	%
	Suva
Regular collection/transport	39.5
Not applicable	35.6
Strict standards	8.0
Sanitary dumping	4.4
Enforcement services	3.9
Awareness/education	3.3
Facility	3.2
Other	1.2
No answer	0.7

Table 29b	%
	Apia
Not applicable	63.9
Regular collection/transport	27.6
Others	2.8
Strict standards	2.3
No answer	1.1
Enforcement services	1.1
Facility	0.6
Awareness/education	0.3
Sanitary dumping	0.3

Table 29c	%
	Tarawa
Regular .collection/transport	67.5
Not applicable	20.7
Enforcement services	5.1
Sanitary dumping	4.5
Facility	1.3
Strict standards	0.6
Other	0.3
Awareness/education	0

Not applicable class arises from previous question where the respondents said 'yes' to the adequacy of facilities and services.

Table 30 depicts how households dispose off their rubbish. And Table 30a, 30b, and 30c sorts the disposal methods in descending order.

City	Collection serv	Compost	Burn, bury Dump b'yard	Animal feed	No answer	Dump beach Sea/drain	Ret. To shop	Reuse	As fill material	Sell/ export
Suva	96.7	1	0.9	0.1	1.3	0	0	0	0	0
Apia	88.5	4.8	4.2	0.6	1.4	0.3	0	0	0.3	0
Tarawa	27.1	34.1	28	0	1.6	7	0.3	0	1.9	0

Responses	Frequency (%)
Collection	96.7
No answer	1.3
Compost	1.0
Burn, bury, dump b'yard	0.9
Animal feed	0.1
Dump beach/sea/drain	0
Ret. To shop	0
Reuse	0
As fill material	0
Sell/export	0

Responses	Frequency (%)
Collection	88.5
Compost	4.8
Burn, bury,dump b'yard	4.2
No answer	1.4
Animal feed	0.6
Dump beach/sea/drain	0.3
As fill material	0.3
Ret. To shop	0
Reuse	0
Sell/export	0

Responses	Frequency (%)
Compost	34.1
Burn, bury, dump b'yard	28.0
Collection	26.5
Dump beach/sea/drain	7.0
As fill material	1.9
No answer	1.6
Animal feed	0.6
Ret. To shop	0.3
Reuse	0
Sell/export	0

Tables 31, 32, 33 and 34 deal with the subject matter of composting. The summary of responses to questions 33, 34, 35, and 36 are provided in these tables.

Table 31

Q34 Does your family makes compost at home?			
City	Yes	No	No answer
Suva	29.1	67.8	3.1
Apia	37.2	61.1	1.7
Tarawa	35.7	62.1	1.9

Table 32

Q.35 If no, would you agree doing so if compost making is demonstrated and promoted? (%)					
City	Yes	No	No answer	Not applicable	Total
Suva	51	19.2	2.3	27.4	100
Apia	51.5	9.3	1.4	37.7	100
Tarawa	54.5	8	2.2	35.4	100

Table 33

Consolidated response of those favouring composting (at home)? (%)			
City	Yes	No	Total
Suva	80.1	19.9	100
Apia	71.5	28.5	100
Tarawa	89.8	10.2	100

Table 34

Q.36 Those who favoured Centralised composting by an agency?				
City	Yes	No	No answer	Total
Suva	78.1	20.8	1.1	100
Apia	69	28.5	2.5	100
Tarawa	89.8	8.9	1.3	100

Section H: Policy and Planning The questions in this section deal with policy and planning issues. The results of questions 38 - 45 are summarised in Tables 35, 36, and 37. (Table 36 is accommodated on the next page)

Table 35	Suva City		Apia		Tarawa	
Question	% Agree	%Disagree	% Agree	%Disagree	% Agree	%Disagree
Creation of a separate body/authority to manage waste efficiently?	48	52	67.9	32.1	93	7
If agreed, are you willing to pay per month for improved services?	54.4	45.6	52.9	47.1	79.3	20.7

Table 37

CITY	ISSUE	Agree(%)	Disagree(%)	No answer(%)
Suva	People should be fined if they drop litter	98.8	0.5	0.7
	Govt/municipal should enforce strict laws and standards	98.8	0.5	0.7
	There is need for more involvement of private sector,NGO's	95.2	4.2	0.6
	CBOs in waste management			
	Schools should teach children about ill-effects of uncontrolled waste	97.7	1.7	0.6
	To control waste, government should introduce tax on all polluting materials	88.2	11.2	0.6
	Govt should give subsidy/easy loan to those involved in waste reduction	94.8	4.3	0.7

Table 37b

CITY	ISSUE	Agree(%)	Disagree(%)	No answer(%)
Apia	People should be fined if they drop litter	94.4	5.4	0.3
	Govt/municipal should enforce strict laws and standards	98.3	1.7	0
	There is need for more involvement of private sector,NGO's	98.9	1.1	0
	CBOs in waste management			
	Schools should teach children about ill-effects of uncontrolled waste	99.2	0.6	0.3
	To control waste, government should introduce tax on all polluting materials	87	12.4	0.6
	Govt should give subsidy/easy loan to those involved in waste reduction	88.2	11.5	0.3

Table 37c

CITY	ISSUE	Agree(%)	Disagree(%)	No answer(%)
Tarawa	People should be fined if they drop litter	92.4	6.7	1
	Govt/municipal should enforce strict laws and standards	96.5	2.2	1.3
	There is need for more involvement of private sector in waste mgmt.	97.5	1.3	1.3
	Schools should teach children about ill-effects of uncontrolled waste	97.1	1.9	1
	To control waste, government should introduce tax on all polluting materials	86.9	11.5	1.6
	Govt should give subsidy/easy loan to those involved in waste reduction	96.5	2.2	1.3

How much are you willing to pay per month for improved services?

Table 36 Suva City

Interval	Frequency
\$1-\$5	127
\$6-\$10	128
\$11-\$15	16
\$16-\$20	50
\$21-\$25	4
\$26-\$30	4
\$31-\$35	1
\$36-\$40	1
\$41-\$45	0
\$46-\$50	2
\$51-\$55	0
\$56-\$60	0
\$61-\$65	0
\$66-\$70	0
\$71-\$75	0
\$76-\$80	0
\$81-\$85	0
\$91-\$95	0
\$96-\$100	1

Table 36b Apia

Interval	Frequency
\$1-\$5	30
\$6-\$10	56
\$11-\$15	3
\$16-\$20	32
\$21-\$25	1
\$26-\$30	5
\$31-\$35	0
\$36-\$40	8
\$41-\$45	0
\$46-\$50	15
\$51-\$55	0
\$56-\$60	0
\$61-\$65	1

Table 36c Tarawa

Interval	Frequency
\$0.50	1
\$1	62
\$2	69
\$3	32
\$4	6
\$5	60
\$6	8
\$7	13
\$8	4
\$9	4
\$10	19

Suva

The data for Suva is skewed to the left. The modal class is one with a value of \$6- \$10. Disregarding the one extreme value, the mean for a sample size equal to 333 is \$ 8.66 per month. The standard deviation for n = 333 is \$6.86 indicating considerable variation.

Apia

In the case of Apia, the modal class also happens to be one with a range value of \$6- \$10. Disregarding the extreme values, the mean for a sample size equal to 151 is \$15.71 per month with a standard deviation of \$14.48. It appears that the modal class is more representative of what people are willing to pay.

Tarawa

The data for Tarawa is more evenly distributed than Suva or Apia. The modal value for Tarawa is \$2 per month. For a sample size equal to 278, the mean value is \$3.66 per month and the sample standard deviation is \$2.62.

7. Discussion

7.1 Suva

7.1.1 Section A: Personal Data

The aim of the survey was to gauge the level of waste awareness in the general public, i.e. selected as the urban population of fifteen years of age and above. Care had to be taken for the sample group to be representative of the population so that the survey was not biased toward any particular group.

A special Daily Tally Sheet was devised for the survey to ensure that bias of any kind with respect to gender, age group, employment status, income level, education, and residence type was avoided.

It is interesting to note that the level of education is quite high in Suva. Only 0.2 % of the respondents had no formal education. 18 % had primary level of education. The remainder (81.8 %) had secondary or tertiary education.

The distribution of respondents in Tables 1 - 5 indicate that the survey was balanced and that all sections of the urban population were represented. The sampling was done in all collection zones to get the views of respondents from all areas serviced by the Council.

7.1.2 Section B: General Level of Awareness

The general level of awareness for Suva is relatively high. More than 90 % of respondents gave correct answers to questions 7, 8 and 9. The high level of awareness is because there is only one organisation (Suva City Council) collecting waste in Suva and the rubbish is carted to Lami dump which is highly visible and is located on the main road near Suva.

The understanding of who pays for waste collection is also relatively high. 73 % said that it is the public who pays for the collection service. A small percentage (7.3%) believed the Council pays for the service. The 'others' category (17%) gave answers such as 'the landlord', 'the church', and 'the employer'. In other words these respondents were not paying the city rate.

On the whole the general level of awareness of waste is quite high in Suva.

7.1.3 Section C: Knowledge and Understanding of Solid Waste Issues

This section probes deeper into people's understanding of waste and related issues.

More than 90% of the respondents correctly said that waste should not be thrown into river, sea, or coastal areas (Table 8).

Regarding hazardous waste, 73% of the respondents said that they knew what it was. However not all of them could come up with correct examples. The most common examples cited are 'sharp objects', and 'pesticides, paints and batteries.'

A significant proportion of the respondents (42%) either did not know or incorrectly felt that hazardous waste could be disposed at the dump *It appears that public education should focus more on hazardous waste.*

The majority of the respondents (87%) said they knew that waste could be put to some useful purpose. However the response was skewed in favour of one or two examples. The most frequent example were compost (56%) followed by reuse (17%), and recycling (13 %).

Obviously there is a knowledge gap; people are not fully aware that waste is a resource and can be put to use. Waste must not be perceived as simply a waste.

Regarding the adverse effects of uncontrolled waste disposal, most people could cite an example. However the response was skewed toward one example. A small percentage of respondents, were not aware of the adverse consequences of uncontrolled waste disposal. The results are summarised below.

	Don't know	Most common example cited
Health Effect	5 %	Dengue/malaria 65 %
Economy Effect	19 %	Tourist decline 31 %
Environment Effect	6.2%	Water pollution 64%

The spread of answers does not indicate a good understanding of the adverse effects of uncontrolled waste disposal. . Awareness and education programs need to focus more on hazardous waste, waste as a resource, and the adverse effects of uncontrolled waste.

7.1.4 Section D: Sources of Understanding

This section looks at where people get their information and understanding of waste. More than half the respondents (67%) had come across some information on waste management.

When they were asked to identify the source of information, *radio and television were the most popular sources.* Other sources (poster/handouts, newspapers, health and municipal workers, schools, community meetings, and clean up campaigns) were relatively small (please see Table 19).

The figures indicate that not enough is being done at community level education using a face to face approach.

20% of the respondents could not identify a source of information on waste. This indicates that with the mass media approach to awareness and education, people have

difficulty in remembering the source or content although they may remember that they have come across some waste related information.

These results indicate that when information and education is channelled through mass media it is not very effective in changing the attitude and behaviour of people. *Waste education has to move more towards being specific, contact-oriented, activity related and community based.* However professionally produced mass media messages aired at prime time will still be a useful tool.

A very small number of people (9 out of 811) had attended some sort of workshop, seminar or training on waste (please see Table 21). The results show that very few agencies are active at a community level. This again highlights that fewer agencies are working with people on a face to face level.

There is obviously a need for agencies promoting better waste management to combine awareness and education campaign with small participatory waste projects at a community level.

7.1.5 Section E: Key Waste Issues and Concerns

The first few questions in this section attempt to provide an understanding of the nature and extent of waste issues and concerns from people's perspective.

92% of people interviewed felt that waste disposal is a problem in Suva city. When asked to scale the seriousness of the problem 44% said that waste is a 'serious problem', 24% said 'very serious', and 18% said 'very very serious' problem. A very small minority of people (only 0.9 %) felt that waste is not a problem.

When asked to specify the types of waste that are of great concern, the three most frequently mentioned types are shown below:

Papers (all sorts)	55.5 %
Plastics (all sorts)	28.6 %
Cans/tins	6.2 %

Question 28 was open-ended and respondents were asked to enumerate the three most serious problems that require immediate attention. The wide range of answers is coded into ten categories shown below.

1. Collection Service Inadequate (refers to Suva City Council)

Late arrival: the truck arrives late to collect the rubbish put out by households. This gives time for scattering of the rubbish to occur (dogs, wind, scavengers, children, passing vehicles, etc.).

Irregular Collection: the schedule is not adhered to. Instead of 3 times per week collection is only once or twice per week.

Inadequate Collection: for example, in Tamavua-I-Wai collection only once per week is not adequate.

Inept handling: refers to bin damage, rough handling, and leaving behind scattered rubbish.

Inefficient: customer pays high city rates but the quality of service is poor.

2. Illegal Disposal (by people)

Dumping in the sea, coastal areas, creeks, and backyards (especially common in low income groups and crowded residential areas such as Laucala and Tamavua-I-wai. Burying and burning in back yard is another form of improper disposal

3. Stray Animals

Dogs (mostly stray but sometimes domesticated too) are very common in Suva. Late arrival by collectors give dogs time to attack rubbish packs and scatter the garbage.

4. Littering

Littering on streets, public places, and coastal areas is increasing. The Litter decree could be enforced including \$40 fine. Common items of litter include cans, plastic bottles, glass bottles, plastic bags, plastic packets and wrappers and disposables.

5. Drain Blockage

Due to littering, scattering, illegal dumping, non-clearance of drains and lack of filtering devices across drains. Plastics, refuse, tins and cans are the major items causing blockages that lead to flooding. Decomposition of the blocked rubbish gives rise to offending odours.

6. Bad Odours and Bad Appearance

Examples mentioned are the Lami dump, garbage trucks, decomposing rubbish, scattered rubbish, etc.

7. Lack of Facilities

More bins in recreational areas, downtown, market places, near major shopping centres, and densely populated areas are needed. Use of closed compactor trucks, proper gear and tools for handling rubbish, collection of old household items, etc.

8. Human Factors

Lack civic pride, awareness, attitude problem, laziness, etc.

9. Garden Waste/Grass cutting

Separate charges for the collection of garden refuse will lead to problems. The grass cutting contractors don't do a good job. Suva City Council needs better supervision.

10. Other

Scavenging at Lami dump, food scraps lying around, bins without lids, bins or receptacles of all sorts, misplacement of rubbish (wrong time and day).

The main five perceived problems are:

? Littering	32 %
? Lack Facilities	30 %
? Bad smell/eye sore	8 %
? Illegal disposal	7 %
? Stray animals	6 %

It appears that there are two major problems: the behaviour of the waste generators (littering, illegal disposal, and receptacles of all sorts) and the performance of the waste collectors (lack of facilities). Many other problems stem from these two core problems.

The CEO of Fiji Visitors Bureau remarked during an interview. " I see not only birds but plastics flying around in Suva." According to some people interviewed, the waste problem in Suva is deteriorating. Unless something is done quickly, the image of Fiji as a tropical paradise will be destroyed.

7.1.6 Section F: Causes and Contributory Factors

This section explores the causes and contributory factors to the problems mentioned in Section E. The three most common causes mentioned by respondents are:

? Lack of awareness and education	34 %
? Human factors	31 %
? Lack legislation/standards	11 %

The other causes mentioned are lack of training, lack of enforcement of legislation, and lack of resources.

The qualities alluded to in reference to "human factors" are lack of civic pride, laziness, carelessness, inconsiderate, irresponsible, etc. If people are educated they may be motivated to change their attitude and behaviour for the better. But if people still don't change their behaviour, then authorities should resort to legislation and enforcement.

There are two good examples of how people responded quickly to the use of enforcement in Suva. One is the towing away of improperly parked vehicles by Suva City Council and the other is the seat belt enforcement by Land Transport Authority. Behaviour changed overnight; people started parking their vehicles properly and drivers and passengers started wearing seat belts.

The changing of human behaviour is a complex issue. Awareness and education is a necessary component but not sufficient on its own. The pre-requisites for behavioural change are a hierarchy of connected factors such as:

- ? motivation through awareness and education;
- ? availability of practical viable alternatives;

- ? incentives;
- ? awards and recognition; and
- ? legislation and enforcement

If viable alternatives are not there, people won't change.

This section also reiterates the importance of waste awareness and education.

7.1.7 Section G: Solutions/Waste minimisation

Question 30 of this section is open-ended. Respondents were asked what could be done to keep Suva City clean. The wide range of answers is coded into nine categories shown below.

1. Awareness, Education and Training

Required in proper waste disposal, composting, waste minimisation, misconceptions and incorrect perceptions such as: "if I dispose elsewhere, SCC will not charge me", training of SCC workers, educating contractors, adverse effects of uncontrolled waste disposal, more seminars in highly populated areas such as Raiwai, Raiwaqa, and squatter settlements.

2. Better Services by SCC

More frequent collections especially in some areas, collection of discarded household items, rationalising the collection of garden refuse, regular training and education in liaison with other agencies. Supervising the work of contractors and collecting of scattered garbage.

3. Better Facilities

More bins and modern equipment such as compactor trucks, 'wheely' bins, skips with lids, health and safety gears for workers, more workers, etc.

4. Standards, Legislation and Enforcement

Litter Decree enforcement, the use of fines, appointment of city/town rangers, City Bylaws enforced, Standards and specification made clear and enforced after a period of education, SCC to work with H.A and PRB, etc. In blocks, barracks and high rise buildings the rules of residence should be enforced strictly, as is being carried out in Singapore.

5. Use of Media

The messages to be disseminated in vernacular. Spots and messages to be prepared professionally and aired at prime time, explore talk back programme in three languages with radio stations, make use of popular talk back radio personalities.

6. Introducing Waste Separation/Sorting

There is hardly any sorting of waste being done in Suva. Lots of materials that can be reused or recycled ends up at the dump. What a waste of waste!

7. Waste Minimisation Initiatives

Reuse, recycling initiatives, composting, subsidies, tariff on polluting substances, etc.

8. Clean up campaigns, competitions, Award and Recognition

Involving a wide range of the community such as church groups, community based organisations, youth groups, schools, NGOs, Govt departments, Housing Authority, Public Rental Board, and private sector companies.

9. Other

Creating another body to manage waste, waste concerned agencies to work together, introducing neighbourhood waste scheme, etc.

The main five suggestions are:

? Awareness, education, and training	40 %
? Improved services	22 %
? Better facilities	18 %
? Standards, legislation, enforcement	6 %
? Waste minimisation	5 %

Once again the top priority is perceived as awareness building and education.

60% of the respondents said that waste facilities and services were inadequate. The four most frequently mentioned suggestions for facilities and services are:

- ? Regular collection and Transport,
- ? Strict Standards,
- ? Sanitary dumping, and
- ? Enforcement services.

In Suva the most common method of waste disposal by households is via the collection service (97%). This indicates that there is very little activity in composting, waste segregation, reuse, and recycling.

People in Suva are favourably disposed towards the idea of making compost (80%). About 29% said that they were making compost at home and 51% agreed to do so if compost making was demonstrated. The majority of the respondents agreed to centralised composting by an agency (78%).

It appears that compost making could become a viable venture in Suva. There is a small amount of compost making occurring at home. Centralised composting by an agency is recommended.

Compost generated from waste can be mixed with other organic residues such as hops from breweries, sludge from water treatment plant, disposal from fish canneries, and poultry manure. These are easily available in Suva, but a coordinated approach has to be

adopted. The marketing outlets for compost such as export overseas or to atoll countries, backyard gardening, floriculture, ornamentals, medicinal plants, etc have to be explored and developed.

The Department of Environment, Suva City Council or the private sector could take the initiative to start a project on compost making. This would require the segregation of as well as awareness and education programs.

7.1.8 Section H: Policy and Planning

Respondents were divided almost 50: 50 on the question of whether a separate body should manage the waste in Suva. Those who agreed felt that Suva City Council has too many responsibilities. A waste authority covering Suva, Nasinu, Nausori, Lami, and Navua was suggested To bring in efficiency, waste management has to be run as a business where people pay for the required services.

54 % agreed to pay for improved services but not all were ready to say how much more they would pay. Some respondents felt that if they gave a figure they would be required to pay that amount..

Disregarding the extreme values the mean for 333 respondents was \$8.66 per month with a standard deviation of \$6.86 indicating considerable variation on either side of the mean value. Majority of the values lies within the first two class intervals (\$1-5 and \$6-10). (The mean value refers to what respondents were willing to pay per month for improved waste collection service).

Regarding issues raised in questions 40 to 45 (refer to Table 37), the majority of respondents (more than 90 %) agreed that positive action should be taken.

This is a clear signal that Government, Council, and concerned agencies should move swiftly to deal with deteriorating waste problem.

7.2 Apia

7.2.1 Section A: Personal Data

The aim of the survey was to gauge the level of waste awareness in the general public, i.e. selected as the urban population of fifteen years of age and above. Care had to be taken for the sample group to be representative of the population so that the survey was not biased toward any particular group.

A special Daily Tally Sheet was devised for the survey to ensure that bias of any kind with respect to gender, age group, employment status, income level, education, and residence type was avoided.

Despite cultural limitations that young people may not be interviewed in the presence of elders, it was possible to interview people in the age group 15-20 years. The young people, mostly students, comprised 10 % of the sample (Table 2).

It is interesting to note that 21% of the respondents did not have any formal education (Table 4).

The distribution of respondents in Tables 1 - 5 indicates that the survey was well balanced and that all sections of the urban population were represented

7.2.2 Section B: General Level of Awareness

Considering questions 7, 8, and 9 the general level of awareness in Apia is average or just below average. The mean value for the right answer for the three questions was 52 %. This may be because there are four different private contractors collecting garbage and the Tafaigata dump is located 10 km away from the city.

In Apia waste collection is subsidised by the Government. Only 42 % of the respondents knew this. A large proportion of respondents (52 %) did not know the correct answer to the question: Who pays for waste collection service?.

The general level of awareness of waste in Apia can be described as average or just below average.

There is obviously a need for a basic information pamphlet informing the public about the new zones of collection, day/time of collection, nominated contractors, and a number to call in case of complaint, etc.

7.2.3 Section C: Knowledge and Understanding of Solid Waste Issues

This section looks at people's understanding of waste and related issues.

94% of the respondents said that waste should not be thrown into river, sea, or coastal areas (Table 8).

Regarding hazardous waste, 61% of the respondents said they knew what it was; 39% did not. However, of those who said 'yes', 40% had no answer when asked for an example. The most common examples cited for hazardous wastes were 'sharp objects', 'chemicals' and 'pesticides, paints, batteries.'

A significant proportion of the respondents (48%) either did not know or felt that hazardous waste could be disposed at the dumpsite..

It appears that public education should focus more on hazardous waste.

The majority of respondents (81%) knew that waste could be put to some useful purpose. However the response was skewed in favour of one or two examples. The most frequent example was 'reuse' (43%) followed by 'compost' (30%), and recycling-(7.3%).

It appears that the awareness of the potential for reuse of wastes is higher in Apia than Suva.

People are not fully aware of the wide range of uses that waste can be put to. There is need to bring about the awareness that waste is a resource.

Most people could cite an example of the adverse effects of uncontrolled waste disposal. However the response was skewed towards one example. Respondents ranging from 7 % to 21 % were not aware of the adverse consequences of uncontrolled waste disposal. The responses are summarised below.

	Don't know	Most common example cited
Health Effect	17 %	Dengue/malaria 46 %
Economy Effect	21 %	Tourist decline 42 %
Environment Effect	7 %	Water pollution 66%

The spread of answers does not indicate a sound understanding of the adverse effects of uncontrolled waste disposal.

Awareness and education programs should focus more on hazardous waste, waste as a resource, and adverse effects of uncontrolled waste disposal.

7.2.4 Section D: Sources of Understanding

This section looks at the sources of information and understanding of waste. More than half the respondents (68%) had come across some information on waste management.

When they were asked to identify the sources, *television and radio were the most popular sources*. The information content and sources are summarised below:

Source	Content	Agency
Radio	Keeping Samoa clean	DLSE
	Waste separation	DLSE
	Vector borne diseases	Health Department
	Using rubbish bins wisely	Health
	Proper use & handling of pesticides	Agriculture & Fisheries
T V	Angel Ad.	DLSE
	Water pollution	Water Authority
	Water conservation	Water Authority
	Rubbish in drains	DLSE
	Disease prevention	Health Department
	Burial/disposal of tin, cans, etc.	Health Department

Other sources identified (poster/handouts, newspapers, health and municipal workers, schools, community meetings, and clean up campaigns) are relatively small (see Table 19b).

The figures indicate that not enough is being done at community level education using a face-to-face approach.

. These results indicate that when information and education is channelled through mass media it is not very effective in changing the attitude and behaviour of people.

One interviewee remarked: Awareness and education efforts are spread thin and wide in the community. There is need to sharpen the focus on specific issues, areas, and community based target groups.

However professionally produced mass media messages aired at prime time will still be a useful tool.

A very small number of people had attended some sort of workshop, seminar or training on waste. The results show that very few agencies are active at community level. This highlights that fewer agencies are working with people on a face to face level.

There is obviously a need for agencies promoting better waste management to combine awareness and education campaign with small participatory waste projects at a community level.

7.2.5 Section E: Key Waste Issues and Concerns

The first few questions in this section attempt to provide an understanding of the nature and extent of waste issues and concerns from people's perspective.

91% of the people interviewed felt that waste disposal is a problem in Apia city. When asked to scale the seriousness of the problem 21% said that waste is a 'serious problem', 15% said 'very serious', and 11% said a 'very very serious' problem. *A very small minority of people (only 0.8%) felt that waste is not a problem.*

When asked to specify the types of waste that are of great concern, the three most frequently mentioned types are shown below:

- ? Plastics (all sorts) 45.6 %
- ? Garden waste 14.9 %
- ? Papers (all sorts) 11.8 %

Question 28 is open-ended and respondents were asked to detail the three most serious problems that require immediate attention. The wide range of answers is coded into eleven categories shown below.

1. Stray Animals/dogs

Stray dogs tipping rubbish bins, scattering rubbish, diapers, etc.

2. Plastics

All kinds of plastics especially beverage bottles littered all around.

3. Littering

Public throws rubbish anywhere and everywhere, not aware or sensitive to its effect on environment.

4. Blocked Drains

It is due to littering and illegal disposal by residents.

5. Vandalism of bins

People from nearby areas come in the night or early morning to dump waste in the bins in the town area. Even dead animals and offal have been found in personal bins.

6. Collection Service Inadequate

Late arrival, irregular, inadequate service, inept handling, etc. Excluding nearby areas from collection service creates problems for others. Linked to vandalism of bins.

7. Lack Facilities

Inadequate and inappropriate equipment. Open trucks, falling debris, smell, collection gear and equipment outdated.

8. Illegal Dumping

Vandalism of bins, dead animals in bins and drain, vacant land/properties, coastal areas, backyard, roadside, and waterways are targets of illegal dumping.

9. Insects/vector borne diseases

Decomposing heaps of rubbish make a good breeding ground for insects and organisms that spread diseases.

10. No response

11. Other

Odour, bottles and tins around, garden waste as a result of agricultural activities.

When the responses to Question 28 are sorted (Table 25b), the main five problems are:

Plastics	26 %
Littering	13 %
Illegal dumping	10 %
Stray animals/dogs	9 %
Collection service inadequate	7 %

The first four problems have something in common in that they are all related to illegal/improper disposal of rubbish and its scattering. Plastic is a serious problem because of littering and improper disposal. The fifth problem is related to the waste collection system. It appears that there are two major problems: the behaviour of the waste generators (littering, illegal disposal, and receptacles of all sorts) and the performance of the waste collectors (lack of facilities). Many other problems stem from these two core problems.

One solution to the plastics problem (including PET bottles) would be recycling. Littering and illegal dumping will require education and enforcement of legal provisions. Improvements in collection service would require education, programming and planning to provide better services.

7.2.6 Section F: Causes and Contributory Factors

This section explores the causes and contributory factors to the problems mentioned in Section E. The three most common causes mentioned by respondents are:

Human factors	49 %
Lack of awareness and education	40 %
Lack resources	3 %

The other causes mentioned are lack of legislation, enforcement, and training.

The qualities alluded to in reference to “human factors” are lack of civic pride, laziness, carelessness, inconsiderate, irresponsible, etc. If people are educated they may be motivated to change their attitude and behaviour for the better. But if people still don't change their behaviour, then authorities should resort to legislation and enforcement.

At times both options are necessary.

The changing of human behaviour is a complex issue. Awareness and education is a necessary component but not sufficient on its own. The pre-requisites for behavioural change are a hierarchy of connected factors such as:

- ? Motivation through awareness and education;
- ? Practical viable alternatives;
- ? Incentives;
- ? Awards and recognition; and
- ? Legislation and enforcement

If viable alternatives are not there, people won't change.

7.2.7 Section G: Solutions/Waste minimisation

Question 30 of this section is open-ended. Respondents were asked what could be done to keep Apia City clean. The wide range of answers is coded into ten categories shown below.

1. Public Awareness and Education

2. Improve Collection Service

Employ, supervise workers, better salary, etc.

3. Improve Facilities

Every family should have a bin, more bins in public areas, proper machinery, equipment, safety gears, etc

4. Waste Minimization/Reduction

Recycling and reuse initiatives

5. Introduce Waste sorting

Provide waste handling facilities such as sorting/transfer station, etc

6. Collect household gadgets separately

Old household appliances, etc

7. Encourage Community Participation

Use village mayors (pulenuus) and traditional system, regular inspections and clean-up campaigns,

8. Legislation and Enforcement

Prosecute those who litter and dump illegally, enforce standards, etc

9. No Response

10. Other

Improve and maintain drainage system, etc.

When responses to Question 30 are sorted, the main five suggestions are:

? Public Awareness and Education	28 %
? Encourage Community Participation	27 %
? Legislation & Enforcement	14 %
? Improved Facilities	11 %
? Improve Collection Service	9 %

Here again the top priority is awareness building and education.

34% of the respondents said that waste facilities and services were inadequate. When suggestions for facilities and services are sorted, the four most frequently mentioned ones are:

- ? Regular collection and Transport,
- ? Strict Standards,
- ? Enforcement services, and
- ? Improved Facilities

In Apia the most common method of waste disposal by households is collection service (88%). The other two methods of disposal of some importance are 'composting' (5%) and 'burn/bury/dump backyard' (4%). This indicates that there is little activity in waste segregation, reuse, and recycling.

People in Apia are favourably disposed towards the idea of compost making (72 %). About 37 % said that they were making compost at home and 52 % agreed to do so if compost making was demonstrated to them. The majority of the respondents agreed to centralised composting by an agency (69%).

It appears that compost making could become a viable venture in Apia.

A number of compost making initiatives are already underway. These initiatives are carried out by the Crops Division of the Ministry of Agriculture, Siosiomaga Society and the Women in Business Foundation (see Chapter on Resource Available). Bio-degradables, organic farming, and niche market for high value, low volume products are of special interest to these organizations.

Organic farming could be a viable export venture in and around Apia. DLSE could take the initiative to pool resources to create a viable project in compost making. This of course would require segregation of waste, and an awareness and education program.

7.2.8 Section H: Policy and Planning

Respondents were divided on the question of setting up a separate body for managing waste in Apia. 68 % agreed to the proposal.

53 % agreed to pay for improved services but not all were ready to say how much more they would pay. Some respondents felt that if they gave a figure they would be required to pay that amount..

Disregarding the extreme values the mean for 151 respondents was \$15.71 per month with a standard deviation of \$14.48 indicating considerable variation on either side of the mean value. The majority of the values lie within the first two class intervals (\$1-5 and \$6-10).

In relation to questions 40 to 45 (refers Table 37b), the majority of the respondents (more than 90 %) agreed that positive action should be taken.

This is a clear signal that the Government of Samoa, DLSE, and concerned agencies should move swiftly to deal with the waste problem.

7.3 South Tarawa

7.3.1 Section A: Personal Data

The aim of the survey was to gauge the level of waste awareness in the general public, i.e. selected as the urban population of fifteen years of age and above. Care had to be taken for the sample group to be representative of the population so that the survey was not biased toward any particular group.

A special Daily Tally Sheet was devised for the survey to ensure that bias of any kind with respect to gender, age group, employment status, income level, education, and residence type was avoided.

Concerning education, 5.4 % of the respondents had no formal education and 29 % had only primary education.

The distribution of respondents in Tables 1 - 5 indicates that the survey was balanced and that all sections of the urban population were represented.

7.3.2 Section B: General Level of Awareness

Considering questions 7, 8, and 9 the general level of awareness in Tarawa is relatively low. 48 % did not know the right answer to Question 7, 73 % to Q 8 and 34 % to Q 9 (Table 6). This may be because of the low level of service provided by BTC and TUC coupled with the practice of multiple, changing dumpsites. At one time the Councils were dumping rubbish at six different sites.

On South Tarawa the residents are required to pay for the waste collection service. However the rate of recovery is poor and some don't pay because the service does not occur. Only 37 % of the respondents were correct in answering the question: "Who pays for waste collection service?" A considerable proportion (32%) attributed the payment to Councils. This response indicates the perception that government or the councils should provide the service free.

The general level of awareness of waste on South Tarawa is low.

There is obviously a need for a basic information pamphlet clearly stating, amongst other information, the collection zones, the routes, and the days and time of collection. Given the level of education, the 'print' information should be supplemented with intensive radio campaign as a method of informing the communities.

7.3.3 Section C: Knowledge and Understanding of Solid Waste Issues

This section examines people's understanding of waste and related issues.

It is interesting to note that 33 % of the respondents said that waste can be thrown into river, sea, or coastal areas (Table 8) - they saw nothing wrong with this. This occurs because of lack of space and the absence of other viable options.

Regarding hazardous waste, 76 % of the respondents said they knew what it was; 24% did not. However, of those who said 'yes' 37 % had no answer when asked for an example. The most common examples cited for hazardous waste were 'chemicals' (49 %) and 'sharp objects' (8 %).

A significant proportion of the respondents (27 %) either did not know or felt that hazardous waste could be disposed at the dumpsite.

It appears that public education should focus more on hazardous waste, handling and disposal which are critical issues in an atoll environment.

The majority of the respondents knew that waste could be put to some useful purpose. However the response was skewed in favour of one or two examples. The most frequent example stated was 'composting' (66 %), 'landfill/reclamation' (12 %) and 'recycling' and 'reuse' (each about 6 %). The response reflects the situation on South Tarawa. Composting was a traditional activity, which over the last 6 years has been heavily promoted by FSP, Agriculture Division and PRAP and creating 'new' land with waste has become an accepted practice.

People are not fully aware of the wide range of uses that waste can be put to. There is a need to create awareness that waste is a resource and very little of it should be dumped.

People are quite aware of the adverse health consequences of uncontrolled waste dumping, the different diseases it can cause. This could be from awareness and education campaign in the past.

The impact of waste on the economy was not well understood; 47 % of the respondents did not know the answer.

With regard to environment impact, 35 % did not know the answer and 41 % cited 'water pollution' as an example. Water is a critical element in an atoll environment and people are aware of it. The 'don't know' proportions of respondents are summarised below.

	Don't know
Health Effect	15 %
Economy Effect	47 %
Environment Effect	35 %

With regard to adverse consequences of uncontrolled waste disposal, awareness and education efforts should focus more on the effects on the economy and the environment.

7.3.4 Section D: Sources of Understanding

This section examines the sources of information and understanding of waste. About 50% of the respondents had come across some information on waste management, the other 50 % had not.

When they were asked to identify the sources, *radios followed by newspaper were the most popular sources*. Other sources (poster/handouts, newspapers, health and municipal workers, schools, community meetings, and clean up campaigns) were relatively small.

Since there is no television service on South Tarawa, radio and newspapers are the most popular sources of information. Though there are some indications of a face to face approach to community education, there is not enough occurring.

The results indicate that waste awareness and education should focus on specific issues, areas, and community based target groups.

A very small number of people (4 out of 314) had attended some sort of workshop, seminar or training on waste. The results show that very few agencies are active at community level education. This again highlights that fewer agencies are working with people on a face to face level.

There is obviously a need for agencies promoting better waste management to combine awareness and education campaigns with small participatory waste projects at community level.

7.3.5 Section E: Key Waste Issues and Concerns

The first few questions in this section attempt to provide an understanding of the nature and extent of waste issues and concerns from people's perspective.

69 % of the people interviewed felt that waste disposal is a problem on South Tarawa. When asked to scale the seriousness of the problem 51 % said that waste is a 'slight problem', 11 % said a 'serious problem', and 3 % said a 'very very serious' problem. About 4 % of the interviewees felt that waste is not a problem.

In the case of Tarawa, 'slight problem' becomes the modal class.

The perception of waste problem is unique on South Tarawa. It has to do with the concept of social conscience and collective responsibility. Waste becomes a problem if a person's home and yard is filthy. If any other place is filthy, it's not considered a problem.

When asked to specify the types of waste that are of great concern, the three most frequently mentioned types were:

- ? Plastics (all sorts) 43 %
- ? Cans/tins 14 %
- ? Glasses 9 %

Question 28 is open-ended; respondents were asked to detail the three most serious problems that require immediate attention. The wide range of answers is coded into eleven categories shown below.

1. Space Consideration: not enough and restricting

On South Tarawa not enough space characterises the problem of waste disposal. The environment is so restricting that there are not many options to waste disposal. Therefore what may be unacceptable in another social environment is acceptable here, for example, *beach pecka* (defecating on beach) due to the fact that only 40% of South Tarawa residents are connected to the sewerage system.

Not enough space coupled with inadequate and inefficient waste collection service leave people with no other option but to use the sea, beachfront, and lagoon as dumping grounds. With the exception of Betio, Bairiki, and Bikenibeu the collection service does not cover all households, especially those, which are far from the main road.

There is a third dimension to the issue of lack of space. Valuable space is taken up by derelict vehicles, scrap metals, plastics and other non-decomposing waste. Plastics pollute the soil and prevent the growth of food plants.

Since building/living space is scarce many people 'create' new land by using waste as fill-in material. *Here the 'space consideration' overrides the environmental considerations.*

2. Illegal Dumping/Littering

For various reasons including laxity of enforcement and absence of practical and viable options, people resort to illegal dumping. It takes the form of tossing rubbish in the sea, lagoon, and on beach front, near houses, vacant spaces, by roadside, - almost "anywhere and everywhere". Dead animals are put in the 44-gallon rubbish drums. The lagoon is full of floating human and animal wastes.

3. Scattering of Rubbish/Stray Animals

Scattering of rubbish is a serious problem on South Tarawa. The principal causes observed on South Tarawa are dogs, wind, waves, children, scavengers, rubbish trucks and trailers with open sides and passing vehicles. Wave action is very efficient in dragging waste from near- shore landfills and spreading it far and wide. Children looking for toys and playthings rummage through piles of rubbish. Cats, rats, and other vermin are minor causes.

4. Bad Odour/Discomfort/Bad Appearance

Illegal dumping (dead animals, disposable nappies, etc.) and long periods of wait before the rubbish is collected allows the process of decomposition, fermentation and putrefaction to occur giving rise to offending odours and polluting by-products.

5. Health Hazard

Decomposing rubbish, soiled nappies, sharp objects, etc. are a serious health hazard. Children in search of play things rummage through rubbish. They eat without cleaning their hands and in this way contract diseases like diarrhoea and gastro-enteritis.

Most people in Kiribati walk barefoot. Broken bottles and sharp objects can cause injuries and lead to further complications.

6. Kimbees (disposable nappies), Plastics, Batteries, Bottles, Cans as Pollutants

Disposable nappies, referred to as *kimbees*, are cited as a serious problem. Women do not dispose of soiled nappies properly. Fishermen have hauled kimbees in their fishing nets. People find them floating in the lagoon when they go for a swim. Since kimbees are soiled, people do not like to handle them.

Plastics, batteries, broken bottles, aluminium cans, non-biodegradables are also an issue. They are health hazard, pollute the soil, and contaminate ground water. Batteries, especially the small ones, are a serious problem on outer islands because of absence of electric power.

7. Breeding Ground/Vector Borne Diseases

Flies and mosquitoes are mentioned quite often. A heap of rubbish is a good breeding ground for flies, mosquitoes, rats, cockroaches, and other organisms. These organisms in turn spread diseases.

8. Pollution Problem

Illegal dumping, inadequate service, unsanitary landfills, kimbees, and other waste streams compound the issue of pollution. Terrestrial pollutants affect well water, and the ground water lens. Polluted water in turn leads to diseases such as scratch worms, diarrhoea, and gastro-enteritis.

Seepage of leachate and other forms of pollutants from landfills affect marine life, illegal disposal into the sea and lagoons are affecting shell fish and other types of fishes.

9. Inadequate Service/Facilities

Inadequate service and facilities among others include no household bins provided by the Council, no bins in public places, certain areas not serviced at all, irregular service, etc.

10. No Response/No Problem/Don't Know

Some people don't see waste as a problem (Q25). This could be due to a particular mindset of the people in relation to lack of social conscience and collective responsibility.

Every day early in the morning one finds women and children sweeping and cleaning their compound. People like to keep their home and immediate environment free of waste but any place beyond the compound is not the responsibility.

Betio and Bairiki are much cleaner now than they were about a year ago and some people perceive this as enough change.

11. Other

Burning waste is a fire hazard. Broken bottles are used as fighting weapon, and cause road accidents. Hot air from decomposing heaps affect people, plastics interfere with gardening, etc.

When the responses to Question 28 are sorted (Table 25c), the main five problems are:

? Bad smell, discomfort, eyesore	18 %
? Littering/Illegal dumping	17 %
? Pollution problem	12 %
? Specific Pollutants	9 %
? (plastics, kimbees, batteries, bottles, cans, etc)	
? Breeding ground/vector borne diseases	8 %

Odour seems to be a significant issue in Kiribati. These wide spread littering and dumping, inefficient collection service, and decomposing rubbish causing environmental and other problems.

7.3.6 Section F: Causes and Contributory Factors

This section explores the causes and contributory factors of the problems mentioned in Section E. The three most common causes mentioned by respondents are:

? Human factors	22.3 %
? Lack enforcement	17.8 %
? Lack of awareness and education	14.6 %

There was a 'no answer' category here of about 18 %. Field experience shows that people sometimes don't answer. One possible reason could be conceptual problems and a low level of education.

The qualities alluded to in reference to "human factors" are lack of civic pride, laziness, carelessness, inconsiderate, irresponsible, etc. If people are educated they may be motivated to change their attitude and behaviour for the better. But if people still don't change their behaviour, then authorities should resort to legislation and enforcement. It is interesting to note that lack of enforcement is mentioned ,followed by lack of awareness and education.

On South Tarawa human attitude may be changed with waste awareness and education program but until practical viable alternatives are found, it will be difficult to change human behaviour.

7.3.7 Section G: Solutions/Waste minimization

Question 30 of this section is open-ended. Respondents were asked what could be done to keep South Tarawa clean. The wide range of answers is coded into nine categories shown below.

1. Improve Collection Service

Extend service to areas not served, into villages that are far away from the main road, maintain regular and efficient service- daily collection if possible.

2. Improve Facilities

Council/Government to provide a bin to every household - most common request. Bins/skips to be placed in public places. More trucks, better equipment and gear. Set up sanitary landfills, facilities for proper disposal of medical and hazardous waste, leachate containment, etc

3. Legislation and Enforcement

Government and Council should enforce strict standards and codes of waste management practices. Punish and fine people who litter. Outlaw 'beach pecka'. Curb all illegal dumping into sea, lagoon and beachfront.

4. Inspection and Clean-up Campaigns

Councils/Department of Environment should organise clean-up campaigns at least once a month. Council should organise village inspections. Village or Local Area Committee members should be involved.

5. Awareness, Education and Training

Education to focus on social responsibility, consideration for neighbours and others, consequences of our actions, relationship between human behaviour, environmental health, and social and economic well being. Organise meetings in village 'maneaba'. Use Government newsletter "Teuekera" to educate people. Integrate waste management into school curriculum. Make use of radio.

6. Waste Segregation and Minimisation

Introduce the sorting of waste. Use biodegradables to make compost. Encourage composting and food gardening. Demonstrate compost making in every village. Start recycling facilities. Recycle all forms of plastic. Restrict/regulate the imports of waste creating and polluting items. Kimbees should be banned or taxed. Government should allow only import of rechargeable batteries.

7. Advice Type Responses

Examples: keep household cleans, put waste in bins, reduce the use of plastic bags, avoid using non-biodegradable, individuals should keep their areas clean, etc.

8. No Response

9. Other

Create separate body to manage waste. Government to build toilets/composting toilets. Use rubbish to create 'new' land by dumping beside seawall. Government to control flies and mosquitoes. Set up appropriate disposal facilities for different categories of waste such as medical waste, hazardous waste, and kimbees.

When responses to Question 30 (dealing with solution) are sorted, the first five suggestions are:

? Legislation & Enforcement	16 %
? Improve Collection Service	15%
? Improve Facilities	15 %
? Waste Segregation/Minimisation	15 %
? Awareness, Education & Training	14 %

It is interesting to note that on South Tarawa respondents have placed emphasis on legislation and enforcement, and on improving services and facilities, and not so much on awareness and education.

72 % of the respondents said that waste facilities and services were inadequate. When suggestions for facilities and services are sorted, the four most frequently mentioned ones are:

- ? Regular collection and Transport,
- ? Enforcement services,
- ? Sanitary Dumping, and
- ? Improved Facility

Again we have a 'no answer' category which has been explained earlier.

On South Tarawa responses to methods of waste disposal by households are spread over a range of categories as follows:

? Compost	34 %
? Burn, bury,...	28 %
? Collection service	27 %
? Beach, sea, drain	7 %
? As fill material	2 %

Most people on South Tarawa are using a number of methods to dispose household waste. Unlike Suva and Apia, the collection service is one of the methods of disposal.

People on South Tarawa are favourably disposed towards the idea of compost making (90%). About 36 % said that they were making compost at home and 54 % agreed to do so if compost making was demonstrated. The majority of the respondents agreed to centralised composting by an agency.

Considering the existing practice of compost making, the nature of atoll soil, and the promotion of food gardening, it would be prudent to promote composting at the household level.

7.3.8 Section H: Policy and Planning

The majority of the respondents (93 %) agreed to the of setting up a separate body for managing waste on South Tarawa. This reflects the level of service provided by the Councils. *Setting up another authority would demand capital expenditure and duplicate an existing agency in a small place. A better option would be to improve the existing services and facilities.*

79 % of the respondents agreed to pay for improved services. Of those who agreed for improved services and gave a figure, the mean for 278 respondents was \$3.66 per month. The standard deviation was \$2.62.

The majority of the respondents were willing to pay \$1 to \$3 per month. Considering that average annual income in Kiribati is low, the mean value appears to be a reasonable estimate of what people are willing to pay per month for improved services.

Concerning questions 40 to 45 (refers Table 37c), the majority of the respondents (more than 90 %) agreed that positive action should be taken.

This is a clear signal that the Government of Kiribati, MESD, and concerned agencies should move swiftly to deal with the waste problem.

(Note: The essence of Results and Discussion is summarised in Findings and Recommendations Chapter which, at the request of reviewers, has been placed after the Executive summary. The next chapter deals with waste management resources available in each of the three countries).

8. AN ASSESSMENT OF CURRENT RESOURCES AVAILABLE

8.1 Fiji

Fiji Institute of Technology

Person Contacted

Ms Winifereti Nainoca
Senior Lecturer Science
Box 3722, Samabula, SUVA

Fiji Institute of Technology (FIT) is a tertiary institution specialising in vocational training. A number of certificate, diploma, and degree level courses are offered.

Environment is an area of interest and concern as is solid waste management. FIT in association with Auckland University of Technology (N Z) runs a 3-year degree course leading to a Bachelors in Applied Science with major in Environment. One unit under this course focuses on solid waste management.

- ? Staffing- 4 on regular basis though more people are involved in teaching the degree course.
- ? Enrolment: 15 students in the final year.
- ? Entry Point: Form 7 pass.

The extent of coverage of the topic of solid waste management depends upon the lecturer who teaches the course. Ms Nainoca feels that there is scope of improving the depth and extent of coverage of solid waste issues. A forum needs to be set up set up where discussion and exchange of information can take place.

Curriculum Development Unit Ministry of Education, Suva.

Person Contacted

Mrs Vaseva Vasu
Curriculum Development Unit
Ministry of Education
Vinod Patel Building, Suva.

Mrs Vasu feels that there is adequate coverage of solid waste in primary and secondary school curriculum. The prescriptions where solid waste is covered is as follows:

Primary School

Prescriptions: Health Science, Basic Science, Vernaculars, and Social Science

Secondary School

Prescriptions: Social Science- Form 4, Geography Forms 5 to 7, topic Environment

Biology Forms 4 to 7, topic Man's Influence on Eco-system.

Economics- Forms 4 to 7. Topics on economic development and related problems such as industrial waste and problems of controlling and disposing waste.

Vernacular- Growth, Development, Land, Problems.

Problems: pollution from industrial waste, plastics, factory discharge, logging waste, etc. affecting fresh water and marine life.

Note: Prescriptions for forms 4 to 7 now revised. The topic on solid waste specially addresses methods of waste disposal.

Suggestions

1. More emphasis be given to action than knowledge.
2. Provision of facilities in schools such as incinerators, bins, compost making, and recycling schemes.
3. Community awareness through municipal authority and Department of Environment.
4. Attempt to change the attitude of students and community towards sanitation and proper methods of waste disposal.

Coca Cola Amatil Laucala Beach State, Suva

Person Contacted

Navin Chandra
Environment Manager
Private Mail Bag
Suva

Coca Cola is one of the largest manufacturers of soft drinks in the Region. About 70 percent of its soft drinks are now marketed using recyclable PET bottles.

There are other companies in Fiji which use PET bottles for beverages and other products such as fats and oils, natural waters, honey, sweeteners, juices, salad dressings, and household cleaners.

Some of the major companies and their products are as follows:

Company	Product
Moti Bhai and Company:	sprint (soft drink), oils, ghee, etc
Punja & Sons:	ghee, oils, etc.
Eddie Hing:	RC Cola
Tappoos:	Distributors of Pepsi Products
Fiji Natural Waters:	bottlers of natural water

What is PET? And what are other forms or grades of plastic?

PET which stands for polyethelene terephthalate, is a plastic resin formed by combining two monomers, namely, ethylene glycol and terephthalic acid. It is a popular package for

food and non-food products since it is inexpensive, lightweight, re-sealable, shatter resistant and recyclable. Because of its desirable packaging properties PET is commonly used to package soft drinks, water, juice, salad dressings, oils, and household cleaners.

Depending upon the chemical composition plastics can be classified into seven grades or types. These are:

1. PET - Polyethylene terephthalate
2. HDPE - High Density PE
3. PVC - Poly Vinyl Chloride
4. LDPE - Low Density PE
5. PP - Polypropylene
6. PS - Polystyrene
- 7 Others

The code numbers (1 to 7) on the base of the plastic containers, encased within the recyclable logo (three circular arrows) indicate the type or grade of plastic used. By convention the manufacturers are required to put this number on every bottle. A container or bottle with code number 1 indicates that it is made of PET.

Of the companies using PET bottles to market their products, Coca Cola is the only company that has put in place a program to recycle their bottles. This is definitely an initiative in the right direction.

Mission Pacific

The PET recycling project initiated by Coca Cola is called Mission Pacific. It is a program for the collection and recycling of used PET bottles. Its aim is to:

- ? Increase the collection of used PET soft drink bottles, and
- ? Distribute income by paying collectors 68 cents per kilogram of PET bottles.

The company is collecting their own PET bottles, which are used as containers for Coca Cola, Diet Coke, Fanta, Sprite, Jucy, and Schweppes. At the Coca Cola yard in Suva (Laucala Beach), the bottles are crushed, baled and shipped to the Coca Cola PET Reformation Plant, Preston, Sydney. The recovery rate of used bottles is reported to be much higher than 18 percent average for other countries.

The success of the program in Fiji is attributed to:

1. Planning: All aspects of the Mission Pacific were planned well in advance right from the point of collection to the delivery at the yard. Coca Cola's success story in Costa Rica, called Mission Planeta, was taken into account while planning Mission Pacific.
2. Goals: The Short and Long term Goals were clearly visualised. The short term goal is to induce people to collect empty bottles, either from litter or designated spots, and deliver them to the factory in return for money.

3. The long-term goal is to bring about a behavioural change; to educate people about environment friendly behaviour. That is consumers don't throw away bottles after use but keep or deposit them for recycling.
4. The initial target groups were well defined. The groups, among others, included church groups, youth groups, restaurants, schools, shops, bottle dealers, town councils, service stations.
5. The logistics of transportation were worked out in detail.
6. Incentives: There was monetary incentive for people to collect bottles.

In addition to providing free collection bags and transport, the company buys bottles at the following rates.

- ? 2 cents per 500ml bottle and 4 cents for 2 litre bottle.
- ? Or 68 cents per kilogram (To make one kilo, one has to collect about 33 small bottles or 18 2-litre bottles.
- ? One bag full of bottles is about 40 kilos and that is worth \$30.
- ? A family of four regulars make about \$200 per week.

Two cents per bottle may appear little but the company argues that it has to incur other expenses as well. For example cost of bags, transportation, salary of manager, wages of workers at the yard, and cost of promotion.

The Mission Pacific initiative could be extended to include other companies in Fiji, Samoa, and Kiribati to deal with plastic waste, especially of PET origin.

WASTE RECYCLERS (FIJI) LTD.

Person Contacted

Sunil Singh
Manager
Wailada Industrial Estate
Lami, Fiji
P O Box 3081

The directors of Waste Recyclers (Fiji) Ltd are based in Australia. Mr. Singh manages the day-to-day business of the Company from Lami Office. The Company recycles a number of items including paper, ferrous and non-ferrous metals, and plastics.

Paper: The types of paper accepted for recycling are office papers, press off-cuts, cartons, cardboards, etc. Newspapers are not accepted for recycling because the economy of scale doesn't allow for a profitable business.

The Company has placed about 4000 boxes in Suva for collection of waste paper. No money is paid for the waste paper collected.

Non-ferrous Scraps: The Company collects items made of copper, brass, aluminium, and lead for recycling. The common items that contain non-ferrous elements are radiators, battery, cooling systems, cars, transformers, cables and wires.

Depending upon the grade and quality, the Company pays 30 cents to \$2.00 per kilogram of metal.

Ferrous: The Company collects ferrous materials such as steel off-cuts, mild steel rods, engine blocks, and automobile parts from those customers who call them. No money is paid to the customers.

Household Items : The Company used to collect household whiteware such as fridges, stoves, washing machines, fans, etc. They have discontinued this service. According to the Manager, these items don't have much ferrous or non-ferrous elements in them any more.

Plastics/Crates: The Company also collects Coca Cola crates and beer crates and sends them overseas for recycling. The damaged crates from Apia, now being discarded at the dumpsite could possibly be shipped to Fiji.

Scrap Metal Fiji Ltd

Person Contacted

Katarina Miliana
Supervisor
Matua Street, Walu Bay, Suva
P O Box 16952 Suva

The Company has two offices; one in Suva and another in Lautoka and have been collecting scrap metal for 6 years. They also collect scrap metals from Northern Division through Labasa. They deal in the following non-ferrous metals:

- ? Copper, Aluminium, Brass, Alum/Cast, Lead, Extruded Alum, Radiators, Batteries, Aluminium cans, Air conditioners, Hot water systems, Stainless steel

The Company pays the following rates to its customers

- ? Copper -\$1.80 per kilo
- ? Brass -\$1.00 per kilo
- ? Aluminium -\$2.00 per kilo
- ? Batteries from 40 cents to \$2 per battery depending upon size.

Observations from the supervisor include:

- ? Lot of non-ferrous metals goes to the dump. Rubbish is a resource; it can become a source of income for many families

- ? Education is required. People generally cannot distinguish between ferrous and non-ferrous items. Customers ring for collection service but the wrong material has been collected.
- ? The Department of Environment should arrange for the participation of waste care businesses in Environment Week so that people can be informed about recycling and income earning opportunities.
- ? Cost of doing business: The Government need to look at the cost aspects of recycling business and provide some form of relief such as back loading empty containers at subsidised or reasonable rate. This will promote the recycling business.

Waste Care Fiji

Persons Contacted

Brian Mc Lister
General Manager

Anil Shah
Financial Controller
Lot 15 Wailada Industrial Estate
Lami
G P O Box 15184 Suva

The General Manager felt that sharing specific information would not be in the interest of the Company. Therefore the discussion that follows is of a general nature.

Waste Care has probably the most modern trucks and equipment for waste collection and disposal in Fiji. It has several solid waste collection trucks, one septic tank truck, numerous skips, and employs about 15 workers. At present it operates in Suva, Nausori, and Nasinu and is likely to extend its services to other parts of Fiji.

Business and commercial operators in Suva are required to make arrangements for the disposal of the waste they generate. Waste Care has taken advantage of this niche market. It provides huge bins (skips) to the commercial operators and, once full picks them up for disposal at the Lami dump.

The Nausori Town Council has awarded the contract of handling household waste to Waste Care. The consultant observed their operations in Nausori for half a day. The town now appears much cleaner than before. Waste Care makes sure that its workers pick up scattered waste as well as removing the skips.

The General Manager reported that for Nasinu Town Council, they collected 85 tonnes of waste during one week end.

Observations of Waste Care operations indicate that with proper equipment and gears, one can do a good job of waste collection and disposal.

Housing Authority

Person Contacted

Narendra Prasad
Chief Executive Officer
Housing Authority
Valelevu, Nasinu, Suva
P O Box 1263 Suva

Initial results and personal observation indicate that the densely populated areas of Suva have a unique set of waste problems. To explore these problems further and to find possible solutions, Housing Authority and Public Rental Board were contacted to get their views.

The Housing Authority develops housing subdivisions and assists people of low income with loans to build their houses. The Authority comes under the jurisdiction of the Ministry of Environment, Housing, and Local Government. The Director of Housing, on behalf of the Ministry, liases with the Authority.

The Authority deals with single units and a set of units called barracks. The multi-storey high rise residential blocks belong to the Public Rental Board.

The Housing Authority acts as a developer, they neither own the lots nor the houses. Once sold to the owners they have no control on the occupants. The Town Council has the legal right to enforce by laws of the Local Government Act concerning litter, waste, and public health.

Nevertheless, the Authority has a voluntary mechanism of working with the owners through the Tenants Association. As part of social responsibility and image building, the Authority is willing to work with Tenants Association on problems of waste management. *It feels that adequate legislation is in place to deal with waste issues, but a lack of enforcement is creating problems.*

The Authority made the following suggestions:

1. The Suva City Council, Housing Authority, Public Rental Board, and Nasinu Town Council work together on a Beautification Campaign in low-income areas.
2. A broad-based approach should be adopted. Uncontrolled waste disposal should be linked to health, income, and environmental impacts. It might be necessary to co-opt such agencies as Health Promotion Unit of the Ministry of Health and Pacific Community (SPC) with resources in public awareness and education.

Public Rental Board

Person Contacted

Sevanaia Tabua

General Manager, Public Rental Board, 132 Grantham Road, Suva.

The waste problems experienced in PRB high-rise blocks are similar, perhaps more serious, than those of Housing Authority. *The seriousness of waste problem is related to density of population.* A greater density of people creates more waste problems but this can be dealt with given appropriate solutions.

The General Manager feels that the existing mode of waste collection and handling is not appropriate or suitable for people living in high-rise blocks. Some alternate and innovative solutions have to be found. He also feels that one has to go a step beyond the Beautification Campaign and come up with some substantial measures. Some ideas that came up during discussion are:

1. Begin to see waste as a resource. People will be willing to change if waste management can be linked to food production (through composting), better nutrition and health of children (mothers are motivated if the proposed changes deal or relate to babies and young children), and income earning opportunity.
2. There is need to change the way in which garbage is now handled in densely populated areas, especially the high-rise blocks. Some waste segregation or sorting of waste should take place. Plastics, papers, and cans can be used to earn some supplementary income. Organic waste could be composted and used to grow vegetables, fruit trees, medicinal plants, herbs, shrubs, and ornamentals.
3. Each block perhaps should have a skip into which the remaining garbage after sorting should be placed. When full or at regular intervals, the garbage would be disposed of at the dump.
4. With regards to long term planning, the introduction of wheely bins (bins with wheels) is recommended. These bins will reduce rubbish scattering and reduce the frequency of collection required.
5. The money saved from reduced collection runs could be used to collect garden refuse and discarded household articles.

The wheely bins would also take care of scattering of rubbish so common in all the three cities under study. It may help to solve the problem of vandalism of bins and the need to construct platforms to keep away stray animals, children, and scavengers.

Unlike the Housing Authority, the PRB owns the high-rise residential blocks seen in Raiwai, Raiwaqa, and Toorak. The Board is the landlord, the occupants are the tenants.

Fiji Visitors Bureau

Person Contacted

Mr Sitiveni Yaqona

Chief Executive, Fiji Visitors Bureau, GPO Box 92, Suva

Several interesting aspects of waste surfaced during discussion with Mr. Yaqona.

1. *The waste problem has to be personalised and localised.* Waste starts with people living in communities and the solution will have to be found there. Waste or Clean Neighbourhood Scheme should be started similar to the Neighbourhood Watch Scheme.
2. " I see not only birds but plastics flying around in Suva." (S. Y.)
3. Rubbish in plastic bags is dumped by the roadside. When contractors cut grass, rubbish and plastic is scattered all over.
4. Portable shredding service should be made available so that green waste can be converted to compost.
5. A multi-level approach is to be adopted to deal with waste problem; starting with the home, community, and schools. If school waste education programmes are effective it will help change the attitude and behaviour of adults at home.
6. Mass media education programmes such as TV spots have to be professionally done and aired at prime time and repeated often to be effective.
7. After a stormy weather one can see a 'carpet of coke bottles and grass' floating off the coast to Suva. (The stormy weather dislodges plankton, which gets enmeshed with floating coke bottles.)

The main task of Fiji Visitors Bureau is to promote Fiji overseas. Their involvement with the National Beautification Committee (NBC) is peripheral. Though the Fiji Visitors Bureau has no specific resources to deal with waste, Mr Yaqona would like to see more done on the waste front through NBC.

Mineral Resources Department

1. Name & Address of Org/Agency:

Mineral Resources Department

Private Mail Bag

Suva

Ph: 381611

2. Particulars of Contact Person

Ifereimi Dau

Principal Environment Officer

3. Is Environment an area of interest/concern?: Yes

4. What about SWM? Yes, for the contact person in particular

5. Budget for SWM or related activity. If yes. How much?
There is none specifically but time and resources can be allocated on a needs basis
6. Staffing: no of personnel involved (directly or indirectly)? 1-2 at the most
7. Any policy/plan/guideline document? No. We follow the Department of Environment Policies/Guidelines and implement these in regulating mining companies
8. Any help desk facility available? Yes, the contact person is normally available for consultations, enquiries, etc.
9. Any regular/or planned education program: radio, print media, TV, community theatre/drama etc.
None
10. Any regular or planned training/workshop/seminar? None
11. Are you planning any SWM activity? If yes specify None
12. Any other issue?
Before the setting up of the Department of Environment, we used to be the Government Department responsible for advice on landfill and solid waste issues. We still provide a back-up role to the Department of Environment in this area, especially in the technical assessments, etc. of landfill project proposals.

Department of Environment

1. Name & Address of Org/Agency:
Department of Environment.
P.O. Box 2123. Government Buildings. Suva
Level 3. FA Building. Suva.
Ph: 311 699

2. Particulars of Contact Person
Vandanna Naidu
Waste Management Officer

3. Is Environment an area of interest/concern? Yes

4. What about SWM? Yes, to the department as a whole

5. Budget for SWM or related activity. If yes. How much? There is no specific budget. Only through special projects from SPREP, UN, UNDP etc.

6. Staffing: no of personnel involved (directly or indirectly)? 1 staff directly involved. Most of the Department of Environment staff are at times indirectly involved.

7. Any policy/plan/guideline document? National Waste Minimisation and Management Strategy, 1994. This is to be reviewed.

8. Any help desk facility available? Yes, through the department's Information Unit.

9. Any regular/or planned education program: radio, print media, TV, community theatre/drama etc.

There is no regular programs. In the future, planned programmes on waste batteries and tyres, vehicles etc.

10. Any regular or planned training/workshop/seminar? None

11. Are you planning any SWM activity? If yes specify None for this year

12. Any other issue?

The Waste Management Officer normally assists organisations such as SPREP on waste management projects under the SPREP WASTE program as their country focal point.

The Waste Management Officer is currently paid by the Government of Fiji and not SPREP.

SOPAC

1.Name & Address of Org/Agency:

SOPAC

Ph: 381611

2. Particulars of Contact Person

Craig Pratt

Environmental and Hazard Management Officer

3. Is Environment an area of interest/concern? Yes. In terms of the physical environment eg. soil, energy, hazard assessment.

4.What about SWM? Nothing specific. Solid waste management issues arose through physical assessment for landfill sites.

5.Budget for SWM or related activity. If yes, how much? There is no specific budget but it is allocated indirectly through other areas.

6. Staffing: no of personnel involved (directly or indirectly)? 1-2 people

7. Any policy/plan/guideline document? There is no policy/plan/guideline.

8. Any help desk facility available? Yes, it basically caters for all offshore geological, physical environment

9. Any regular/or planned education program: radio, print media, TV, community theatre/drama etc. None

10. Any regular or planned training/workshop/seminar? None

11. Are you planning any SWM activity? If yes specify. None

12. Any other issue? Any Solid Waste Management project would be indirectly linked through physical assessments of siting of landfills.

SPACHEE

1.Name & Address of Org/Agency:

SPACHEE

2 Denison Rd. Domain.

Ph: 312 371

2. Particulars of Contact Person

Wana Sivoi

Waste Management Officer

3. Is Environment an area of interest/concern? Yes

4.What about SWM? Yes

5.Budget for SWM or related activity. If yes. How much?No

6. Staffing: no of personnel involved (directly or indirectly)? 1 staff

7. Any policy/plan/guideline document? No.

8. Any help desk facility available? No.

9. Any regular/or planned education program: radio, print media, TV, community theatre/drama etc. No

10. Any regular or planned training/workshop/seminar? Yes

11. Are you planning any SWM activity? If yes specify No

12. Any other issue? SPACHEE in the past have conducted solid waste awareness programs. This has been done in an ad-hoc manner in both rural and urban areas. Eg. Laqere, Kalekana, etc.

Ecowomen

1.Name & Address of Org/Agency:

Ecowomen

2 Denison Rd. Domain.

Ph: 312 371

2. Particulars of Contact Person

Wana Sivoi

Waste Management Officer

3. Is Environment an area of interest/concern? Yes

4.What about SWM? No

5. Budget for SWM or related activity. If yes. How much? No specific budget. Since Ecowomen is a unit within SPACHEE. The unit relies totally on SPACHEE in terms of finance

6. Staffing: no of personnel involved (directly or indirectly)? One staff. The same staff is assigned with SWM issues for SPACHEE

7. Any policy/plan/guideline document? No

8. Any help desk facility available? Yes. There is a SPACHEE/ECOWOMEN help desk that deals with all environmental issues

9. Any regular/or planned education program: radio, print media, TV, community theatre/drama etc. There is no regular or planned programs for the media and community

10. Any regular or planned training/workshop/seminar? None

11. Are you planning any SWM activity? If yes specify None for this year

12. Any other issue? Ecowomen is part of the SPACHEE organisation that deals with environmental issues and women in Fiji.

8.2 Samoa

In Apia there is no town council as such. The Department of Lands, Surveys, and Environment (DLSE) take care of the urban waste. In Samoa a government department has the same status as a ministry, unlike Fiji where a department is generally an arm of a ministry. The head of a department is director and that of a ministry is secretary in Samoa.

Department of Lands Surveys and Environment

As the name suggests, the DLSE is the government authority, which deals with matters relating to Lands, Surveys and Environment in Samoa. Waste management is an integral part of Environment protection and conservation.

The DLSE provides those kinds of services generally provided by a town council. It manages the landfill, looks after parks and gardens, makes arrangement for the collection of household waste (though the actual collection is done by one or more private contractors), maintains markets, and looks after public lands.

Waste Management

With regard to waste management, the DLSE has the following resources:

Staffing

Planning and Policy Development- 4 staff

Public awareness, Education and Capacity building- 3 staff.

Landfill Management- 4 staff working under a supervisor

Annual Budget

For waste collection = wst 300,000.00
Landfill management = 75,000.00
Public sanitation and road maintenance = 165,000.00
Public toilets and cemetery upkeep = 190,000.00
Educational and promotional activities = 257,000.00

Activities

The DLSE works very closely with the National Beautification Committee and Samoa Visitors Bureau. The activities of the National Beautification Committee are described separately.

The staff who work on public awareness and educational programmes organise workshops for youths, CBOs, and NGOs on aspects of waste management. The awareness and educational programmes are channelled through radio and television. They have also been involved in clean-up campaigns for the last 3 to 4 years.

The DLSE also organises a special Environment Week when a number of activities are undertaken to focus attention on the environment and waste management. These activities include T V spots, radio programmes, competitions (debates, songs, drama, etc.) for school children and youth, production of educational material for schools, and involvement of CBOs in waste management activities.

The DLSE encourages public to contact the department for information and assistance with regard to waste management. Its telephone number and email address are widely publicised. The public is free to use the department's library facility. School children and university students can use the conference room to do their project or research on waste issues.

Samoa Visitors Bureau & National Beautification Committee

The Manager Planning and Development of Samoa Visitors Bureau (SVB) plays a key role in the organisation and running of National Beautification Committee (NBC). The NBC meets every Tuesday at the SVB.

On the whole the SVB promotes tourism development in Samoa. *However the Manager Planning and Development feels that pollution and waste management form an integral part of tourism promotion and development.*

Activities

The NBC focuses on developing guidelines and standards to prevent pollution of beaches, improving waste collection service, organising clean-up campaigns, spearheading the *Samoa Campaign* (an initiative in conjunction with Australia to keep Samoa clean), and fund raising to improve drainage in urban Apia.

Other specific activities include:

- ? Beautification Inspection of villages
- ? Conducting awareness seminars in villages
- ? Dog eradication campaign
- ? Setting up task force to deal with complaints pertaining to waste.
- ? Awareness building through television, radio and print media.
- ? Organising clean-up campaigns
- ? Organising a week long *Teuila festival* where cleanliness and beautification are emphasised.

Membership

The NBC's membership comprises of:

- ? Samoa Visitors Bureau, Department of Lands, Surveys, and Environment, Health Department, Public Works Department, Police Department, Fire Department, Agriculture Department, Private Sector Business, Hotel Association, Labour Department, Education Department, Ministry of Internal Affairs, Pulenuus (village mayors)

Main Issues

According to the Manager of Planning and Development of SVB the main waste issues in Apia are:

1. There are not enough bins in the town area. Villagers from the surrounding areas come in the night or early in the morning and unload their household rubbish into private and public bins.
2. There is no separation or sorting of rubbish in Apia. Many people from Apia have been to New Zealand and are aware of waste separation. It should be introduced in Apia.
3. Waste Collection service is irregular and not up to standard. A good and efficient waste service could make a big difference.

The NBC with SVB as lead agency is a desirable set-up that can be emulated elsewhere.

University of the South Pacific

Alafua Campus

The Alafua campus of USP has no teaching programme or project on waste management. Composting and utilising biodegradable wastes are taught as subjects in agronomy and soil science but there is no research or outreach programme on waste utilisation.

Siosiomaga Society

Siosiomaga Society is a non- governmental organisation. Its main focus is on biodiversity and Integrated Bio-Systems (IBS) where biodegradable waste is considered as a component of the IBS cycle. However the Society is also involved in waste management activities, especially in clean-up campaigns and the location of dump site.

The President of the Siosiomaga Society, Mr Clark Peteru, summarised the waste problems and issues in Apia as follows:

- ? Waste collection service is irregular and inadequate in coverage.
- ? Backyard and waterways are used as dumping ground.
- ? Raw sewer disposal at the dumpsite and flooding of septic tanks during heavy rains is a serious problem.
- ? Littering in public places
- ? Not enough awareness on handling batteries and waste oil.

Women in Business Foundation

Women in Business in a non-governmental organisation which encourages and trains women in business ventures. It has a close working relationship with Eco-women in Fiji.

Presently the Foundation is placing a great deal of emphasis on organic farming. The produce from certified organic farms have a niche market in overseas countries. Products like cold press coconut oil and soaps fetch high prices in Australian markets. Furthermore, some of the products from organic farms are of high value and low volume which make handling and transportation easier.

It appears that the scope for exporting organic products is considerable. The products that have potential include coconut oil, breadfruit, taro, pineapple, and *kura* for medicinal purposes.

Where does the work of the Foundation link up with waste management? It is in the area of organic farming. Organic farming requires organic manure, which can be made by composting bio-degradables.

In the villages where organic farming is promoted, the Foundation is working with women and youth groups. The church is also involved through the youth groups.

Presently the Foundation is working with Food and Agriculture Organization (FAO) on a composting proposal involving youths from several villages.

Pepsi: Tropical Island Bottling Co. Ltd.

Two private sector companies, namely, Pepsi, operating as Tropical Island Bottling Co. Ltd. and Vailima Brewery were chosen for visit. However, the visit to Vailima could not be arranged as the management of Vailima were pre-occupied.

These two companies present an interesting perspective on waste management. Both are involved in the production and marketing of beverages. Vailima uses glass bottles and Pepsi uses plastic bottles. *Vailima has a successful return bottle incentive scheme involving retailers and consumers. Pepsi has no return scheme incentive and poses a waste disposal problem.*

Pepsi markets a range of soft drinks including grapes, orange, root beer, ginger ale, tonic water, and pepsicola. At the time of discussion, the Company had no return bottle scheme. As a result Pepsi plastic bottles can be seen littering in urban and peri-urban areas of Apia. There are two schemes being considered. One, the Company has already bought a shredding machine at the cost of NZ \$ 5000.00. Used Pepsi bottles will be collected, shredded, compressed and then disposed of at the dumpsite.

Two, the Company is willing to pay 2 cents per bottle returned to the factory site. Whether this will be adequate incentive for consumers to return bottles is not known. No study has been done to ascertain consumer behaviour to the 2-cent incentive.

Return Bottle Scheme

The Vailima return bottle scheme has a higher rate of reimbursement. A consumer gets 10 cents for one small bottle returned and 20 cents for a big bottle. The retailer gets 20 cents for one small bottle and 30 cents for a big bottle. In addition, delivery trucks that maintain a regular supply of Vailima beer to retailers also collect the empty bottles. The consumers return the empty bottles to retail outlets, which are within walking distance. This return bottle scheme seems to be working quite well.

Vailima is using glass bottles, which can easily be cleaned and reused. This process of reuse is economically viable. Pepsi is using plastic bottles which cannot be reused for refilling. The used bottles, however, can be recycled and put to some other use. However no recycle facilities are available locally and no arrangement is in place to re-export the bottles to recycling factories overseas.

When a return bottle incentive scheme was suggested to the General Manager of Pepsi, his typical reaction was: "Any price increase is not a good news to the consumer."

On solid waste issues the general manager commented as follows:

- ? The dumpsite is located at a higher elevation. Contaminants and leachate can possibly pollute soil and ground water.
- ? Hazardous waste and sewage are dumped in a hole at the dumpsite.
- ? The dump yard is not fenced. People, scavengers, and animals move in and out without any hindrance.
- ? Enforcement is poor.
- ? *Awareness and education efforts are too diverse within the community. There is a need to focus on specific issues and areas.*
- ? The Church has been used to mount AIDS awareness and education. Similarly waste issues could become part of church sermons.

Ministry of Youth, Sports and Cultural Affairs

The Ministry of Youth, Sports and Cultural Affairs (MYSC) does not deal with waste or environment issues but it has access to a very important human resource, namely, youth. The youth in urban areas and villages are organised into church groups. Each denomination of the Christian church has a youth director who looks after the spiritual,

mental and physical development of youth. The MYSC works directly with the youth directors.

Youth Development Committee comes under the umbrella of the MYSC. The youth directors from various church denominations including boy scouts, girl guides, YMCA, and YWCA are represented on Youth Development Committee.

The MYSC has the following relevant resources:

- ? Monthly newsletter, which is circulated to government departments, youth groups, NGOs, and CBOs.
- ? Radio programme that is aired fortnightly
- ? Steps undertaken to mount T V programmes
- ? Two staff who work on youth development programmes

On solid waste issues, the secretary made the following comments:

- ? Plastic waste is a serious problem in Samoa. It should be banned.
- ? Traditionally waste and sanitation were handled by women and they still play an important role in waste management.
- ? Culture and tradition is still intact and strong in Samoa. CBOs and traditional social structures can be used effectively to deal with waste issues.

National University of Samoa

1. Name & Address of Institution

National University of Samoa
P O Box 5768
Apia

2. Particulars of Contact Person

Dr Eletise

3. Is Environment an area of interest and concern? Yes

4. Do you teach or address Solid Waste Management? No

5. Do you promote any technology relating to Solid Waste? No

6. Any short term training/workshop in SWM? No

7. Details of the course you teach:

? Whether degree/dip/cert.? Certificate and part of Degree course

? Title of the course? Environmental Studies

? Duration of the course? 4 semesters (2years)

? Staffing? One lecturer full time and guest lecturers

? Entry point requirement? Pass level one.

? No of students? Expecting about 10

? What is taught in the unit on SWM?

Since Dr Eletise was not available Mr Pat Buckley shared the above information with the consultants. He was not aware of the details of the course except to say that the courses will lead to Certificate in Environment Science and will form part of the units students can take of a BSc degree.

Any other issue?

1. From beach toilet to septic tanks is a great improvement in Samoa.
2. Presence of SPREP in Apia has made a great difference to waste awareness and management.
3. Samoa is responding to world trends in development and waste management. There are no serious problems except automobile fumes.

Bluebird Transport Ltd

Bluebird Transport Ltd is one of the companies contracted to collect and transport waste in Apia.

Person Contacted:

Henry Westerlund

Managing Director- Blue Bird Transport Ltd., P O Box 173, Apia

The Company employs six people to handle waste; two drivers and four assistants. The Company operates in accordance with the guidelines set by the DLSE. The Company is on a two-year contract of which only one year is remaining.

On waste issues and complaints against the Company, the Managing Director had this to say:

- ? There is a need to train people to be aware of proper waste disposal. People just litter in towns and throw rubbish in drains as if it is a normal thing to do.
- ? People dump their rubbish into sea and waterways that dry up during summer months. When rains come, the flowing rubbish blocks the drains and cause flooding.
- ? *Waste management requires concerted effort of the whole community, not just the contractors.*
- ? The law enforcement aspect is weak. Offenders are not punished or penalised.
- ? Outside the collection area, all villages should have a common dumping yard.
- ? Regular awareness and education campaigns for schools and village communities.

Samoa Polytechnic

The Samoa Polytechnic is an institution for technical education and vocational training. It runs a 2-year certificate course in Welding and Plumbing, Fitting and Machining, Automotive, Electrical, Refrigeration and Horticulture. A 3-year diploma course is offered in electronics and business studies. The diploma is awarded by the National University of Samoa.

Horticulture is the only course where students are taught to utilise garden refuse and other biodegradables as manure for growing ornamentals and vegetables. They are also taught how to make compost and use plant refuse for mulching and soil cover.

On waste management the staff interviewed stated:

- ? The DLSE should put emphasis on recycling of water
- ? Waste oil from garages is becoming a problem. Seventy five percent of the oil imported finds its way into the soil.

- ? The Government of Samoa should seek assistance from mainland China to promote biogas plants
- ? The Government should explore the possibility of setting up a recycling plant. Mayfair and Bendigo recycling companies from Melbourne were cited as good examples.

Ministry of Agriculture, Forests, and Fisheries

The crops division of the Ministry of Agriculture at Nu'u is piloting compost making using biodegradables. Two methods have been successfully trialed . One is a Japanese method called *Bokashi* where the process of decomposition is complete within a month and the manure is ready for application. The other called *normal compost* and takes about three months.

The Crops Division is now training the agriculture extension officers to transfer this technology to farmers.

8. 3 Kiribati

Ministry of Environment and Social Development

The Ministry of Environment and Social Development (MESD) has the following divisions under its umbrella: Environment and Conservation Division; Social Welfare; Cultural Centre; Meteorology Division; Birth, Death, and Marriage Registration Division

Environment and Conservation Division

Contact Person

Mr. Taulehia Pulefou

Pollution Control Officer

Of these divisions, the Environment and Conservation Division (ECD) has the responsibility for waste management. It has four functional units dealing with specialised areas of the environment. These are:

- ? Pollution Control,
- ? Biodiversity and Conservation,
- ? Environment Impact Assessment, and
- ? Environment Education.

The ECD in the Ministry of Environment and Social Development (MESD) is the focal point for raising public awareness about local environmental concerns and issues. The Division has a legislative and capacity building focus, coupled with extensive consultative activities in government and the communities

The Environment and Conservation Division has a staff of 5. Of these five, three are project officers on contract and two are presently undergoing training.

The Pollution Control Unit focuses on waste awareness and education, capacity building, and waste minimisation. From time to time it organises clean-up campaigns. It tries to

work through other groups already existing in the community such as youth groups, women's groups, and non-governmental organisations. . It has developed and presented many short radio talks covering a wide range of environmental issues.

The ECD, along with FSP, Teinainano Urban Council, and Local community, participated in the Bikenibeu Waste Collection Pilot Project. Under this project, FSP provided 44-gallon drums to be used as garbage bins. TUC was to arrange for regular collection, and the local community to compost biodegradables and put rest of the rubbish into the drums provided. The ECD was required to provide monitoring report.

Priority Areas of Action for the ECD over next 3 years

The major area of action is to facilitate the compliance of all government and business organisations with the provisions of the Environment Act. In this respect, the ECD will have to improve its own capacity to manage and administer both Development Control and Pollution Control systems.

Further, the ECD will be developing regulations for Waste Management, Biosafety and the Protection of Biodiversity, for which it will likewise have to improve its capacity by appointing new posts and by putting processes and procedures in place.

The ECD will continue in the implementation of the Conservation Area Programme, the Pacific Island Climate Change Assistance Programme and the Biodiversity Strategy Action Plan, all SPREP/GEF financed

Concerning solid waste management, it will be enforcing its role under the Environment Act for ensuring the minimal pollution of the environment from landfill sites. Further, it will be seeking the clean-up of unregulated waste sites such as those on Kiritimati island where disused vehicles and machinery from the bomb testings of the 50s and 60s has accumulated.

Social Welfare Division

Min. of Environment and Social Welfare

Contact Person

Mr Amon Timan
Senior Welfare Officer

The Social Welfare Division can be seen as a resource to further the cause of waste management. The Division serves as an umbrella organization for a number of church denominations and non-denominational groups. These, among others, include youth groups of Catholic Church, Kiribati Protestant Church, Seventh Day Adventists, Church of Jesus Christ of Latter Day Saints, Church of God, Assembly of God, and Bahai Faith. The non-denominational groups include Girl Guides, Boy Scouts, and Red Cross.

Since majorities of the people in Kiribati belong to one church or the other, most of the youths can be reached through the Social Welfare Division.

Youth Advisory Committee

Each Church group has a director of youth programmes. These directors and representatives of other non-denominational groups along with the Senior Social Welfare Officer form the Youth Advisory Committee.

Presently the Social Welfare Division, is in the process of consulting and drafting National Youth Policy.

The Policy will address key issues identified during the process of wide consultation with youths and other interested groups. These issues include:

- ? Employment creation and on-job training
- ? Education and training especially of youths who drop out of education system
- ? Sports and recreation
- ? Health services focusing on adolescent health, HIV and AID education, reproductive health, substance abuse, etc.
- ? Law and Order issues that arise out of adolescent behaviour, social problems and substance abuse (alcohol, tobacco and drug).
- ? Future formal co-ordination mechanism for youths. Setting up a National Federation of Youths- similar to AMAK (National Federation of Women).
- ? Youth Development Award Scheme. Under this scheme youth will be encouraged to address the basic needs of community and find solutions to day-to-day problems.
- ? Tree Planting and Conservation. Under this project every youth is encouraged to plant at least one coconut tree, one *pandanus* tree, and raise pigs at home.

The senior social welfare officer felt that youth could be mobilised to deal with solid waste issues. Waste considerations could be integrated into Youth Development Award Scheme and Tree Planting and Conservation Scheme. Youths in the past have participated in clean-up campaigns.

Mr. Timan remarked that youth mobilisation should begin with community awareness and education programmes since waste problems are generated in the community and solutions can be found where problems are created.

AMAK- National Women's Federation

Contact person:

Ms Aren U Teannaki
Women Development Officer
Ministry of Environment and Social Development

Ms. Teannaki is actually an employee of MESD; she is seconded to AMAK to work as Women's Development Officer.

AMAK is seen as a resource because it can be used to reach most of the women's groups in Kiribati. Catholic and Protestant Women's groups, two major church groups, and fourteen other women's groups are affiliated to AMAK. Each of these two church groups

has about 5000 members. The other remaining groups are smaller and membership ranges from 100 to 1000 members.

AMAK's focus is on the social and economic development of women and their basic and legal rights. Its range of activities include developments in the areas of:

- ? Agriculture, Fisheries, Women-in-Business, Skill oriented training, Domestic violence, and Legal rights.

Environment and solid waste management is not part of their brief. They see this area as the responsibility of MESD. *However, the Women Development Officer felt that if a basic training kit on solid waste management is produced, it could form part of their regular training programmes with women.*

Curriculum Development and Resource Unit Ministry of Education

Contact Persons:

Ms Rubennang Taukoriri

Curriculum Development Officer, Curriculum Development and Resource Unit, P O Box 263, Ministry of Education

Tamareiti Kairo

Curriculum writer, Curriculum Development and Resource Unit

There are two ways in which waste issues can be integrated in the education system; one, through curricular activities and, two, through co-curricular activities.

Solid waste issues are covered in the primary curriculum but it is integrated with other subjects such as health science.

The contents have been developed since 1996 and it has been incorporated in the syllabus but is not implemented in classroom teaching yet.

Three constraints to the implementation of teaching of solid waste in schools were mentioned.

1. Lack of resource material on solid waste for curriculum writers and teachers.
2. No training programme for teachers on the subject.
3. Lack of teaching/learning aids on waste management.

Obviously, this is an area where funding agencies may consider putting their resources.

Environment Science Syllabus: Classes one to six

Class	Term	Week	Content
2	2	10	? Dangers of rubbish
	Health		? Rubbish Disposal - burning
			? Rubbish disposal - burying
3	Geography	6	? Waste types
			? Effect on water

4			? Effect on land
		7	? Waste reuse
			? Recycle
			? Bury
	1	4	? What are solid/toxic waste
	Environment		? Cause and effect
			? Prevention
		5	? What is waste recycle
			? The use of waste
			? The good/bad of waste
6	1	10	Fish spoilage
	Fisheries &		? Waste
	Marine Resources		? Rubbish/Chemical
			? Factory waste
	2	9	Rubbish
	Health		? Air Pollution
			? Sea Pollution
		? Soil/water Pollution	

Betio Town Council

Contact Person

Buretan Kaureata

Clerk to Betio Town Council, Betio, Tarawa.

The Betio Town Council (BTC) comprises of nine elected councillors. Of the nine councillors one is elected as the Chief Councillor. Buretan Kaureata is an employee of the Government of Kiribati. She has been seconded to the BTC to manage the day-to-day affairs of the Council. The BTC is responsible for waste collection and disposal in Betio. It also issues business licenses and building permits. It collects revenue from four main sources. These are:

- ? Dwelling houses
 - Permanent Houses (Government) = \$53.00 per annum
 - Permanent Houses (Private) = \$29.00 per annum
 - Local Houses = \$17.00 per annum
- ? Govt. and other buildings
- ? Co-operatives, Private businesses
- ? Aircraft and Overseas Ships

In terms of waste handling facilities, BTC has 3 tractors with trailers and one dump truck recently purchased from Australia. With four new vehicles in place, it hopes to do better job of waste collection.

On a normal shift from 8 a.m. to 4 p.m., 15 employees (one supervisor and 14 workers) are engaged in waste collection and disposal. Of the 14 workers, 12 work with the three tractors, one with dump truck, and two work at the dump sites.

There are 5 rate collectors who go around and collect town rates from households and businesses in Betio.

Waste management problems in Betio are compounded by a number of factors. Recently there has been an increase in the number of squatters. These squatters and some others use beach and bush for defecating. Locally it is referred to as "*beach pecka*". Once the beach or vacant lot is soiled, people refuse to co-operate in clean-up campaigns.

Other compounding factors include non-compliance with town regulations, defaulting on payment of town rates, and throwing rubbish on vacant lots, into the sea, and lagoons.

Despite these difficulties, BTC has been trying to clean up the place. According to Buretan Kaureata, the place is much cleaner than some time ago.

Although comparatively speaking Betio looks cleaner than in the past there is still much to be done to improve the solid waste management situation.

Teinainano Urban Council (TUC)

Contact Person:

Tikaa Aukitino
Act. Clerk TUC
Bairiki, Tarawa

There are two town councils on South Tarawa, the BTC and TUC. The jurisdiction of BTC is the islet of Betio with a surface area of 1.75 sq km. The TUC on the other hand manages waste from Bairiki to Buota.

The person holding the post of Clerk (Ms Taate Botara) was on leave. Tikaa Aukitino has been acting as a Clerk for the last two months. No useful information or dialogue could take place, as he was not familiar with the operations and issues relating to waste management.

However earlier studies on town councils have shown that any improvements in waste management on South Tarawa will require a sound management information system and capacity building within the Councils.

Mary's Enterprises

Contact Person

Inatio Teanako

Partner- Mary's Enterprises, Bairiki

Mary's Enterprises is one of the two successful private sector companies, that are involved in recycling aluminium cans.

On South Tarawa all brands of beers and soft drinks are sold in aluminium cans. The Government has discouraged the importation of beer in glass bottles by increasing the import duty. As a result, aluminium cans have replaced glass bottles (which were being used as weapons).

Recycling Aluminium Cans

The recycling of aluminium cans has reduced the problem of littering with cans. Empty aluminium cans are shipped to Sims Metal in Brisbane or to any buyer who offers the best price. International Recyclers based in Australia act as a middleman in the aluminium can transactions.

The Ministry of Environment provides the wire-mesh baskets, which are used to collect empty cans. The baskets are placed at strategic points: outside shops, supermarkets, eating places, schools, and around public offices.

Mary's Enterprises have 5 baskets in Betio, 6 in Bairiki and 3 in Bikenibeu. Once a week or whenever the baskets are full, the cans are emptied into a truck and brought to the crush yard. At the yard cans are compressed or crushed into small pellets by hydraulic press. The pellets are then stacked into containers and shipped overseas.

Mary's Enterprise pays 20cents per kilogram of cans collected. One hundred and twenty five cans when crushed weigh about 3 kilos. A container of crushed cans is about 10 tons. A ton of crushed can fetches somewhere between \$1000 to \$1300 f.o.b. Freight, handling, and port charges come to about \$800 per container.

Considering the export rate of one container every six months and expenses involved (cost of cans, truck, labour, repayment for crusher, etc), aluminium can recycling is a profitable business. However, Mary's Enterprises mostly uses family labour and spare time to run the operations.

Moel Trading Company Ltd.

Contact Person

Johnny Kum Lee

CEO, Moel Trading Co. Ltd, Betio, Tarawa

Moel Trading Company has several lines of business dealing with cans, footwear, video library, computers, and landscaping. It successfully exports aluminium cans to Australia.

Tarawa Cancare is the name under which aluminium cans and non-ferrous metals are exported. The non-ferrous metals include brass, copper and lead. The sources of these metals are described below.

Aluminium: beer and soft drink cans. (Some soft drinks imported from Asian countries are not made of aluminium and they have to be discarded).

Brass: bullets from World War II found on beaches when the tide is out, ship propellers, radiators, and car parts.

Copper: the main source is Phoenix and Christmas Islands. At the time of World War II, the Americans laid copper wires in lead casing extensively on Christmas Island for the purpose of communication. Other secondary sources are radiators and coils from wrecked cars and automobiles.

Lead: from Christmas Island, wrecked ships, and car batteries. However lead has an alternative use - as weight for fishing nets.

Tarawa Cancare exports about 2 to 3 containers of crushed cans per year. The CEO estimates a profit of about \$10,000 to \$11,000 per container. The major capital cost is the cost of a crusher- about \$40,000.

On waste issues facing South Tarawa, the CEO stated:

1. There is need to recycle all forms of plastics and papers. However economy of scale does not make export venture viable. A regional facility to recycle plastics and papers should be explored.
2. Rubbish is scattered in many places including beaches, wharf, open places and vacant lots.
3. BTC should improve its waste collection services. Open trailers with low sides spill rubbish along the way.
4. People throw rubbish and empty shells everywhere. Mosquitoes and flies breed in decomposing garbage. Broken shells damage tyres and inflict wounds on pedestrians.

Foundation of the Peoples of the South Pacific (FSP)

Contact Person

Ms Danfung Binoka

Environment Education Project Officer, F S P Kiribati

P O Box 43 Tel: 28101 Fax: 28082 email: fsp.environment@tskl.net.ki

FSP is one of the non-government organisations which has a successful community based programme. They are active in the areas of food and nutrition, community education and training, market and home gardening, fishery, composting toilets, environmental protection and education, and production of education materials for formal and non-formal teaching.

KEEP

The Kiribati Environmental Education Programme (KEEP) is implemented by FSP. The KEEP project focuses on Solid Waste Management and Environmental Awareness and Education. Sub-projects of KEEP include composting and atoll agriculture, composting Toilets pilots, waste collection pilot and collaboration with the FSP Forestry Project on mangrove restoration and conservation.

FSP Kiribati also has the community education component of the Asian Development Bank SAPHE project. This component of the project covers community education on water and sanitation issues which include the impact of waste on the countries water supply and environmental health education.

Waste Management

Under waste management a number of activities have been initiated. These include waste awareness and education, utilisation of bio-degradables through composting, composting toilets, and the Bikenibeu Pilot Project on Solid Waste Management. The Bikenibeu Pilot Project was undertaken in association with Environment Division and TUC. The objective of the Project was to involve the community in setting up a system for waste collection.

From discussion and observation it appears that FSP has the resources for mounting awareness and education programmes in relation to waste management. It has trained staff, computer hardware and soft ware for educational activities.

As FSP is well equipped to handle waste awareness and education programmes it may be advisable not to duplicate resources, and to utilise FSP for more waste programmes.

Land Management Division

Ministry of Home Affairs and Rural Development - MHARD

Contact Person

Harry Redfern
Senior Land Planning Officer
Land Management Division

The Land Management Division has two organisational set-ups to deal with land, its use, and development. They are the Central Land Planning Board and the Urban Management Committee (UMC).

The UMC is set up by the subvention of the Cabinet. Its members are:

- ? Ministry of Environment and Social Development, Public Utility Board, TUC, BTC, National Planning Office, PWD and Land Owner Representative.

The UMC has an advisory role and deals with urban issues such as:

- ? Development control, Reclaim and create more land through landfill operation, Co-ordinate development activities where land is utilised, Co-ordinate provision of urban services, Provide policy guidelines to SAPHE project, Co-ordinate and facilitate waste management and landfill sites

The Land Management Division has good information on land use, detailed maps of South Tarawa with plots of public amenities and facilities, and cadastral maps. This type of information can be very useful to the two Councils for planning and managing waste activities.

The Division also has experience in using professional drama groups for raising public awareness and education. Professional drama groups have been identified as a good way to reach the community. MAMIRA and ITIBWEBWERI are two professional drama groups that are active in Kiribati. The Division has used Mamira to put across the theme of Zoning and Land Use to the public.

Professional drama groups are resources that can be used for waste awareness and education.

SAPHE Project
Sanitation, Public Health and Environment Project
Contact Person

Mark Kunzer
PPK House, Rhodes
NSW 9743 0333

Jun Naito
Chief Sewerage Section
Original Engineering Consultants Co. Ltd
Japan

SAPHE project is not a resource but since it is closely related to waste management on South Tarawa and aims to create waste amenities and facilities, the Project is briefly described here.

A meeting was convened to discuss some aspects of the project. It was attended by the consultant, Mark Kunzer, Jun Naito, and Taulehia Pulefou.

SAPHE is a huge project in terms of funding (12.8 million US dollars) and what it aims to achieve. It has several components including:

- ? Public water supply
- ? Sanitation and sewerage disposal
- ? Landfill and solid waste management
- ? Institutional Strengthening
- ? Review of enabling legislation and regulations
- ? Community Education

The priority objective of SAPHE is improved waste management for the maintenance of public health through protection of the fresh water lenses. Protection of the sea and lagoon food resources is also important. This will be achieved through:

- ? To achieve waste minimisation, home composting, aluminium can recycling, new recycling activities, and materials reuse are posited.
- ? Improved collection systems will be put in place to allow containerisation at source, broader collection rounds, back up for collection machinery, separated collection of waste and easier collection systems
- ? Four landfill sites are proposed, with proper management procedures. These sites will be monitored for pollution and on-site recycling facilities, such as municipal composting will be pursued. Training for disposal personnel will be provided, through the aid of FSP.
- ? An incinerator will be provided for the burning of hazardous waste, such as that arising at the two hospitals.

The relevant issues that were discussed at the meeting included the following:

1. The project focuses heavily on the delivery of material amenities and facilities. It lacks emphasis on social planning and community consultation. People need to be brought at the centre stage of developments.
2. The two Councils need to improve their information management system
3. Capacity building of Council staff is vital for the success of the SAPHE project.
4. Water, sanitation, and solid waste disposal are closely linked issues on South Tarawa because of the prevailing social, physical, and environmental conditions. *In other words solutions to each of these issues cannot be found in isolation.*
5. Improving only the existing system will not solve the problem. A large section of the population is not covered by the existing sewerage system and they will continue to pollute the environment. This has serious repercussion on the behaviour of others.
6. To change the existing attitude and practices with respect to sanitation and waste disposal, simple, practical and viable alternatives will have to be found. *Awareness, education, and legislation without practical components are of little use in changing attitudes and practices of people.*
7. The technology used and the infrastructure that will be created during the life of the project has to be environmentally friendly and technologically appropriate (easily managed by local people).

Appendix A - Terms of Reference

Terms of Reference for the Waste Awareness Baseline Survey

Project Summary

The European Union funded Pacific Regional Waste Awareness and Education Programme (WASTE) is soliciting relevant companies and organisations to design, coordinate and carry out a waste awareness baseline survey in three of the eight Pacific ACP States (i.e. Fiji, Kiribati, PNG, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu). The baseline established through this project will be used as a reference point for the future against which changes could be measured 5 - 10 years down the line in relation to waste awareness & education type of initiatives.

A. Background

The relevant background on the eight countries is contained in a document entitled “Solid Waste Issues in Pacific Island Countries”.

B. Objectives

The core objectives of the survey program are to:

1. measure awareness of solid waste issues;
2. identify the key solid waste issues in the community;
3. assess the level of understanding of the solid waste issues, including both causal factors and solutions to problems;
4. ascertain the source(s) of understanding; and
5. gauge the level of resourcing available.

C. Methodology

The consultant should provide details on the following issues:

- (1) Approach;
- (2) Sample size;
- (3) Survey technique.

In relation to (3) above, the consultant has to specify the minimum statistical numbers to be surveyed in relation to the urban populations in each of the eight programme countries. The urban populations are shown in Table 1 of the attached document entitled “Solid Waste Issues in Pacific Island Countries”.

The fieldwork will be undertaken in three urban centres: Suva, South Tarawa and Apia. The rationale being that South Tarawa is within Micronesia and on an atoll, Apia is within Polynesia (and the survey may benefit from SPREP's close attention), and Suva

because under EDF VIII the EU intend funding a "public awareness" programme in advance of moving the Suva landfill from Lami to Naboro.

D. Outputs

The output will be a report that will analyse and report the results of the survey.

E. Resource People

The consultancy company should provide personnel with relevant expertise to carry out the field work, training of local interviewers, analysis and reporting. All nominated experts must be nationals of EC or ACP countries.

F. Tentative Assignment Dates

Survey: April-May 2000

Reporting: May-June 2000

G. Reporting

The consultant will deliver:

- ⚡ a draft report, one month after the completion of the field/survey work;
- ⚡ a final report, to be delivered at the latest one month after reception of the comments related to the draft report.

Two copies of the final report, including the synthesis and the summary where appropriate, will be delivered to the Project Coordinator, who will dispatch them to relevant organisations and individuals. The consultant will also deliver an unbound copy of the final report (camera ready) as well as a floppy 3 1/2" (in Word 6) containing the text of the final report.

H. Budget

The total funding available for this project is 75,000 Samoan Tala. The break down of the budget is to be provided by the consultant.

Appendix B - Study Methodology

Methodology

The methodology adopted for the survey was in conformity with what was proposed for the three cities except for minor adaptations to suit the local conditions. However, it must be noted that those changes improved the quality of the survey.

The Approach

The approach of the survey is based on the immediate and long-term objectives.

The immediate objectives, prescribed in the TOR, are summarised as follows:

To gauge the level of awareness of solid waste issues; identify key issues; assess the level of understanding, causal factors, and solutions to solid waste issues; ascertain the sources of understanding; and level of resources available.

The long-term objective of the survey is to arrive at estimators that can be used to monitor or evaluate the waste awareness and education initiatives in 5 - 10 years time. The immediate and long-term objectives were kept in mind while designing the survey.

Sample Size

Before one can talk of size, one has to clearly define the target population under study. The term 'urban population' does not correctly delimit the population of our interest. Urban population includes infants, toddlers and young children. Obviously they cannot be considered as sample units. For the purpose of this study our *target population is a subset of urban population consisting of persons aged fifteen years or more.*

Based on the elaborate discussion documented in the proposal, the proposed and actual sample sizes for the three surveys are given in the table below.

City	Urban Popn	Target Popn.	Sample Size propose	% of Target Popn	No. of H/holds	Actual Sample Size	No. H/holds
Suva	77 366	54 433	816	1.5	408	820	820
Apia	33 873	23 711	356	1.5	178	355	355
Tarawa	28 712	20 098	301	1.5	150	313	313

Note: Original intention was to interview two persons per household but due to practical difficulties of separating people, only one person per household was interviewed. To get the proposed sample size, the numbers of households were doubled. This of course is a change for the better.

Sampling Technique

Definition

Sampling technique refers to the way in which sample units or elements of the population are selected to make up the sample size. Sample take, sampling method and sampling design are other ways of saying the same thing.

Population Characteristics and Sampling Technique

The distinguishing feature of the target population is that it is urban. In an urban population, there is a considerable degree of heterogeneity, which means that if we take any parameter, we can expect a large degree of variation.

Therefore a sampling technique should be able to capture the variation in the population and represent different groups that comprise the population. To capture and mirror the variation Stratified Random Sampling was adopted.

Stratified Random Sampling

A stratified random sample is one that is obtained by separating the population elements into non-overlapping groups, called strata, and then selecting a simple random sample from each stratum. Since complete and up to date sampling lists were not available, stratified systematic sampling procedure was adopted using the Skip formula given below.

'k' = N/n where

N = the number of households in any one stratum,

'n' = the sample size proportionately allocated to that stratum, and

k = the sampling interval.

The sample size is then made up by applying the series formula:

'r' th Unit = $r, r + k, r + 2k, r + 3k, \dots, r + (n-1)k$. where
 r = any random number.

Sampling Unit

In this survey a household is treated as a sampling unit though people living in a household were interviewed. The decision to treat households as sampling units is based on practical considerations and on the assumption that in most countries a sampling frame listing households, rather than individuals, would be more readily available.

Survey Tools and Pre-testing

Instruments of Survey

A structured questionnaire was used as the main instrument of survey. All necessary precautions were taken in designing the questionnaire. The draft questionnaire was circulated widely for comments. Useful suggestions and comments came from many individuals and organizations including European Union and SPREP. Finally a number of factors were taken into consideration in designing the final version. Among others the factors included our own experience, results of pre-testing, resources and time available, social economic conditions of the respondents in the three cities, and analyzability of results.

The questionnaire was trialed and pre-tested before the final version was released for field work (appended for information).

In Suva and Apia English version of the questionnaire was used to interview respondents. In South Tarawa it had to be translated into I-Kiribati. Survey coordinator Mr. Taulehia Pulefou and his departmental colleagues did the translation. Only the questions were translated, the options (answers) were retained in English to facilitate data input in Suva.

Field Work and Limitations

Interviewers/ Survey Assistants

Selection and training of survey assistants is important to make sure that non-sampling errors don't arise during the survey.

In Suva enumerators from the Bureau of Statistics and two students from the USP were employed to carry out the field work. In Apia, the survey assistants were staff of the Department of Land, Survey, and Environment. In South Tarawa, the survey assistants were extension students of the USP, selected by the survey co-ordinator.

Training Survey Assistants

There were two main aspects to training;

- ? the training in survey techniques
- ? providing information that would enlighten the assistants on waste management.

It was important that the assistants understood and appreciated the aims of the survey.

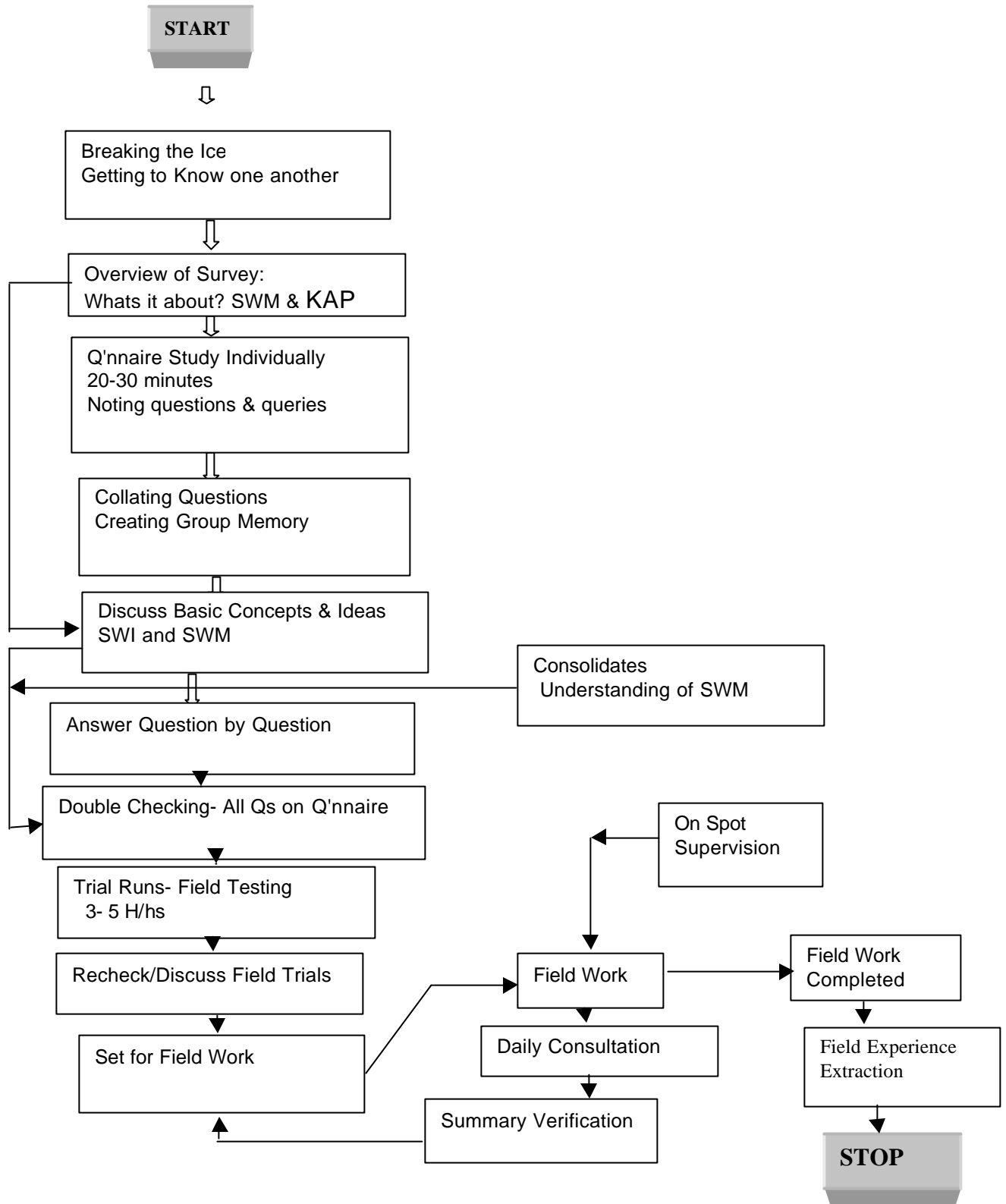
To facilitate understanding and appreciation of key waste issues, a dossier of information was prepared and distributed to the survey assistants.

The survey assistants were required to undergo four hours of training. After the training each assistant was given four questionnaires to complete in their community. The questionnaires were reviewed and discarded. When the actual field work started, mid-day checks were made to ensure that the assistants were progressing appropriately. Every day before the start of field work, the previous day's work was reviewed and assistants were briefed for the day ahead.

Training Procedure

The training procedure and the checks and balances applied to maintain the quality of the survey are given in the flow chart below.

Training Survey Assistants and Survey Procedure



Abbreviations

SWM	Solid Waste Management
SWI	Solid Waste Issues
KAP	Knowledge, Attitude, and Practices
Q'nnaire	Questionnaire
H/h	Household

Limitations

The political crisis in Fiji imposed a limitation on the start of the fieldwork. However after some delays, the survey was undertaken in Fiji first, as neither Kiribati nor Samoa was ready.

In Kiribati, language is an important issue when it comes to social surveys. English words such as “environment” cannot be translated into local language easily. Different groups of people use different equivalents. Even English words are used with connotations quite different from those one is used to. For example, one would call Betio a town, but local people call it as Betio village. The problem was overcome by translating the questionnaire into the local dialect.

3.3.6 Data Analysis and Integrity Checks

Everyday data collected by the field assistants was cross-checked by the supervisors. Any anomaly, discrepancy or data gaps was rectified the next day.

Data from completed questionnaires was transferred to electronic database. SPSS (Statistical Package for Social Science, Version 8.0) software was used to process and analyze data. Input data was cleaned with the help of integrity checks available with the software. Frequency tables were manually checked and doubts, if any, were verified by rechecking the numbered questionnaires. The output data from SPSS was rolled into Microsoft Excel 97 for drawing graphs and illustrations. From Excel the information was imported into Microsoft Word 97 environment.

Appendix C - Questionnaire

SOLID WASTE AWARENESS/MANAGEMENT SURVEY June 2000

1. City Locality Street..... Date.....l'viewer.....

PERSONAL DATA

2. No. people in H/h Sex: Male Female (Name).....
3. Age (Yrs.): 15-20 21-30 31-40 41-50 51-60 >60
4. Employment Status: Student Homemaker Casual/unemployed
 Wage earner Salaried/Self employed Retiree
5. Education: Pri. Sec./Cert. Ter./Dip. No Formal Educ.
6. Locality/Res. Type High/Posh Middle Low
cost/PRB/Squatter

GENERAL LEVEL OF AWARENESS

7. Which agency collects solid waste or rubbish in your area? right answer wrong / Don't know
8. How many times in a week rubbish is collected in your area? right answer wrong / Don't know
9. To which waste dump your household waste is carted to? right wrong answer
10. Who pays for the waste collection service?
 Govt. Council/municipal We/rate payers Others-specify

KNOWLEDGE AND UNDERSTANDING OF S.W. I.

11. Do you think waste can be thrown into river, sea or coastal areas? Yes No
12. Do you know what is hazardous (dangerous) waste? Yes No
13. If 'yes' can you give examples of hazardous waste? medical waste
 chemicals sharp objects pesticides/paints/batteries Other (specify)
14. Should hazardous waste be disposed at the dump site? Yes No Don't know
15. Do you think waste can be put to some useful purpose? Yes No /Don't know
16. If 'yes' what are the ways we can use waste to our benefit?
 Compost Energy Prod. Reuse Recycle Landfill/Reclaim
 Animal Feed Others (specify)
17. Does uncontrolled waste disposal and poor sanitation affect our health? Yes No

18. Can you name one **disease** caused by uncontrolled waste disposal?

- Don't know Dengue/Malaria Typhoid/Cholera Diarrh. Flu

19. How does uncontrolled waste disposal affect our **economy**?

- Don't know property value loss tourist decline productivity fall Other-specify

20. In which ways uncontrolled waste and littering affect our **environment**?

- Don't know water pollution air pollution land/soil pollution other-specify

SOURCES OF UNDERSTANDING- SWI

21. Have you come across any information or messages about littering, waste disposal, recycling, waste reduction, ill-effects of waste, etc. Yes No

22. If 'yes' what were the sources of your information?

- Radio T V local newspapers poster/handouts schools
 clean-up campaigns community meetings health/municipal workers other (specify)

23. During last 12 months have you or any members of your family attended any workshop, seminar or training on waste? Yes No

24. If 'yes' which agency organised the training and what was the subject dealt with?

Agency	Subject

KEY WASTE ISSUES & CONCERN

25. Is uncontrolled waste disposal becoming a problem in your city or town? Yes No

26. If 'yes' how would you rate the seriousness of the problem on a scale from 1 to 5? (SHOW OPTION-tick one)

1	2	3	4	5
No problem	slight problem	serious problem	very serious	very v. serious

27. What types of wastes are of great concern to you and people of your city or town? (SHOW TYPES then tick)

- Papers Plastics Glasses Cans/tins Clothes/leather food craps
 Garden waste Other (specify)

28. What, according to you, are **three most serious problems** regarding waste that require immediate action?

- a.
b.
c.

CAUSES & CONTRIBUTORY FACTORS (next page)

29. What causes these problems you have just mentioned?

- Lack awareness/educ.(prod)
- Human factors (prod)
- lack training (prod)
- Lack legislation/standards (p)
- Lack enforcement (p)
- Lack resources (specify)
- Others (specify)

SOLUTIONS/ WASTE MINIMIZATION

30. What do you think could be done about waste or keeping the city clean?

- a.
- b.
- c.

31. Do you think the **facilities** and **services** provided by Govt./Council are adequate? Yes
 No

32. If 'No' what **facilities** and **services** you think can improve waste handling in your city?

- Reg.collection/transport Sanitary dumping Strict standards Enforcement
- Awareness/ Education Facility(specify) Other (specify)

33. How does your family dispose off household waste?

- Collection serv. Compost Burn/Bury/Dump b'yard Dump beach/sea/drain
- Animal feed Ret. to Shop Reuse As fill material Sell/export

34. Does your family make compost at home? Yes No

35. If 'no' would you agree doing so if compost making is demonstrated & promoted? Yes No

36. Would you favour and support centralised composting by an agency? yes No

POLICY & PLANNING

37. Do you agree or disagree with the following:

Issues	Agree	Disagree
38. Creation of a separate body/authority to manage waste efficiently		
39. If agreed, how much are you willing to pay <u>per month</u> for improved services?	\$?	
40. People should be fined if they drop litter		
41. Government/municipal should enforce strict laws and standards		
42. There is need for more involvement of private sector, NGOs, & CBOs in waste mgmt.		
43. Schools should teach children about ill-effects of uncontrolled waste		
44. To control waste government should introduce tax on all polluting materials		
45. Government should give subsidy/easy loan to those involved in waste reduction		

46. Last question- any important comment or suggestion you would like to make that we did not cover?

Appendix D - Bibliography

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