TARAWA GREEN BAG SCHEME – PROGRESS TO DATE

May 2005

Report prepared by

International Waters Programme Kiribati and PCU

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Executive Summary

[to complete]

Acronyms

BTIC ?

ECD ?

FSPK Foundation of the Peoples of the South Pacific - Kiribati

IWP International Waters Project

TUC ?

1 Introduction

In 2004, FSPK approached the IWP to solicit fund the trial of a scheme to improve household waste collection on Tarawa. The scheme – entitled the Green Bag scheme – involved the free distribution of green garbage bags for collection by the Tarawa council. This report outlines the operation and progress of the scheme today.

1.1 Background to the IWP

The International Waters Project (IWP) is funded by the Global Environment Facility and executed by the South Pacific Regional Environment Programme (SPREP) in partnership with 14 Pacific Island countries. The objective of the project is to help participating countries improve the management of their environment and coastal resources. The IWP will attempt to do this by supporting 'pilot' projects in each participating country. These pilot projects will assist countries (communities and governments) to identify and address the "root causes" of environmental degradation and to design and implement possible solutions at the local and national level. Community based activities may include low tech solutions to addressing environmental degradation while national level activities may involve activities that have a broader or more strategic focus.

The IWP will target pilot projects in Kiribati to address waste management with a view to improving freshwater and marine resources. The IWP has selected the community of Bikenibeu West on Tarawa to host the community-based pilot activities. The focus of activities is 'waste reduction' and in particular, household waste. The pilot site encompasses 205 households with a population of approximately 1618.

1.2 Background to the 'Green Bag' Scheme

Green bags?

Introductory information on the proposed use of green bags was provided in a document by FSPK and can be located in annex 1. The term 'green bag' is given to waste bags that are environmentally friendly. In this case, the green colored waste bags were considered to be environmentally friendly because they biologically degrade over time, leaving no permanent waste in the environment, compared to normal plastic waste bags. The green bags are expected to completely decompose in a landfill environment over five to 10 years.

The household waste problem on Tarawa

Household waste collection is a problem on Tarawa. The Tarawa local council provide a household waste collection service to collect waste from all villages provided they pay their service fee which varies between local households to permanent type of institution. See table below:

TUC service charge info collected 9 Feb 05	**AUD per annum**
Local dwelling house local	10 pa
Local dwelling house – private	10 pa
Local dwelling house – business	40 pa
Permanent dwelling house business	50 pa
Private store	50 pa
Religious group store	50 pa
Company/cooperative store	350 pa
Hotel, motel, restaurant/club bar	350 pa
Government office, other office building dispensaries	450 pa
Warehouse, workshops, schools, hospitals/prison	650 pa
Air craft	150 pa

For government institutions and private companies, TUC claim from them through the Ministry of Internal & Social Affairs service charge in accordance with the number of buildings or type of buildings they have. This system does not extend to private houses and therefore it is up to private houses to approach TUC and pay for the service charge. Public servants are deducted a charge from their salaries to cover waste removal services with the result public service housing areas receive the most regular service – yet not as efficient and reliable as might be expected for a paid service. Waste for collection is usually left by households or institutions mostly in piles some in bins on the roadside. Many institutions use this service however there are also some which burn their rubbish or dump them at the beach or shoreline.

Waste collection by the council is usually conducted by council employees using a shovel. Waste is transported away from the property in a trailer dragged by a tractor. The system is considered to be messy and time consuming.

The waste collection service is not Tarawa wide. Only those who pay their service fee have a chance that their piled waste will be collected at some time and these are mainly from areas where there are government residences, government bodies and businesses. The rest of the area on Tarawa receive no waste removal services at all. In suburbs where waste removal services are weak or do not exist, a stalemate frequently exists to prevent to establishment of better services: householders are reluctant to pay for poor services whereas the local council cannot provide better services without funding.

In the absence of reliable waste removal services, households and institutions either burn their rubbish or dump them with other already existing rubbish piles or dump them at the shoreline or beach.

Waste that is collected by the TUC or BTIC is taken to a landfill site at Nanikai or Betio and sometimes dump them illegally at Ananau Causeway, Temaiku Bight or other dump areas that have already been closed by the Environment & Conservation Division. Do they freely admit to this? Unfortunately, as space is a limited resource on Tarawa and building a landfill is such an expensive venture, it is therefore vital that useable waste is diverted from the landfill to avoid filling up rapidly. There is a need to find a mechanism that supports the removal of waste from households while limiting pressure on the landfill.

The green bag system

The green bag system started as an initiative by the FSPK. The system was principally envisaged as a means to provide a vehicle for gradually introducing a reliable user pays waste collection service. The system has a short term (trial) phase and long term phase.

FSPK commenced experimenting with the green bag since 2002 by providing free green bags to householders. If householders used the green bags or other bags to contain household waste and put them on the road side on a given day, the council would guarantee to collect the bags. Council collection of the bags was funded by the FSPK as part of the scheme trial? Yes?

In the long term, it was envisaged that free provisional of bags would cease and bags would be sold with the cost of council collection built in to the retail price of the bag. In October 2004, FSPK invited the IWP to participate in the scheme by funding the trial of the scheme in Bikenibeu West where the IWP was targeting waste management. The proposal from the FSPK to the IWP is given at annex 2.

2 Expected benefits of the scheme

Prior to the trial, one portion of Bikenibeu West received the waste collection service. This portion represented government houses, shops and a handful of private households who paid the service fee. The rest of the area received no waste service.

The green bag scheme was envisaged by FSPK to be likely to generate a number of potential benefits. In the short term the use of green bags was predicted to reduce the level of unnecessary organic waste going to the landfill. This is because large organic waste such as tree trunks, palm leaves do not fit in Green Bags and would be left behind. Additionally, FSPK expected the use of green bags to result in a much cleaner and safer collection of waste by workers as refuse worked would not have to tred on the waste or touch it while shoveling and arranging it on the trailer.

In the long term, FSPK envisaged that the price of buying the bag would fund the council collection service and lead to better waste management.

3 Expected costs of the scheme

FSPK invited the IWP to support the funding and distribution of 20 000 green bags throughout Bikenibeu West. According to FSPK, one green bag costs around A$0.13 to import when bought in bulk. The council charges A$0.25 to collect each bag. In the short term, this implies a short term financial cost of A$0.13 per bag. In the long term, if the trial is successful, FSPK suggests that each bag could be sold for A$0.50, with the remaining A$0.12 going to the retailer as profit. This would represent an incentive to supply the green bags if demand for the bags and the waste removal scheme are successful.

Table 1 Expected costs for the IWP trial A$

Supply of bags	0.13 x 20000
Collection fee	0.25 x 20000
Total	0.38 x 20000
Cost for 20000 bags and collection	7600

4 Potential risks to the system

The main risks to the system in the short term were that;

- people may not use the bags to collect their rubbish.;
- waste collection services do not occur, or occurs poorly.

In the long term, the main risk would be the continued provision of plastic check out bags by some of the larger retailers in tome. (Some local big businesses give away plastic checkout bags for free after $20 has been spent. These bags can be used to store refuse.)

5 Performance to date

The number of bags distributed and collected to date under the IWP green bag scheme was monitored over an eight week period. At FSPK's suggestion, the number of bags collected and the timing of bag collection was monitored by a student. Correct?

2500 Green bags were distributed to households at the beginning of the period, and 28 were distributed to shops.

5.1 Volume of waste removed

In total, 1123 bags were collected over the period. Two collections were made a week (Tuesdays and Thursdays). The average number of bags collected on any given day was 62. However, bags collected varied from day to day and week to week with the highest number of bags (115) collected occurring on 16 November. This may due to the approaching closing date of the competition and the fact that people were cleaning up

their home and surroundings. The lowest number of bags (28) was collected on 2 December. The reason for this is that most of the stockpiled household rubbish had already been removed by this time. Also Thursdays where 2 December falls is normally lower than Tuesday's collection (still not sure why?).

According to IWPK, green bags usually contains up to 13 - 15 kg of waste, with 14kgs being the average maximum weight. If all bags were filled to capacity, the total volume of weight collected would be in the vicinity of 15 722 kgs of waste – or roughly 16 metric tonnes. Realistically, this volume would probably include a component of waste that would ordinarily have been collected anyway under private collection (eg., households who would otherwise have continued to pay for private collection). The actual volume of newly removed waste is not certain but would logistically be expected to be the majority of waste since all households were able to participate freely in the scheme. In any event, this volume represents waste that is no longer dumped in the sea, in gardens or on the roads, creating health risks and generally lowering environmental standards.

At this point, it would be difficult at this point to predict the demand for bags (or waste collection) from the data provided because of the variability in collection rates. However, the minimum collection level of 28 bags (which is undoubtedly an underestimate) would appear to represent a continued collection rate of at least 392 kgs, or 0.3 tonnes of waste over a three month period.

5.2 Efficiency of waste collection

How much would the scheme be expected to increase the efficiency of waste collection conducted under the TUC? Issues to consider here include the amount of time taken to remove waste as well as health and environmental impacts.

Previous waste collection by the council had been erratic for many users. From this trial, it is apparent that all the bags that were put out were actually collected. (The only exception to this was during a subsequent green bag competition in February 2005 during which pick up truck capacity was exceeded. (100 – 300 bags were then put out for pick up while the truck was only able to hold 100 bags or less. In this case, IWPK assisted by transferring the remaining bags to the ECD compound so as to avoid counting them twice on the next collection day.)

From the short trial conducted, there is a low correlation between the number of bags collected and the time taken to collect them.[1] Collection times varied widely. Experience in the trial indicates that, where there was a long period of collection of 45 minutes or more, the reason was that refuse collectors were walking to pick up the green bags at houses far from the roadside. Other times when they stopped to pick up the piled rubbish near the roadsides by shoveling it onto the truck. Interestingly, the other possible reason

[1] A standard correlation of bags collected to time taken to collect bags was conducted using Excel. Because of an anomaly in the last collection (when timing also included the collection by staff of piles of rubbish as well), the correlation was conducted only for the first 7.5 weeks. Whereas a pure correlation of time and bags collected would be expected to be represented by a value of 1.0, the correlation between number of bags collected and time taken to collect the bags was 0.12.

for slower collections was that the refuse workers feared they may lose their job with the increase efficiency of garbage collection.

Despite these issues, the council indicated that collection of waste during the trial was quicker and easier than it had been previously. This is because there was less bulky green waste to collect. Agreed? (This waste was excluded from the bags.) Additionally, the trial experience suggests that (together with a subsequent green bag competition conducted in February 2005) the use of green bags resulted in a distinctly cleaner environment around houses. Add report of competition to annex.

Final QUESTION TO ASK

- I think we may need to do a quick survey to see what people think of the scheme now. Is this practical or are people sick of surveys?! What do you think? Ok, that makes sense! Do you have specific questions for the survey? Yes. Let's discuss with Steve a short user survey, covering questions such as:

- Did you use a local waste removal service prior to the green bag scheme?
- Did you find the green bag waste collection service reliable?
- What changes, if any, do you think have occurred as a result of the green bag scheme?
- Would you recommend to others to participate in the scheme? If not, why not?
- If the scheme continued, would you choose to use it in the future? If not, why not?
- If so, would you continue to use the scheme if there was a charge?
- If so, what do you think would be reasonable charge for the service?

6 Recommendations

I would be recommending the continuation of the scheme, providing the survey is supportive. It will be interesting to see how people respond the idea of a charge which is the only way to go until it has been established sufficiently long for the council to take over.

Annex 1 EPI Biodegradable Checkout Bags

Frequently asked questions – and answers

What is a biodegradable plastic checkout bag?

A biodegradable plastic checkout bag is a plastic checkout bag that will degrade as a result of naturally occurring organisms like bacteria, fungi and algae.

Are there other types of degradable plastics?

Yes. "Photo-degradable" (degrades in natural daylight), "Oxidative-degradable" (degrades – "oxidises" – in air) and "Hydrolytic-degradable" (degrades in water). However, because light, air an water may all be absent from landfills, "Biodegradable" plastic is best used for checkout bags because most will ultimately be discarded in landfills.

What makes the checkout bag biodegradable?

Foodstuffs biodegradable checkout bags are made from "normal" polyethylene product - the same as most checkout bags - but also contain 3% by weight of a proprietary patented oxo-biodegradation technology material called TDPA (Total Degradable Plastics Additive) manufactured by a company called EPI.

How does TDPA work?

EPI's TDPA works by breaking down polyethylene bags that are normally water-resistant ("hydrophobic" or "water-repelling") into a water-absorbing form ("hydrophilic" or "water-appealing"). As a result of this chemical process, TDPA biodegradable bags can then be broken down in the same way micro-organisms would break down "normal" degradable waste - into CO_2, water and non-toxic bio mass.

How long do the bags take to degrade?

That depends on the type of landfill or waste disposal the bag ends up in.

There is a first stage process whereby the bag will become "hydrophilic" (water-absorbing) and be fragmented into smaller physical pieces. The speed at which this occurs will depend on the availability of light (UV), oxygen, elevated temperatures and physical stress experienced - all of which can contribute to a speedier chemical transformation in landfill environment. Three to five years is a "normal" time for this degradation process.

The second stage of the process breaks the bag down to further to final residues - CO_2, water and non-toxic bio-mass - which are not harmful to the landfill environment. This process can take five to ten years in an "active" landfill environment.

Can it take longer than this?

If there is no light or oxygen, and if the temperature remains cool and the environment is not physically stressed, degradation can be slower. Where no oxygen is present (as can be the case in landfills), the bags can also degrade due to presence of "warm" landfill temperatures.

Are there any other landfill additives required to support the biodegradation?

No. TDPA works without any additives. Biodegradable checkout bags will also degrade without the 160mm of top soil typically used to cover "fresh" garbage in landfills each day.

How do we know TDPA works?

EPI's TDPA degradable film products has been in use worldwide for over 9 years – by over 150 solid waste management companies in USA, Europe, Australia and New Zealand. This experience has shown compelling evidence that EPI's TDPA works.
This day-to-day practical experience is also supported by independent scientific trials conducted in Canada, China and UK.

Do the bags have a shelf-life?

We recommend that the bags be used within 18-24 months from date of manufacture. Otherwise the degradation process will start to render the bags unfit for their designed practical function as a checkout bag meeting a specific weight-load function. This shelf life property enables consumers to re-use the bags, if necessary over the 18-24 months period.

What happens if the bags end up being recycled as traditional plastics?

In New Zealand, recycled checkout bags are only a minute proportion of commercially recycled plastic waste (less than 0.01%) and therefore the presence of EPI's TDPA material in recycled plastics goods is not significant enough to affect their functional shelf-life.

We estimate that biodegradable bags would have to become as much as 25% of recycled plastics to become a problem - at which point the presence of EPI's TDPA would still be less than 1% of the recycled product.

Are checkout bags likely to reach this threshold?

Extremely unlikely. Not only because checkout bags are extremely light and therefore require huge numbers to achieve any significant proportion of the recycled plastic waste - but also because most New Zealanders use checkout bags for "secondary packaging" in the form of kitchen food waste bags. As a result, checkout bags in the main end up in landfills.

What if the bags don't end up in a landfill?

Even if the bags are discarded by less civic-minded or environmentally-caring people, their exposure to open air, sunlight, rivers and sea will mean that they will also degrade - minimising pollution physical harm to wildlife.

What other supermarkets use EPI's TDPA checkout bags?

Co-op supermarket chains in the United Kingdom, Carrefour stores in Singapore and Central/Super-Valu chains in Ireland.

Is TDPA safe?

All but one of the ingredients of TDPA are approved by the US Food & Drug Administration. The remaining ingredient is a non-toxic metal salt widely used in ceramics, glass, prosthetic and biomedical devices – which is also considered essential to humans as a mineral nutrient.

Can Biodegradable checkout bags contaminate landfills and the environment?

No. Since the only products of degradation are CO_2, water and non-toxic biomass.

How can I find out more about EPI's TDPA?

By visiting the website www.epi-global.com

Source: Provided by FSPK 03 November 2004.

Annex 2 Description of how the Green Bag system works

Problems:

- Currently, 70% - 80% of Tarawa waste collected by the councils is organic.
- This organic material should not go in the landfill.
- Wastes picked up with a shovel and a tractor and trailer is a messy and time consuming process.
- The councils do not have the capacity to cover all the areas they need to collect waste from as it takes so much time.
- Many people do not pay for waste collection as they claim they get no collection.
- Funds for collection is not a problem as the council receives about $70,000 per year for service fee and the major income for the council. Rather, the council has not the ability to operate waste collection service efficiently.

Solution

- Introduce a system of Green Bag waste collection.
- Large organic wastes (tree trunks, palm leaves) do not fit in Green Bags.
- This cuts down much of the organic waste being collected.
- Green bags are sold, and some of the cost of each bag is given to the council.
- Thus, the price of buying the bag includes the cost of council collection for that bag.
- If people put leaves in the green bag, then they are paying a price to do so.
- Collection of waste is much quicker and easier for the council.
- Collection of waste is much cleaner and safer for the workers.
- Council income is spread over very large number of users.
- Council tells people that after a certain date ONLY green bags will be picked up.
- Old oil drums can be used as Green Bag collection points to stop dog problems.
- Businesses and offices still pay their waste levy as usual, but must use garbage bags for small waste collection. Council could give out Green Bags to businesses, and offices, schools etc when they pay their waste fee.

What needs to happen

- Council agrees to pick up any Green Bags that are put by the roadside.
- Kaoki Mange can act as importer of Green Bags to start off system.
- Analysis of waste collection costs to determine Green Bag price.
- Work out how the system gets the money to the councils.
- Develop overall system design.
- Work on By-laws to push people to use Green bags.
- More public awareness on Green Bags by the Kaoki Mange.
- Kaoki Mange can finance public awareness work.

INTERNATIONAL WATERS
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Annex 3 Greenbag Competition

14 – 24 February 2005

Introduction

The ultimate aim of the competition is to cleanup Bikenibeu West.
The competition should drive people of Bikenibeu West to collect inorganic rubbish beyond their household boundary, in the streets, the beaches and the rubbish dumps. Above all, it is hoped that the message about the use of greenbag should be retained in the people's mind. That is: For Kiribati te Boboto, use the greenbags for unusable rubbish. It is hoped that the competition will give a good face lift to Bikenibeu West and that most inorganic rubbish in the streets and beaches of Bikenibeu West will be removed.

The rules of the competition is shown in the table below:

Competition Categories	Awards go to:	Minimum number of greenbags	Prizes:
1. Overall championship	The best three	200	1. grass cutter 2. wheelbarrow, shovel, spade and knife 3. sheelbarrow, beke, knife
2. Group Championship	The best group only	600	1. grasscutter
3. Within religious groups	The best three.	50	1. shovel, spade, knife 2. shovel, spade 3. shovel
4. Participating religious groups	Any group with having a minimum number of greenbags	150	1. volleyball, basketball

Summary results of the competition:

Competition Categories	Awards go to:	Number of greenbags	Prizes:
1. Overall championship	1. Atita Rerei 2. Tekori Ruka 3. Aite	372 309	1. grass cutter 2. wheelbarrow, shovel, spade and knife 3. sheelbarrow, beke, knife

2. Group Championship	1. LSA – Bikenibeu West 2. Matangare 3. Kekeiaki	1,233.5 495.5 253.0	1. grasscutter 2. no prize 3. no prize

Type of Competition: Within religious groups

Names	Religious groups	No. of greenbags	Position
Atita	LSA	372	1st
Aitee	LSA	281	2nd
Tebutii	LSA	246.5	3rd
Ietewa	Kekeiaki	178	1st
Kobutitau	Kekeiaki	56	2nd
Taaua	Marenaua	82	1st
Tekori	Matangare	309.5	1st
Nei Biina	Matangare	95	2nd
Takoi	Matangare	63	3rd
Kabunateiti	Mormon	56	1st

1. shovel, spade, knife
2. shovel, spade
3. shovel

4. Participating religious groups	Bahai	1,233.50
	Matangare	495.50
	Kekeiaki	253.00
	Marenaua	152.00

1. volleyball, basketball

According to IWPK baseline survey: waste is generated at a rate of 0.2 kg/person/day, or 324 kg/day for Bikenibeu West population or 118,100 kgs or 118 tonnes year

The approximate weight of rubbish removed during the 2 weeks campaign is 13,988 kg or 14 tonnes. The weight of greenbag full of rubbish ranges from 1 – 13 kg, averaging about 6 kg per greenbag. With a total number of 2,333 greenbags; 13,998 or about 14 tonnes of rubbish has been removed from Bikenibeu West.

In fact with the approximate waste generation rate of 324 kg/day; the 2 weeks greenbag competition has removed about 6 weeks waste production. CONGRATULATIONS BIKENIBEU WEST!!

What More Needs to be Done?

1. remove remaining rubbish
2. improve the look of Bikenibeu West (landscaping)
3. and to keep Bikenibeu West clean and neat at all times

Next Steps:

1. Check areas where waste is persistent
2. Survey inactive residents reasons being inactive
3. IWPK to improve approach & methods.