

フィジー共和国

フィジー国
廃棄物減量化・資源化促進プロジェクト
プロジェクト事業完了報告書

平成 24 年 3 月
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独立行政法人
国際協力機構 (JICA)

国際航業株式会社
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環境

JR

12-051

目次

1	はじめに	1
1.1	プロジェクト上位目標とプロジェクト目標及び成果	1
1.2	プロジェクトの対象地域.....	2
1.3	プロジェクトの対象廃棄物.....	2
1.4	プロジェクトの全体工程.....	2
2	投入	3
2.1	JICAの投入	3
2.2	フィジー側の投入	6
3	活動	10
3.1	Plan of Operation (PO).....	11
3.2	作業フローチャート	15
3.3	活動の概要.....	18
3.3.1	成果1にかかる活動	18
3.3.2	成果2にかかる活動	18
3.3.3	成果3にかかる活動	20
3.3.4	成果4にかかる活動	22
3.3.5	成果5にかかる活動	23
4	プロジェクトの運営	24
4.1	合同調整委員会(JCC)	24
4.2	PDMの修正.....	25
4.3	セミナー	30
4.3.1	廃棄物管理マスタープラン	30
4.3.2	3Rアクションプラン	34
4.3.3	3Rガイドライン、3R推進マニュアル.....	35
4.4	ワークショップ	36
4.4.1	廃棄物管理計画骨子／パイロットプロジェクト実施にかかる合意形成(2009年6月)	36
4.4.2	廃棄物管理計画(案)にかかる合意形成(2009年10月)	38
4.4.3	3Rガイドライン、3R推進マニュアル(2011年2月)	39
4.5	コミュニティ・ミーティング	43
4.6	週例会議.....	44
4.6.1	週例会議の開催と内容.....	44

4.6.2	週例会議の効果.....	45
4.7	本邦研修.....	45
	第1回本邦研修(2009年11月15日～11月28日).....	45
4.7.1	第2回本邦研修(2010年8月30日～9月13日).....	46
5	その他.....	48
5.1	ILOとの連携.....	48
5.1.1	第1回現地活動(2009年6月13日～19日).....	48
5.1.2	第2回現地活動(2009年10月7日～8日).....	49
5.1.3	第3回現地活動(2010年3月4日～5日).....	51
5.2	JOCVとの連携.....	52
6	結論と勧告.....	55
6.1	結論.....	55
6.2	勧告.....	56

添付資料 1: ラウトカ市(LCC)活動報告

添付資料 2: ナンディ町(NTC)活動報告

添付資料 3: 環境局(DOE)活動報告

添付資料 4: Minutes of Meeting 25 July, 2008

添付資料 5: Record of Discussion 25 July, 2008

添付資料 6: Minutes of Meeting 26 November, 2007

添付資料 7: JCC 議事録(1～10)

略語表

AP	Action Plan	行動計画
C/P	Counterpart Personnel	カウンターパート
CA	Capacity Assessment	能力評価
DOE	Department of Environment	環境局
EIA	Environmental Impact Assessment	環境影響評価
IC/R	Inception Report	インセプション・レポート
JCC	Joint Coordinating Committee	合同調整委員会
JICA	Japan International Cooperation Agency	独立行政法人国際協力機構
MLGUDH	Ministry of Local Government, Urban Development and Housing	
MOE	Ministry of Environment	教育省
M/M	Minutes of Meeting	議事録
MOH	Ministry of Health	保健省
MRF	Material Recovery Facility	
NGO	Non-Government Organization	
OJT	On-the-Job Training	オンザジョブ・トレーニング
POS	Public Opinion Survey	住民意識調査
P/P	Pilot Project	パイロットプロジェクト
PR	Public Relations	広報
P/R	Progress Report	プロGRESSレポート
R/D	Record of Discussions	討議議事録
SPREP	South Pacific Regional Environment Programme	
SWM	Solid Waste Management	廃棄物管理
3R	3R (Reduce, Reuse, Recycle/Return)	3R (発生抑制、再利用、リサイクル/返却)
3RPP	3R Pilot Project	3Rパイロットプロジェクト
W/S	Workshop	ワークショップ

1 はじめに

本プロジェクトは、ラウトカ市及びナンディ町における廃棄物管理計画の作成、3R 推進パイロットプロジェクト、対象地域全体での 3R 推進及び啓発活動による住民意識向上を通じて「フ」国の特性に合わせた 3R モデルを構築することにより、環境局、ラウトカ市及びナンディ町の廃棄物管理にかかるキャパシティを強化するもので、2008 年 10 月に開始された。

第 1 年次（2008 年 10 月～2009 年 3 月）は、ラウトカ市とナンディ町でベースライン調査を行い廃棄物管理の実態をごみの流れ図を作成して、現状の問題を抽出するとともに廃棄物減量化を軸においた廃棄物管理基本計画の骨子を取りまとめた。また 3R 推進による廃棄物減量化の実行性を検証するためのパイロットプロジェクトの準備作業を行った。

第 2 年次（2009 年 4 月～2010 年 3 月）は、廃棄物減量化のための 3R 活動として排出ごみの 70%を占める有機ごみに対して、ホームコンポストの普及、市場ごみの分別とコンポスト化、Green waste のチップ化とリサイクルを、資源物に対しては分別収集をそれぞれパイロットプロジェクトで実施し、その実行性を検証した。さらにラウトカ市とナンディ町はこの結果を踏まえて 2017 年を目標年とする廃棄物管理基本計画を策定した。

第 3 年次（2010 年 4 月～2011 年 3 月）では、基本計画に基づいて廃棄物減量化を町ぐるみで推進するために、商業地区での資源物回収をパイロットプロジェクトで実施するとともに、住居地区での 3R 活動域を拡大した。一方、環境局はラウトカ市とナンディ町における廃棄物減量化・資源化促進プロジェクトをモデルとして他地域に 3R 活動を普及させるために、3R ガイドライン(案)、3R 推進マニュアル(案)を作成し、2011 年 2 月に全国の廃棄物管理職員を対象にワークショップを開催した。

第 4 年次は、3R 活動域を更に拡大しナンディ町では全域、ラウトカ市ではおよそ 3 分の 1 で資源物回収を実施するようになった。環境局では 3R の全国展開を見据え、パイロットプロジェクトの結果を踏まえて 3R ガイドラインと 3R 推進マニュアルを最終化し、同年 11 月 2 日、3 日にセミナーを開催して、関係者へ内容を説明した。

本報告書は、本プロジェクトの 2008 年 10 月の開始時から 2012 年 3 月までの 3.5 カ年に渡り実施された廃棄物減量化・資源化促進プロジェクト事業の完了報告である。なお、本報告書で添付資料にあるラウトカ市とナンディ町及び環境局の活動報告は、それぞれのカウンターパートが自らでとりまとめたものである。

1.1 プロジェクト上位目標とプロジェクト目標及び成果

上位目標

フィジー国の西部地域を中心として、3R が進展する。

プロジェクト目標

フィジー国の特性に合わせた 3R モデルの構築をとおして、環境局、ラウトカ市、及び

ナンディ町における3Rに係るキャパシティが向上する。

プロジェクトの成果

- 成果1： ラウトカ市及びナンディ町における3Rに焦点を当てた固形廃棄物管理計画が、それぞれ作成される。
- 成果2： パイロットプロジェクト (PP) の実施を通じて、ラウトカ市及びナンディ町自治体が、適切な廃棄物管理能力を獲得する。
- 成果3： ラウトカ市及びナンディ町全域における3Rの実施を通じて、ラウトカ市及びナンディ町が、3R推進能力を獲得する。
- 成果4： 3R促進に係る環境教育活動を通じて、ラウトカ市及びナンディ町の住民の意識が向上する。
- 成果5： フィジー国の特性に合わせた3Rモデルが構築・提案される。

1.2 プロジェクトの対象地域

フィジー国西部地域に位置するラウトカ市 (Lautoka City Council) 及びナンディ町 (Nadi Town Council)

1.3 プロジェクトの対象廃棄物

ラウトカ市、及びナンディ町が収集・運搬サービスを行っている家庭系ごみ・商業系ごみを対象とする。ただし最終処分場に係る活動や対象地域の廃棄物フローの検討などにおいては必要に応じ、産業廃棄物等を含むラウトカ処分場に搬入・埋立される廃棄物を対象とする。

1.4 プロジェクトの全体工程

契約年次	2008年度			2009年度			2010年度			2011年度									
	第1年次			第2年次			第3年次			第4年次									
調査年度	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
現地調査	■			■			■			■			■						
国内調査	□			□			□			□			□			□			
レポート(IC/R)、事業進捗報告書(PR/R)	▲IC/R				▲PR/R (第1号)								▲PR/R (第2号)						▲PR/R (第3号)
研修					▲PP実施								▲3R推進AP研修						
セミナー													▲WMP研修						
ワークショップ					▲MP子PP計画								▲3R拡大研修						
JCC	▲JCC1				▲JCC2								▲JCC3						▲JCC4
													▲JCC5						▲JCC6
													▲JCC7						▲JCC8
																			▲JCC9
																			▲JCC10

2 投入

2.1 JICA の投入

a. 専門家派遣

平成 20 年度専門家派遣

専門分野	氏名	平成20年度												現地	国内		
		10月	11月	12月	1月	2月	3月										
総括/廃棄物管理	孔井 順二															4.00	0.50
廃棄物減量化/リサイクル(1)/財務組織・制度	志村 享															1.43	0.50
廃棄物減量化/リサイクル(2)	楠 幸二															2.00	0.00
廃棄物教育/啓発(1)	可児 圭子															0.00	0.00
廃棄物教育/啓発(2)	岡 かおる															0.00	0.00
最終処分計画	鈴木 保															2.80	0.00
3R促進	川畑 友里江															0.50	0.00
環境社会配慮/キャンペーン ティアセメント	高沢 正幸															1.50	0.00
業務調整	スティーヴン・サント ストロム																
															12.23	1.00	
															13.23		

平成 21 年度専門家派遣

専門分野	氏名	平成21年度													平成21年度			
		4月	5月	6月	7月	8月	9月	10月	11月	12月	1月	2月	3月	現地	国内			
総括/廃棄物管理	孔井 順二																5.37	
廃棄物減量化/リサイクル(1)/財務組織・制度	志村 享																0.70	
廃棄物減量化/リサイクル(2)	楠 幸二																4.33	
廃棄物教育/啓発(1)	可児 圭子																3.10	
廃棄物教育/啓発(2)	岡 かおる																0.43	
最終処分計画	鈴木 保																0.70	
3R促進	川畑 友里江																4.07	
環境社会配慮/キャンペーン ティアセメント	高沢 正幸																1.70	
業務調整	川畑友里江/ 高沢正幸																	
															20.40	0.00		
															20.40			

平成 22 年度専門家派遣

専門分野	氏名	平成22年度												平成22年度				
		4月	5月	6月	7月	8月	9月	10月	11月	12月	1月	2月	3月	現地	国内			
総括/廃棄物管理	孔井 順二																3.50	
廃棄物減量化/リサイクル(1)/財務組織・制度	志村 享																0.50	
廃棄物減量化/リサイクル(2)	楠 幸二																3.00	
廃棄物教育/啓発(1)	可児 圭子																1.50	
廃棄物教育/啓発(2)	岡 かおる																0.00	
最終処分計画	鈴木 保																0.00	
3R促進	川畑 友里江																4.00	
環境社会配慮/キャンペーン ティアセメント	高沢 正幸																1.10	
業務調整	川畑友里江/ 高沢正幸																	
															13.60	0.00		
															13.60			

平成 23 年度専門家派遣

専門分野	氏名	平成23年度												平成23年度				
		4月	5月	6月	7月	8月	9月	10月	11月	12月	1月	2月	3月	現地	国内			
総括/廃棄物管理	孔井 順二		■		■				■	■					■		3.47	0.50
廃棄物減量化/リサイクル(1)/財務組織・制度	志村 享								■								0.50	0.00
廃棄物減量化/リサイクル(2)	楠 幸二			■					■	■							1.53	0.00
廃棄物教育/啓発(1)	可見 圭子								■						■		0.83	0.00
廃棄物教育/啓発(2)	岡 かおる																0.00	0.00
最終処分計画	鈴木 保																0.00	0.00
3R促進	川畑 友里江			■						■				■			1.50	0.00
環境社会配慮/キャンパシティアセスメント	高沢 正幸									■							0.70	0.00
業務調整	川畑友里江			■						■				■				
																8.53	0.50	
																9.03		

専門家派遣月数概要

専門分野	氏名	平成20年度		平成21年度		平成22年度		平成23年度		合計	
		フィジー	日本	フィジー	日本	フィジー	日本	フィジー	日本	フィジー	日本
総括/廃棄物管理	孔井 順二	4.00	0.50	5.37		3.50		3.47	0.50	16.34	1.00
廃棄物減量化/リサイクル(1)/財務組織・制度	志村 享	1.43	0.50	0.70		0.50		0.50	0.00	3.13	0.50
廃棄物減量化/リサイクル(2)	楠 幸二	2.00	0.00	4.33		3.00		1.53	0.00	10.86	0.00
廃棄物教育/啓発(1)	可見 圭子	0.00	0.00	3.10		1.50		0.83	0.00	5.43	0.00
廃棄物教育/啓発(2)	岡 かおる	0.00	0.00	0.43		0.00		0.00	0.00	0.43	0.00
最終処分計画	鈴木 保	2.80	0.00	0.70		0.00		0.00	0.00	3.50	0.00
3R促進	川畑 友里江	0.50	0.00	4.07		4.00		1.50	0.00	10.07	0.00
環境社会配慮/キャンパシティアセスメント	高沢 正幸	1.50	0.00	1.70		1.10		0.70	0.00	5.00	0.00
業務調整	ステイヴン・サンドストロム/ 川畑 友里江	(1.0)		(2.0)		(2.0)		(2.0)		(7.0)	(0.00)
合計		12.23	1.00	20.40	0.00	13.60	0.00	8.53	0.50	54.76	1.50
		13.23		20.40		13.60		9.03		56.26	

b. 機材の調達

	機材	メーカー/機種名/仕様	単位	数量	備考
一 年 次	コピー機	RICHO / Aficio MP2000	台	1	LCC (JET)
	デスクトップパソコン	Toshiba // Memory 2GB, HH120GB	台	1	Incl. UPS : Nova 600 UPS
	PC用デスク	Vinod Patel	台	1	LCC (JET)
	ノートパソコン	Toshiba/ L300 / Memory 4GB, HH:	台	2	LCC, NTC
	プリンター	RICOH / SP 3300 DN / Printing speed: 28ppm	台	3	LCC, NTC
	ソフト	Microsoft / Windows WP	式	3	1 Desktop, 2 Laptops
	ソフト	Microsoft / Office	式	3	1 Desktop, 2 Laptops
	ソフト	Adobe Creative Suite 4.0 Design Premium	式	1	HP, image processing
	ビデオカメラ	Sony DCR-SR220E	台	2	LCC, NTC
プロジェクター	Toshiba / TDP SP1 Multimedia Projector / 23.9~300	台	2	LCC, NTC	
二 年 次	トラックスケール	Avery Scale 20kg - 80ton	台	1	JICAフィジー事 務所調達、LCC
	掘削機トラック	KATO HD-512III	台	1	JICAフィジー事 務所調達、LCC

	多機能トラック	HINO WU422R-HKMRB3	台	1	専門家チーム調達、LCC
	シュレッダー	Vermeer BC1000XL	台	1	専門家チーム調達、LCC
	草刈り機	Kawasaki TH-34/BC320HK	台	20	専門家チーム調達、LCC、NTC
	ホームコンポスター	Rotomould Fiji Ltd.	個	100	3R促進、LCC、NTC
	コンクリート版	Avery scale	個	50	処分場一部改善、LCC
	土砂等				処分場一部改善、LCC
三年次	多目的トラック	HINO WU422R-HKMRB3	台	1	JICAフィジー事務所調達、NTC

c. その他

専門家チームは、3R プロモーション用教育材料を、以下の仕様で現地の PASIFIKA Communications に再委託して作成した。

c.1 マルチメディア用教育材料の制作

以下のビデオを制作する。

- 資源物の分別、貯留及び排出の仕方 (2～3 分)
- ホームコンポストの始め方 (3～5 分)

なお、2 年次に撮影したビデオファイルを極力使用する。

c.2 マスメディア用キャンペーンツールの制作 (ラジオ広告)

ラジオプログラムの目的は、分別収集サービスとホームコンポストの詳細を示すことである。ラジオプログラムの長さは 1 分で、1 ヶ月間放送する。

c.3 ポスターの制作

ポスターは、役所、学校及びショッピング施設等の公共空間に展示されるもので、以下の内容を示す：

- ナンディ、ラウトカのごみ収集システム、リサイクルプログラム
- イラストや漫画による、分別と排出の方法

ポスターは A2 サイズで、枚数は 500 枚とする。

c.4 3R 推進ウェブサイトの修正

3R 推進ウェブサイトを、様々な教育材料をダウンロードできるように修正する。

3R 推進のケースを示すために、いくつかの“3R 推進方法”のサブページを作成する。

c.5 3R 推進ビデオの修正

3R 推進パイロットプロジェクトは、3年次に商店、事務所、レストラン等の商業地区に拡大された。2年次に制作した3R 推進ビデオに、商業セクターによる3R 推進を追加する修正を加える。

2.2 フィジー側の投入

a. ラウトカ市の投入

a.1 人的投入

ラウトカ市は、保健部の全職員を時間の許す限りプロジェクトに参加させた。以下は、CPとなるラウトカ市の保健部のメンバーである。

氏名	役職
Mr. Rajendra PRATAP	Former Director of Dept. of Health
Mr. Prem SUNDAR	Former Executive Director of Dept. of Health
Mr. Gyneshwar RAO	Director of Dept. of Health
Mr. Rouhit Karan SINGH	Health Manager, Dept of Health
Mr. Shalend Prem SINGH	Senior Health Inspector/ Co-Project Manager
Mr. Wally ATALIFO	Health Inspector
Mr. Jeremaia MARAWA	Health Inspector
Mr. Mithun Prasad	Health Inspector
Ms. Ronika	Health Inspector

a.2 投入費用

2008年10月～2010年3月までにラウトカ市がプロジェクトに支出した費用（中間評価報告書より）

No.	Major Budget Item	Amount in F\$
1.	Office and Materials	750.00
2.	Machinery Fuel (landfill bulldozer)	4,080.00
3.	Gravel and Soil (for maintaining access road)	2100.00
4.	Open Shed & concrete slab/Renovation of office at VDS/new gate for VDS	8,229.65
5.	3 labours (MPT driver/handyman/wood chipper operator)	15,048.00
6.	Compost box and sieve	185.00
7.	EMP- water analysis and monitoring	1,200.00
8.	VDS boundary survey /redefinition works by surveyor	1,650.00

9.	Environmental symbol and slogan competition, media awareness and prize money for winners.	565.83
10.	Opening and handing over ceremony for weighbridge and machinery at VDS and 3R PP launching at Field 40	2,215.90
11.	Transportation/travelling (Recyclable collection, market waste collection, JCC and JWM)	4,075.00
12.	Backup generator for VDS	4,000.00
13.	Home composter for expansion	4,455.00
14.	Landscaping at VDS entrance	100.00
15.	Separate bins for market waste composting project	500.00
16.	Counter part staffs assigned to project	10,334.00
	Total	F\$59,488.38

2010年5月～2011年10月までにラウトカ市がプロジェクトに支出した費用（終了時評価報告書より）

No.	Major Budget Item	Amount in F\$
1	Office and Materials	\$100.00
2	Machinery Fuel (landfill bulldozer) improvement works.	\$9,362.66
3	Machinery Fuel (Excavator) improvement works	\$6,237.59
4	3 labours (MPT driver/handyman/wood chipper operator	\$30,492.00
5	Transportation/travelling (Recyclable collection, market waste collection,)	\$2,188.40
6	Transportation/travelling (JCC and JWM)	\$805.00
7	Home composter for expansion	\$5,500.00
8	Landscaping at VDS entrance	\$200.00
9	Separate bins for market waste composting project	\$1,780.00
10	Counter part staffs assigned to project	\$17,201.00
11	Purchase of Submersible pump for VDS	\$1,800.00
12	Purchase of Water Blaster for VDS	\$1,890.00
13	Purchase of Water tank and pump for VDS	\$1,000.00
14	Access improvement for VDS	\$80,000.00
15	Gravel for VDS	\$4,600.00
16	weighbridge calibration - 2010	\$4,250.00
17	Weighbridge calibration - 2011	\$13,128.50
18	Miscellaneous expenses for 3R Project (meetings, hosting visitors etc)	\$2,000.00
19	Water Blaster for VDS	\$1,890.00
	Total	\$184,425.15

b. ナンディ町の投入

b.1 人的投入

氏名	役職
Mr. Sakaraia SERAU	Director of Dept. of Health
Ms. Premila CHANDRA	Senior Assistant Health Inspector
Mr. Rajeshwar RAJ	Acting Director of Dept. of Health/Co-Project Manager
Ms. Nafiza ALI	Assistant Health Inspector, Dept of Health
Mr. Taniela SATURY	Litter Officer
Mr. Uday	Litter Officer

b.2 投入費用

2008年10月～2010年3月までにナンディ町がプロジェクトに支出した費用（中間評価報告書より）

No.	Major Budget Item	Amount in F\$
1	Meeting Expenses	1,200.00
2	Office Materials	300.00
3	Labour used for Recyclable collection	7,600.00
4	Launching of 3RPP in Matavolivoli	1,800.00
5	Transport and travelling	2,550.00
6	Purchase of home composters	5,500.00
7	Counterpart involved	8,900.00
8	Machinery operations	3,013.00
	Total	F\$30,863.00

2010年5月～2011年10月までにナンディ町がプロジェクトに支出した費用（終了時評価報告書より）

No.	Major Budget Item	Amount in F\$
1	Composter bin purchased (200)	11,000.0000
2	Counter involvement (salary)	12,988.8000
3	labour for Recyclable Collection	6,877.9152
4	Market launching (banner/lunch)	400.0000
5	Cost involved in market waste Composting	6,200.0000
6	Compost yard labour	2,000.0000
7	clean school program(workshop,lunch,prizes)	2,000.0000
8	Shibushi Mayor Visit and the team - Dinner@ port denarau	1,000.0000
9	Transporation/travelling/MPT announcement/Collection/JWM in Lautoka (LCC/DoE) and Suva -JCC	4,100.0000
10	3R Expansion to namaka,martintaar,town-meeting	700.0000

	cost/grog/circular	
11	office materials -printing/ supply paper of JET/meeting paper in office	260.0000
12	Machinery - Digger for compost turning,MPT colln,compost yard mentenance,fuel and wear and tear cost	5,000.0000
13	Matavolvoli meeting only - grog/meeting paper	1,050.0000
14	Counter parts training allownace in japan- sep 2010,2011(for 8 staffs)	9,800.0000
	Total	63,376.7152

c. 環境局の投入

c.1 人的投入

Name	Position
Mr. Epeli Nasome	Former Director of Dept. of Health
Mr. Jope Davetanivalu	Project Director / Director of Dept. of Health
Mr. Aminiasi Qareqare	Project Manager Acting Principal Environment Officer, DOE
Ms. Senivasa Waqaraimasi	Senior Environment Officer, Western Division, DOE
Ms. Lusiana Ralogaivau	Environmental Officer
Ms. Laisani Lewanavanua	Environmental Officer

c.2 投入費用

2008年10月～2010年3月までに環境局がプロジェクトに支出した費用（中間評価報告書より）

No.	Major Budget Item	Amount in F\$
1.	Meeting Expenses	2,000.00
2.	Transport / Traveling Cost	1,000.00
3.	Accommodations for C/Ps to attend JCC	1,600.00
	Total	F\$4,600.00

3 活動

プロジェクトを実施する過程で修正した PDM に基づき、運営計画（PO）および作業フローチャートも修正した。以下にプロジェクト開始時と終了時の PO と作業フローチャートを示す。

活動の詳細は、中間評価および終了時評価でまとめられたものをベースに編集した。

3.1 Plan of Operation (PO)

(1) Plan of Operation (プロジェクト開始時)

Name of Project: Waste Minimization and Recycling Promotion Project			2008				2009												2010												2011												2012					
			Q4		Q1		Q2			Q3			Q4			Q1		Q2			Q3			Q4			Q1		Q2																			
			10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	
Term of Cooperation: Three years and six months			Period of the Project																																													
Project Area: Lautoka City and Nadi Town			JCC																																													
Target Group: Dept. of Environment, Municipal Gov. and Communities in Lautoka and Nadi Town			Joint Evaluation																																													
Outputs and Activities			Results of Activities																																													
Output 1: Solid Waste Management Plan focusing respectively in Lautoka City and Nadi Town																																																
1-1	Survey the current status of SWM	Results of baseline survey, Waste survey, Capacity assessment, etc.	[Gantt chart showing activity from Oct 2008 to Dec 2008]																																													
1-2	Conduct a field survey on Lautoka landfill site	Survey report on Lautoka landfill	[Gantt chart showing activity from Nov 2008 to Dec 2008]																																													
1-3	Trace the current waste flow from generation to final disposal and identify issues to be adressed	Waste flow, waste analysis report	[Gantt chart showing activity from Dec 2008 to Jan 2009]																																													
1-4	Develop frameworks of SWM	Framework document of SWM	[Gantt chart showing activity from Jan 2009 to Feb 2009]																																													
1-5	Build a consensus on the frameworks of SWM among stakeholders	M/M of stakeholder meeting	[Gantt chart showing activity from Feb 2009 to Mar 2009]																																													
1-6	Develop draft SWM plans based on the frameworks of SWM	Draft SWM plan	[Gantt chart showing activity from Mar 2009 to Apr 2009]																																													
1-7	Finalize SWM plans	SWM plan	[Gantt chart showing activity from Apr 2009 to May 2009]																																													
Output 2: Pilot Projects are implemented																																																
2-1	Conduct a community survey	Community survey report	[Gantt chart showing activity from Oct 2008 to Nov 2008]																																													
2-2	Select pilot areas on the basis of the community survey	Map for pilot project areas	[Gantt chart showing activity from Nov 2008 to Dec 2008]																																													
2-3	Develop a pilot project plan on 3R	Pilot project plan on 3R	[Gantt chart showing activity from Dec 2008 to Jan 2009]																																													
2-4	Develop a pilot project plan on a partial improvement of Lautoka landfill	- Pilot project plan on a partial improvement of Lautoka landfill - Environment Management plan	[Gantt chart showing activity from Jan 2009 to Feb 2009]																																													
2-5	Conduct training, on the job training, etc. for the staff of Lautoka city council and Nadi town council to implement pilot project	Materials for capacity development	[Gantt chart showing activity from Feb 2009 to Mar 2009]																																													
2-6	Complete the Environmental Impact Assessment (EIA) process required for the pilot project on a partial improvement of Lautoka landfill	Necessary documents for EIA process	[Gantt chart showing activity from Mar 2009 to Apr 2009]																																													
2-7	Conduct the pilot project on 3R at project areas	Progress report	[Gantt chart showing activity from Apr 2009 to May 2009]																																													
2-8	Conduct the pilot project on a partial improvement of Lautoka landfill	Progress report	[Gantt chart showing activity from May 2009 to Jun 2009]																																													
2-9	Review and evaluate the pilot projects	Evaluation report	[Gantt chart showing activity from Jun 2009 to Jul 2009]																																													
2-10	Conduct OJT for operation and maintenance of Lautoka landfill	Progress report	[Gantt chart showing activity from Jul 2009 to Dec 2011]																																													
Output 3: 3R is implemented at whole area of Lautoka City and Nadi Town																																																
3-1	Develop a 3R promotion action plan at whole area of Lautoka city and Nadi town	3R promotion action plan	[Gantt chart showing activity from Jul 2009 to Aug 2009]																																													
3-2	Conduct training, on the job training, etc. for the staff of Lautoka city council and Nadi town council to implement 3R promotion	Materials for capacity development	[Gantt chart showing activity from Aug 2009 to Sep 2009]																																													
3-3	Implement 3R promotion	Progress report	[Gantt chart showing activity from Sep 2009 to Dec 2011]																																													
3-4	Review and evaluate 3R promotion	Evaluation report	[Gantt chart showing activity from Dec 2011 to Jan 2012]																																													
Output 4: Awareness of residents in Lautoka City and Nadi Town is raised through implementation of environmental education activities on 3R promotion																																																
4-1	Review on environmental education tools/programs in Fiji, Japan and other countries	Review report	[Gantt chart showing activity from Oct 2008 to Nov 2008]																																													
4-2	Develop effective educational tools/programmes	Educational tools/programmes	[Gantt chart showing activity from Nov 2008 to Dec 2008]																																													
4-3	Conduct training, on the job training, etc. for the groups and personnel concerned on 3R promotion in Lautoka and Nadi	Training report	[Gantt chart showing activity from Dec 2008 to Jan 2009]																																													
4-4	Introduce the educational tools/programmes in the pilot project areas	Progress report	[Gantt chart showing activity from Jan 2009 to Feb 2009]																																													
4-5	Evaluate the educational tools/programmes	Evaluation report	[Gantt chart showing activity from Feb 2009 to Mar 2009]																																													
4-6	Improve the educational tools/programmes	Improved educational tools/programmes	[Gantt chart showing activity from Mar 2009 to Apr 2009]																																													
4-7	Implement activities to raise awareness through using the educational tools/programmes in Lautoka city and Nadi town	Progress report	[Gantt chart showing activity from Apr 2009 to Dec 2011]																																													
Output 5: 3R model for Fiji is developed and recommended																																																
5-1	Review all the process & results of the activities for 3R promotion by the project and extract findings	Outputs review report	[Gantt chart showing activity from Dec 2008 to Jan 2009]																																													
5-2	Develop draft guidelines, manuals on 3R model for Fiji, etc. for its promotion	Draft guidelines, manuals, etc.	[Gantt chart showing activity from Jan 2009 to Feb 2009]																																													
5-3	Finalize the guidelines, manuals, etc.	Guidelines, manuals, etc.	[Gantt chart showing activity from Feb 2009 to Mar 2009]																																													
5-4	Conduct seminars to present other municipalities the guidelines and manuals	Seminar reports	[Gantt chart showing activity from Mar 2009 to Apr 2009]																																													

☐ : Plan given in the IC/R ■ : Actual work implemented

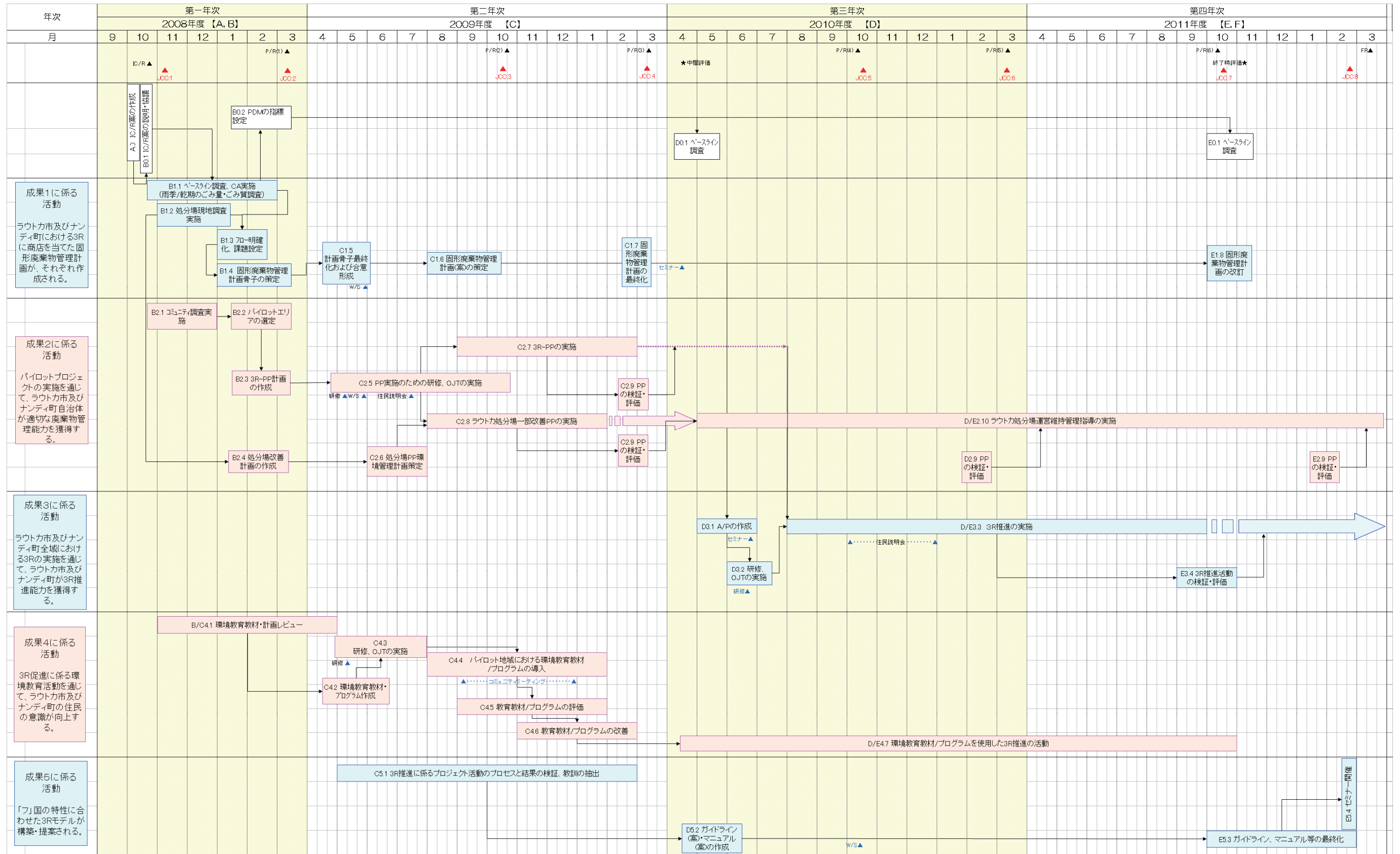
(2) Plan of Operation (プロジェクト完了時)

Name of Project: Waste Minimization and Recycling Promotion Project	2008												2009												2010												2011												2012					
	Q4			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4			Q1			Q2																							
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6																					
Term of Cooperation: Three years and six months	Period of the Project																																																					
Project Area: Lautoka City and Nadi Town	JCC																																																					
Target Group: Dept. of Environment, Municipal Gov. and Communities in Lautoka and Nadi Town	Joint Evaluation																																																					
Outputs and Activities	Results of Activities																																																					
Output 1: Solid Waste Management Plan focusing respectively in Lautoka City and Nadi Town																																																						
1-1 Survey the current status of SWM	Results of baseline survey, Waste survey, Capacity assessment, etc.																																																					
1-2 Conduct a field survey on Lautoka landfill site	Survey report on Lautoka landfill																																																					
1-3 Trace the current waste flow from generation to final disposal and identify issues to be addressed	Waste flow, waste analysis report																																																					
1-4 Develop frameworks of SWM	Framework document of SWM																																																					
1-5 Build a consensus on the frameworks of SWM among stakeholders	MM of stakeholder meeting																																																					
1-6 Develop draft SWM plans based on the frameworks of SWM	Draft SWM plan																																																					
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Output 2: Pilot Projects are implemented																																																						
2-1 Conduct a community survey	Community survey report																																																					
2-2 Select pilot areas on the basis of the community survey	Map for pilot project areas																																																					
2-3 Develop a pilot project plan on 3R	Pilot project plan on 3R																																																					
2-4 Develop a pilot project plan on a partial improvement of Lautoka landfill	- Pilot project plan on a partial improvement of Lautoka landfill - Environment Management plan																																																					
2-5 Conduct training, on the job training, etc. for the staff of Lautoka city council and Nadi town council to implement pilot project	Materials for capacity development																																																					
2-6 Complete the Environmental Impact Assessment (EIA) process required for the pilot project on a partial improvement of Lautoka landfill	Necessary documents for EIA process																																																					
2-7 Conduct the pilot project on 3R at project areas	Progress report																																																					
2-8 Conduct the pilot project on a partial improvement of Lautoka landfill	Progress report																																																					
2-9 Review and evaluate the pilot projects	Evaluation report																																																					
2-10 Review and evaluate the Pilot Project for landfill operation	Progress report																																																					
2-11 Preparation of 3R-PP separate collection for recyclables in commercial area	Progress report																																																					
2-12 Conduct Pilot Project on separate collection for recyclables in commercial area	Progress report																																																					
2-13 Conduct OJT for operation and maintenance of Lautoka landfill	Progress report																																																					
Output 3: 3R is implemented at whole area of Lautoka City and Nadi Town																																																						
3-1 Develop a 3R promotion action plan at whole area of Lautoka city and Nadi town	3R promotion action plan																																																					
3-2 Conduct training, on the job training, etc. for the staff of Lautoka city council and Nadi town council to implement 3R promotion	Materials for capacity development																																																					
3-3 Implement 3R promotion	Progress report																																																					
3-4 Review and evaluate 3R promotion	Evaluation report																																																					
3-5 Monitor the progress of communities' perception, behavior change of the people by conducting the Public Opinion Survey	Progress report																																																					
Output 4: Awareness of residents in Lautoka City and Nadi Town is raised through implementation of environmental education activities on 3R promotion																																																						
4-1 Review on environmental education tools/programs in Fiji, Japan and other countries	Review report																																																					
4-2 Develop effective educational tools/programmes	Educational tools/programmes																																																					
4-3 Conduct training, on the job training, etc. for the groups and personnel concerned on 3R promotion in Lautoka and Nadi	Training report																																																					
4-4 Introduce the educational tools/programmes in the pilot project areas	Progress report																																																					
4-5 Evaluate the educational tools/programmes	Evaluation report																																																					
4-6 Improve the educational tools/programmes	Improved educational tools/programmes																																																					
4-7 Implement activities to raise awareness through using the educational tools/programmes in Lautoka city and Nadi town	Progress report																																																					
Output 5: 3R model for Fiji is developed and recommended																																																						
5-1 Review all the process & results of the activities for 3R promotion by the project and extract findings	Outputs review report																																																					
5-2 Develop draft guidelines, manuals on 3R model for Fiji, etc. for its promotion	Draft guidelines, manuals, etc.																																																					
5-3 Finalize the guidelines, manuals, etc.	Guidelines, manuals, etc.																																																					
5-4 Conduct seminars to present other municipalities the guidelines and manuals	Seminar reports																																																					

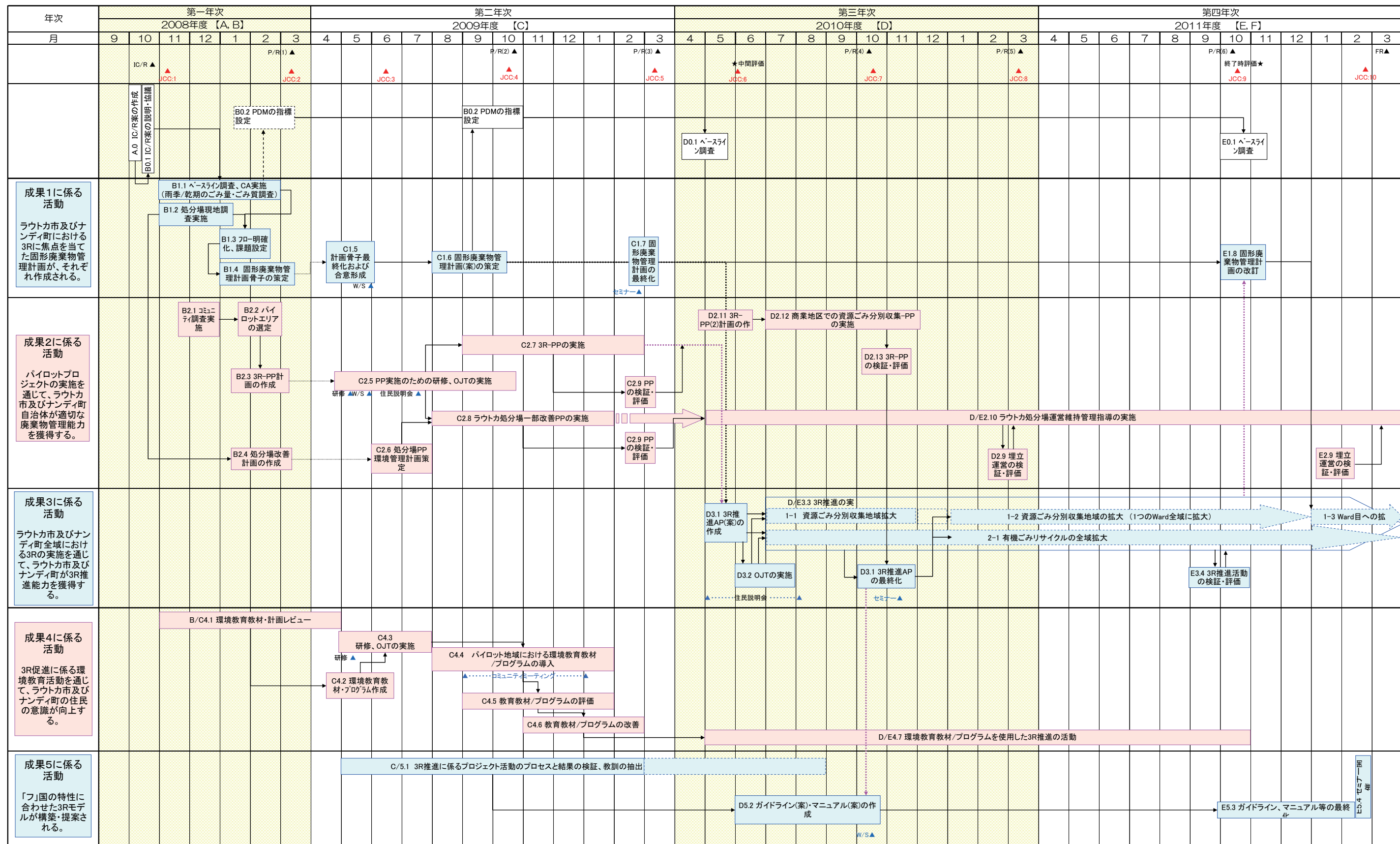
Original Plan : Actual work implemented

3.2 作業フローチャート

(1) プロジェクト開始時の作業フローチャート



(2) プロジェクト終了時の作業フローチャート



3.3 活動の概要

3.3.1 成果1にかかる活動

1-1 固形廃棄物管理の現状を調査する

再委託により、ごみ量・ごみ質調査、最終処分量調査、タイムアンドモーション調査、住民意識調査、コンポスト市場調査、リサイクル活動調査を実施した。

1-2 ラウトカ処分場の現地調査を実施する

ラウトカ処分場の地形測量調査（再委託）及び現地踏査（専門家チームと C/P）を実施した。

1-3 固形廃棄物の排出から最終処分までの流れを明らかにし、課題を特定する

ラウトカ市とナンディ町のごみの流れ図を作成した。

1-4 固形廃棄物管理計画骨子を策定する

第2回 JCC で骨子（素案）を示し、2009年5月までに骨子を作成した。

1-5 固形廃棄物管理計画骨子に関する合意を関係者間で形成する

ラウトカ市では2009年6月1日に28名の関係者を、ナンディ町では6月2日に32名を集めて第1回ワークショップを開催し、廃棄物管理計画骨子(案)の合意を形成した。

2009年10月13日に、パイロットプロジェクトでの教訓を共有するためにラウトカ市とナンディ町が合同で第2回ワークショップを開催し、骨子に基づいて作成した廃棄物管理計画案を説明し、関係者の合意を得た。

1-6 固形廃棄物管理計画骨子に基づき、固形廃棄物管理計画案を作成する

C/P と専門家チームが共同で作成した廃棄物管理基本計画を作成し、ラウトカ市は2010年2月24日に、ナンディ町は2月26日にセミナーを開催して関係者に基本計画を説明し合意を得た。この廃棄物管理基本計画は第5回 JCC においてそれぞれの C/P が内容を説明し、JCC で承認されたことをもって最終化された。

1-7 固形廃棄物管理計画を最終化する（見直し）

当初予定どおり、廃棄物管理計画の見直しを行い、JCC において、ラウトカ市とナンディ町からプロジェクト終了後を踏まえた3R推進の方針が示された。しかしながら専門家チームは、活動2-9（PPの検証・評価）の結果、ラウトカ市とナンディ町とで実施してきた3Rの各活動について課題が明らかになったことから、プロジェクト終了後の継続的な3R推進を担保するために、C/Pが自覚と責任を持って今後の対処方針を決めることが重要と判断し、C.E.Oを含めて議論することにした。これにより、見直しを反映した改訂版の作成作業が2011年末までの予定が若干ずれ込み、2012年1月に改訂版が作成された。

3.3.2 成果2にかかる活動

2-1 コミュニティ調査を実施する

再委託により、コミュニティ調査を実施した。

2-2 コミュニティ調査結果を基にパイロットエリアを選定する

コミュニティ調査、現地踏査を基に、ラウトカ市では Field40 を、ナンディ町では Matavolovoli 地区を 3R パイロットプロジェクトサイトとして選定した。

2-3 3Rパイロットプロジェクト計画（有機廃棄物のコンポスト化を含む）を作成する

2009年3月までに、ラウトカ市及びナンディ町で実施するパイロットプロジェクト計画を作成し、2年次のプロジェクト実施計画に反映した。

2-4 ラウトカ処分場一部改善パイロットプロジェクト計画を作成する

2009年3月までに、ラウトカ市ブナト処分場の一部改善パイロットプロジェクト計画を作成し、2年次のプロジェクト実施計画に反映した。

2-5 パイロットプロジェクトを実施するために必要な研修、業務をとおした実習などをラウトカ市及びナンディ町自治体職員に対して実施する

2009年5月より10月までの半年間、パイロットプロジェクトの準備作業を通じて、プロジェクト実施に必要なノウハウを技術移転した。

2-6 ラウトカ処分場一部改善パイロットプロジェクトに必要な環境影響評価（EIA）手続きを実施する

DOE 事前協議により、ラウトカ処分場の一部改善パイロットプロジェクトを実施するに際し、既存処分場の改善であることから EIA は不要であるが、モニタリングについて明記した環境管理計画を提出し、承認を得ることとされていた。

ラウトカ市は 2009年6月23日に環境管理計画を DEO に提出し、8月26日に承認された。

2-7 3Rパイロットプロジェクトを実施する

ラウトカ市は 2009年9月4日、ナンディ町は9月5日にそれぞれ 3R パイロットプロジェクトを立ち上げた。

2-8 ラウトカ処分場一部改善パイロットプロジェクトを実施する

2009年9月1日から技術部の土木技師の監理下で改善工事に着手した。しかしながら12月14日にサイクロンがラウトカ市を直撃したため、その後約1ヶ月間は職員や機材は処分場では災害ごみの対応に追われた。これにより改善作業は約1ヶ月遅れとなり、2月末に施設の改善工事を完了した。

2-9 パイロットプロジェクトを検証・評価する

2010年4月時点での 3R 活動のモニタリング結果を分析し、アクションプランの作成の基礎資料とした。

2-10 ラウトカ処分場一部改善パイロットプロジェクトを検証・評価する

2011年10月に専門家チームは、これまで実施してきた処分場改善事業を総括し、課題を整理して”Vunato Disposal Site Landfill Management”にとりまとめた。この結果を基に、C/Pと問題の発生原因と、解決方法について協議し、プロジェクト終了後における処分場を適正な運営方法について改訂版基本計画に反映させることとした。

2-11 商業地区における資源物分別回収 3R パイロットプロジェクトを準備する

ラウトカ市では2010年4月～6月の3ヶ月間で、Central Business District (CBD)への資源物分別回収の準備を行った。一方、ナンディ町でも同じ期間で、Namaka通りの商業地区へのサービス拡大のための準備を行った。

2-12 商業地区で資源物の分別収集を実施する

ラウトカ市のCBDに対する資源物分別回収PPは、2010年7月より開始した。ナンディ町は同じく7月よりNamaka通りの商業地区に対して資源物分別回収を始めた。

2-13 処分場運営維持管理のためのOJTを実施する

処分場の運営維持管理の能力を強化するために、以下のOJTを実施した。

- (1) 埋立区画の整備： ラウトカ市は、専門家チームが整備した区画-6に続き、2010年8月から区画-1の建設を自力で始め、同10月に完了した。
- (2) トラックスケール計量データの分析： 専門家チームは、搬入ごみ量のデータ分析をC/Pと共にやり、C/Pが自らで排出源別の搬入量及び処分料金を正確に把握するようにした。
- (3) 緊急時に対応(復旧作業)： 10月から始まった雨季は例年になく雨量が多く、2011年5月まで断続的に豪雨があったため、アクセス道路が損傷し所定の埋立区画への搬入ができなくなり、道路上や埋立区画外にごみが投棄された。アクセス道路の損傷は、道路と排水路の維持管理が適切に行われなかったためであるが、C/Pが採石や土砂などの維持管理用資材を要請したにもかかわらず、新SA(2010年10月にSAが交代した)の下で、処分場の運営維持管理費が適切に支出されなかったことに起因する。この復旧作業に必要な資金は、専門家チームとC/Pが協力して新SAと交渉し、2011年5月に復旧作業に要する資金拠出を取り付けた。復旧作業は、専門家チームの施工監理の下で、市の保健部と技術部が協力して、直営で配水管の敷設、路盤復旧及び砂利の敷均し作業を実施した。

3.3.3 成果3にかかる活動

3-1 ラウトカ市、ナンディ町全域を対象とする3R推進アクションプランを作成する

ラウトカ市は2010年9月末までに3R推進アクションプランを作成し、10月25日に市役所議会室で関係者を集めてセミナーを開き、その内容を説明するとともに3R推進のための協力を要請した。一方、ナンディ町は、2010年10月29日に町議会室でセミナーを開催し、その内容を説明するとともに3R推進のための協力を要請した。

3-2 3R 推進を実施するために必要な研修、業務をとおした実習などをラウトカ市及びナンディ町自治体職員に対して実施する

2010年7月からの資源物分別回収サービスの拡大は、人口でラウトカ市は513人が5,000人に、ナンディ町は914人が2914人になる。特に両自治体とも商業地区を含むこととなるため、リサイクラーが回収作業を自主的に行いたいとの申し出を受け、自治体はこれを監理することとなった。リサイクラーを含めて、回収ルートや回収した資源物の積み下ろし場所や時間などを詳細に行い、実際の作業に備えた。しかしながら、リサイクラーの収集車両には資源物回収を知らせるスピーカーが装着されていなかったため、事業実施に際しては、ラウトカ市ではプロジェクトで調達した等目的トラック（MPT）を、ナンディ町では市のピックアップトラックにスピーカーを装着して、ミュージックとともに回収を呼びかけるアナウンスをしながら、リサイクラーの収集車両を先導した。

3-3 3R 推進を実施する

(1) 資源物分別回収

ラウトカ市とナンディ町において実施した、3R 推進活動は下表のとおりである。2011年11月時点で、ラウトカ市では総人口の37.4%にあたる約17,000人に資源物分別回収を実施している。ナンディ町では、一部の商業地区（Town ward）を除く全域（総人口12,181人）で資源物回収を実施している。

(2) ホームコンポスト

PPの結果を踏まえ、ラウトカ市とナンディ町ではホームコンポストの普及を行っており、2011年11月時点で、それぞれ160個、166個（内50個は2009年のPP時にJICAが設置）を設置した。

(3) 市場ごみコンポスト

ラウトカ市は、2009年9月より市場ごみのコンポスト化を始め、2011年10月末時点までに193.6トンの野菜くずを分別回収しコンポスト化している。一方のナンディ町は、ラウトカ市での実績を踏まえ、2011年7月末から町内にある2つの市場で野菜くずの分別回収を始め、2011年10月末時点までに69トンを町のデポに持ち込み、コンポスト製造を継続している。

(4) Green Waste の収集とチップ化

ラウトカ市は2009年9月にプロジェクトで投入したシュレッダーを用いて、公園や街路樹の剪定ごみをチップ化して、マルチング材として利用する他、Fiji Sugar Corporation(FSC)に燃料として売却している。ナンディ町は、2010年10月に日本外務省の草の根無償により投入されたシュレッダーを用いて、公園及び街路樹の選定ごみをチップ化し、マルチング材として利用している。

3-4 3R 推進活動を検証・評価する

2011年10月に専門家チームは、それまでの3R活動（資源物分別回収、ホームコンポスト、市場ごみコンポスト、GW収集とチップングサービス及びスクールプログラム）について、C/Pより報告されたモニタリング結果を技術的、財務的な観点から分析し、Progress and Matters to be discussed on 3R Promotion Activities にとりまとめ、実施し

てきた 3R 活動での課題を明らかにした。さらに専門家チームは、ラウトカ市とナンディ町に対して、課題を説明するとともに、それぞれの活動について、プロジェクト完了後にも 3R 活動を継続的に実施するためにどうするのかを、C/P と議論を始め、第 9 回の JCC (2011 年 11 月 17 日) で、C/P が 3R 推進を継続するための方針を発表した。

3-5 住民意識調査でコミュニティの意識、住民の行動変化の推移をモニタリングする

社会面でのキャパシティアセスメントの観点から、専門家チームは 2009 年 9 月に開始した PP の実施地区である Field 40 (ラウトカ市) と Matavolivoli (ナンディ町) の住民を対象に、意識と行動の変化について、2009 年 9 月、2010 年 5 月、2011 年 3 月及び同年 10 月に住民意識調査を実施した。

3.3.4 成果4にかかる活動

4-1 日本、フィジーおよび他国における環境教育教材・計画をレビューする

1 年次後半から 2 年次前期にかけて実施した。

4-2 効果的な環境教育教材・プログラムを作成する

3R 推進 PP の計画に合わせ、宣伝リーフレット、資源ごみ分別収集手引き、庭ごみ収集ガイド、市場ごみ分別ポスター、パイロットプロジェクトの看板を C/P と協力して製作した。

4-3 研修、業務をとおした実習などを、ラウトカ市およびナンディ町において 3R に関する団体・個人に対して実施する

C/P との週例会議や個別会議で、上記の教材、プログラムを説明した。(加えて、C/P はコミュニティ会議や戸別訪問などの活動を通じて、住民への啓発活動方法を OJT を通じて獲得していった。)

4-4 パイロット地域において環境教育教材・プログラムを導入する

ラウトカ市の Field40 地区、ナンディ町の Matavolivoli 地区でパイロットプロジェクトの開始前、開始後に教材を配布し啓蒙活動を実施した。一般向けには、PP 拡大を念頭に、ラジオキャンペーンを実施した。

4-5 環境教育教材・プログラムの評価を行う

2010 年 2 月にパイロットプロジェクト地区の住民を対象にインタビュー調査を実施し、使用した教材やプログラムの効果について検証するとともに改善すべきことをとりまとめた。

2010 年 10 月に、商業地区での資源物分別回収のモニタリング結果に基づいて使用した教材を評価し、3R 推進アクションプランに示された拡大方針に沿った教材の内容を検討した。

4-6 環境教育教材・プログラムを改善する

上記調査結果を元に、PP 拡大用に修正を加えた配布教材、ポスター、バナーなどを作成した。またコマーシャル地区向けの教材を新たに作製した。外部委託も入れながら、住民への啓発活動を行った。メディアキャンペーンなど一般向け啓発活動の比重を増やした。

2010年6月に、資源物分別回収の拡大に合わせて、各種教育材料の改訂を行った。また、3R活動で実施している、ホームコンポスト、資源物分別回収について、他の自治体への普及を目的にビデオを作成した。

4-7 環境教育教材・プログラムを活用した意識向上活動を、ラウトカ市およびナンディ町において実施する

活動3-3に示す表中で、拡大のための準備作業期間に、上記活動で作成した教材を用いて、雇用した3Rプロモーターが拡大対象地区の住民を個別訪問し、意識向上を図った。

3.3.5 成果5にかかる活動

5-1 3R推進に係るプロジェクト活動のプロセスと結果を検証し、教訓を抽出する

よく機能している資源物分別収集システムと庭ごみ収集システムを持つ自治体の中から、アメリカのBeaverton (Oregon,US)とカナダのHalifax、志布志市の3Rプログラム、三鷹市のコミュニティベースの集団回収システムを参考としてレビューし、"Review of environmental educational programs and their materials"としてとりまとめた。

5-2 フィジー国の特性にあわせた3Rモデルのガイドライン(案)、マニュアル(案)などを同モデルの推進を目的に作成する

2010年10月までにフィジー国の3R推進の基本方針として、3Rガイドライン(案)をとりまとめ、3R推進の具体的な活動を支援する副本として、3R推進マニュアル(案)を作成した。DOEは、2011年2月にラウトカ市において全国自治体の廃棄物処理担当者を招いて3日間の3Rワークショップを開催し、これらの案について説明するとともに、意見交換した。

5-3 ガイドライン、マニュアルなどを最終化する

活動5-2での議論と、2011年2月以降の3R活動のモニタリング結果を踏まえ、3Rガイドラインと3R推進マニュアルは、2011年10月末までに最終化された。

5-4 ガイドライン、マニュアルなどを他の地方自治体に提案するためのセミナーを実施する

DOEは、3Rガイドラインと3R推進マニュアルを提案するために、2011年11月2日にラウトカ市において、全国自治体の廃棄物担当者及び中央政府の関係者を招いて3Rセミナーを開催した。

4 プロジェクトの運営

4.1 合同調整委員会(JCC)

	開催日	開催場所	主な議題
第1回	2008年 11月13日	スバ：JICA事務所	<ul style="list-style-type: none"> インセプション協議 C/Pの確認 志布志市廃棄物管理の紹介
第2回	2009年 3月11日	スバ：JICA事務所	<ul style="list-style-type: none"> 進捗報告書(1) 廃棄物管理計画フレーム(案) パイロットプロジェクト(案) 2年次プロジェクト運営計画 (PO)
第3回	2009年 6月24日	スバ：JICA事務所	<ul style="list-style-type: none"> 進捗報告書(2) 廃棄物管理計画フレーム(案) パイロットプロジェクト計画 パイロットプロジェクトでの機材調達計画 PDMの修正(1)
第4回	2009年 10月21日	ラウトカ市 LCC、NTCプロジェクトサイトの視察	<ul style="list-style-type: none"> 進捗報告書(3) 3R推進の拡大計画 本邦研修の内容
第5回	2010年 3月10日	スバ：JICA事務所	<ul style="list-style-type: none"> 進捗報告書(4) 廃棄物管理計画 (LCC、NTC) PDM修正(2) 3年次プロジェクト運営計画 (PO)
第6回	2010年 6月4日	スバ：JICA事務所	<ul style="list-style-type: none"> 中間評価報告書 PDMの修正(3) 3年次の活動計画
第7回	2010年 10月21日	スバ：JICA事務所	<ul style="list-style-type: none"> 進捗報告書(6) 3Rガイドライン、3R推進マニュアル PDMの修正(4) 国家廃棄物管理戦略
第8回	2011年 3月3日	スバ：JICA事務所	<ul style="list-style-type: none"> 進捗報告書(7) 3Rガイドライン、3R推進マニュアル クリーンスクールプログラム
第9回	2011年 11月17日	スバ：JICA事務所	<ul style="list-style-type: none"> 終了時評価報告書 PDMの修正(5) 3R推進の持続計画
第10回	2012年 2月28日	ラウトカ市	<ul style="list-style-type: none"> プロジェクト事業完了報告書

4.2 PDM の修正

PDM₁ : 2009 年 6 月

Narrative Summary	Objective Verifiable Indicators
<p>Overall Goal 3R (Reduce, Reuse, Return) is progressed in Fiji, mainly in Western Division.</p>	<p>1. Other municipalities mainly in Western Division introduce the 3R model for Fiji.</p>
<p>Project Purpose Capacity of 3R (Reduce, Reuse, Return) of Department of Environment (DOE), Lautoka City and Nadi Town is increased through developing 3R model for Fiji.</p>	<p>1. At least XX seminars/workshops on 3R promotion are organized by DOE. 2. Action plan for 3R promotion is drafted by DOE. 3. Policy and budget for 3R promotion is secured within DOE. 4. Amount of waste disposal is decreased by XX% in Lautoka city and Nadi town.</p>
<p>Outputs</p> <ol style="list-style-type: none"> 1. Solid Waste Management Plans focusing on 3R are developed respectively in Lautoka City and Nadi Town respectively. 2. Lautoka City and Nadi Town obtain the capacity for proper Solid Waste Management (SWM) through the implementation of Pilot projects. 3. Lautoka City and Nadi Town obtain the capacity for 3R promotion activities at whole area of Lautoka City and Nadi Town. 4. Awareness of residents in Lautoka City and Nadi Town is raised through implementation of environmental education activities on 3R promotion 5. . 6. 3R model for Fiji is developed and recommended. 	<ol style="list-style-type: none"> 1. Solid Waste Management Plan 2-1 Evaluation reports on Pilot Projects 2-2 The improved area of Lautoka landfill by the pilot project is operated as planned. 3-1 XX% of households in Lautoka city and Nadi town participate seminars and/or trainings on 3R. 3-2 XX% of households in Lautoka city and Nadi town conduct 3R. 3-3 At least one segregation station is established per XX households. 3-4 Reports on 3R promotion project 4. Awareness of XX% of households in Lautoka city and Nadi town is improved. 5-1 Guideline, manuals, etc. are developed. 5-2 Seminars to present the guideline manuals are conducted to more than half of other municipalities which conduct waste collection.

PDM₂ : 2010年3月

Narrative Summary	Objective Verifiable Indicators
<p>Overall Goal 3R (Reduce, Reuse, Return) is progressed in Fiji, mainly in Western Division.</p>	<p>1. Other municipalities mainly in Western Division introduce the 3R model for Fiji.</p>
<p>Project Purpose Capacity of 3R (Reduce, Reuse, Return) of Department of Environment (DOE), Lautoka City and Nadi Town is increased through developing 3R model for Fiji.</p>	<p>1. Total recycle rate to the Municipal Solid Waste (MSW) generation amount in Lautoka City and Nadi Town will be 14.4% and 16.7% respectively by the end of the Project. 2. Disposal rate to the MSW generation amount in Lautoka City and Nadi Town will decrease by 2.2% and 11.5% respectively from 2008' s by the end of the Project. 3. DOE holds seminars to explain the guidelines and manuals targeting more than half of the municipalities in Fiji which provide waste collection service.</p>
<p>Outputs</p> <p>1. Solid Waste Management Plans focusing on 3R are developed respectively in Lautoka City and Nadi Town respectively.</p> <p>2. Lautoka City and Nadi Town obtain the capacity for proper Solid Waste Management (SWM) through the implementation of Pilot projects.</p> <p>3. Lautoka City and Nadi Town obtain the capacity for 3R promotion activities at whole area of Lautoka City and Nadi Town.</p> <p>4. Awareness of residents in Lautoka City and Nadi Town is raised through implementation of environmental education activities on 3R promotion</p> <p>5. 3R model for Fiji is developed and recommended.</p>	<p>1. Solid Waste Management plan is established.</p> <p>2-1 Plan of pilot 3R projects and partial improvement of landfill sites are prepared. 2.2 Lautoka City and Nadi Town accumulate knowledge and experiences to implement 3R promotion as well as operation and maintenance of the final disposal site through the pilot project. 3-1 Action Plan for 3R promotion is prepared. 3.2 Lautoka City and Nadi Town conduct Action Plan for 3R promotion appropriately. 3.3 Capability for 3R promotion of the staff of Lautoka City and Nadi Town improved.</p> <p>4.1 More than half of households in Lautoka City and Nadi Town will participate in the community meeting for 3R promotion by the end of the Project. 4.2 Recycle rate of the households in Lautoka City and Nadi Town will be 2.9% and 1.5% respectively by the end of the Project.</p> <p>5-1 Guideline and manuals are developed</p>

PDM₃ : 2010 年 6 月 (中間評価時)

Narrative Summary	Objective Verifiable Indicators
<p>Overall Goal 3R (Reduce, Reuse, Return) is progressed in Fiji, mainly in Western Division.</p>	<p>2. Other municipalities mainly in Western Division introduce the 3R model for Fiji.</p>
<p>Project Purpose Capacity of 3R (Reduce, Reuse, Return) of Department of Environment (DOE), Lautoka City and Nadi Town is increased through developing 3R model for Fiji.</p>	<p>1. Total recycle rate to the Municipal Solid Waste (MSW) generation amount in Lautoka City and Nadi Town will be 19.7% and 20.4% respectively by the end of the Project. 2. Disposal rate to the MSW generation amount in Lautoka City and Nadi Town will decrease by 4.4% and 17.1% respectively from 2008' s by the end of the Project. 3. DOE holds seminars to explain the guidelines and manuals targeting more than half of the municipalities in Fiji which provide waste collection services.</p>
<p>Outputs</p> <p>1. Solid Waste Management Plans focusing on 3R are developed respectively in Lautoka City and Nadi Town respectively.</p> <p>2. Lautoka City and Nadi Town obtain the capacity for proper Solid Waste Management (SWM) through the implementation of Pilot projects.</p> <p>3. Lautoka City and Nadi Town obtain the capacity for 3R promotion activities at whole area of Lautoka City and Nadi Town.</p> <p>4. Awareness of residents in Lautoka City and Nadi Town is raised through implementation of environmental education activities on 3R promotion</p> <p>5. 3R model for Fiji is developed and recommended.</p>	<p>1. Solid Waste Management Master Plan is established.</p> <p>2-1 Plans of 3R pilot projects are developed. 2.2 Plan of partial improvement of landfill sites is developed. 2.3 Lautoka City and Nadi Town accumulate knowledge and experience to implement 3R promotion through the pilot project. 2.4 Lautoka City and Nadi Town accumulate knowledge and experience of operation and maintenance of the final disposal site through the pilot project. 3-1 Action Plan for 3R promotion is developed. 3.2 Lautoka City and Nadi Town conduct Action Plan for 3R promotion as scheduled. 3.3 Revised Action Plan for 3R promotion is developed</p> <p>4.1 Rate of public participation of separate collection for recyclables within the target residential area exceeds 30%. 4.2 Home composters are installed as scheduled in the Action plan</p> <p>5-1 Guideline and manuals are developed</p>

PDM₄ : 2010年10月

Narrative Summary	Objective Verifiable Indicators
<p>Overall Goal 3R (Reduce, Reuse, Return) is progressed in Fiji, mainly in Western Division.</p>	<p>1. Other municipalities mainly in Western Division introduce the 3R model for Fiji.</p>
<p>Project Purpose Capacity of 3R (Reduce, Reuse, Return) of Department of Environment (DOE), Lautoka City and Nadi Town is increased through developing 3R model for Fiji.</p>	<p>1. Total recycle rate to the Municipal Solid Waste (MSW) generation amount in Lautoka City and Nadi Town will be more than 19.7% and 20.4% respectively by the end of the Project. 2. Disposal rate to the MSW generation amount in Lautoka City and Nadi Town will decrease by more than 4.4% and 17.1% respectively from 2008's¹ by the end of the Project 3. DOE holds seminars to explain the guidelines and manuals targeting more than half of the municipalities in Fiji which provide waste collection services.</p>
<p>Outputs</p> <p>1. Solid Waste Management Plans focusing on 3R are developed respectively in Lautoka City and Nadi Town respectively.</p> <p>2. Lautoka City and Nadi Town obtain the capacity for proper Solid Waste Management (SWM) through the implementation of Pilot projects.</p> <p>3. Lautoka City and Nadi Town obtain the capacity for 3R promotion activities at whole area of Lautoka City and Nadi Town.</p> <p>4. Awareness of residents in Lautoka City and Nadi Town is raised through implementation of environmental education activities on 3R promotion</p> <p>5. 3R model for Fiji is developed and recommended.</p>	<p>1. Solid Waste Management Master Plan is established.</p> <p>2-1 Plans of 3R pilot projects are developed. 2.2 Plan of partial improvement of landfill sites is developed. 2.3 Lautoka City and Nadi Town accumulate knowledge and experience to implement 3R promotion through the pilot project. 2.4 Lautoka City and Nadi Town accumulate knowledge and experience of operation and maintenance of the final disposal site through the pilot project.</p> <p>3-1 Action Plan for 3R promotion is developed. 3.2 Lautoka City and Nadi Town conduct Action Plan for 3R promotion as scheduled. 3.3 Revised Action Plan for 3R promotion is developed. 3.4 Lautoka City and Nadi Town apply the knowledge and experience acquired through the pilot project to the expansion of 3R promotion to other areas.</p> <p>4.1 Rate of public participation of separate collection for recyclables within the target residential area exceeds 30%. 4.2 Home composters are installed as scheduled in the Action plan 4.3 Awareness-raising activities are conducted to get involved the sufficient number of stakeholders with appropriate approaches.</p> <p>5-1 Guideline and manuals are developed</p>

¹ In 2008, the baseline survey was conducted by Japanese Expert Team.

PDM₅ : 2011年11月

Narrative Summary	Objective Verifiable Indicators
<p>Overall Goal 3R (Reduce, Reuse, Recycle/Return) is progressed in Fiji, mainly in Western Division.</p>	<p>Percentage of population whose local authorities have been implementing the 3R promotion as opposed to the whole population of Western Division.</p>
<p>Project Purpose Capacity of 3R (Reduce, Reuse, Recycle/Return) of Department of Environment (DOE), Lautoka City and Nadi Town is increased through developing 3R model for Fiji.</p>	<ol style="list-style-type: none"> 1. Total recycle rate to the Municipal Solid Waste (MSW) generation amount in Lautoka City and Nadi Town will be more than 14.0% and 22.2% respectively by the end of the Project. 2. Disposal rate to the MSW generation amount in Lautoka City and Nadi Town will decrease by more than 9.4% and 16.9% respectively from 2008's by the end of the Project 3. DOE holds seminars to explain the guidelines and manuals targeting more than half of the municipalities in Fiji which provide waste collection services.
<p>Outputs</p> <ol style="list-style-type: none"> 1. Solid Waste Management Master Plans focusing on 3R are developed respectively in Lautoka City and Nadi Town 2. Lautoka City and Nadi Town obtain the capacity for proper Solid Waste Management (SWM) through the implementation of Pilot projects. 3. Lautoka City and Nadi Town obtain the capacity for 3R promotion activities at whole area of Lautoka City and Nadi Town. 4. Awareness of residents in Lautoka City and Nadi Town is raised through implementation of environmental education activities on 3R promotion. 5. 3R model for Fiji is developed and recommended. 	<ol style="list-style-type: none"> 1. Solid Waste Management Master Plan is established. 2.1 Plans of 3R pilot projects are developed. 2.2 Plan of partial improvement of landfill sites is developed. 2.3 Lautoka City and Nadi Town accumulate knowledge and experience to implement 3R promotion through the pilot project. 2.4 Lautoka City and Nadi Town accumulate knowledge and experience of operation and maintenance of the final disposal site through the pilot project. 3.1 Action Plan for 3R promotion is developed. 3.2 Lautoka City and Nadi Town conduct Action Plan for 3R promotion as scheduled. 3.3 Revised Action Plan for 3R promotion is developed. 3.4 Lautoka City and Nadi Town apply the knowledge and experience acquired through the pilot project to the expansion of 3R promotion to other areas. 4.1 Rate of public participation of separate collection for recyclables within the target residential area exceeds 30%. 4.2 Home composters are installed as scheduled in the Action plan 4.3 Awareness-raising activities are conducted to get involved the sufficient number of stakeholders with appropriate approaches. 5-1 Guideline and manuals are developed

4.3 セミナー

4.3.1 廃棄物管理マスタープラン

a. 固形廃棄物管理計画の策定

ラウトカ市役所/ナンディ町役場は、固形廃棄物管理計画に関連する施策の方向性を示した固形廃棄物管理計画を策定し、関係者を招集して発表した。

(1) 固形廃棄物管理計画の目的

本計画は、ラウトカ市/ナンディ町が実施する廃棄物に関する施策の基本方針のみならず、住民や関係機関の役割について、市の社会的特性や関連法制度を考慮しつつ、整理したものである。

(2) 固形廃棄物管理計画の構成

本計画は、環境管理法 (Environmental Management Act) 及び国家廃棄物管理戦略・アクションプラン (National Solid Waste Management Strategy and Action Plan 2008-2010) の内容に沿うかたちで、「ビジョン」「基本方針と対象」「アクションプラン」から構成される。

(3) 対象年度

本計画の対象年度は、2008年～2017年となっている。計画は、本プロジェクトが終了する2012年3月に見直しを行い、最終化される予定である。

(4) 計画の内容

1. 計画骨子
2. 適切な技術システムの基本方針
3. 計画の概要
4. 固形廃棄物管理計画
 - ・ ビジョン
 - ・ 数値目標
 - ・ 戦略
 - ・ 実施計画
5. アクションプラン

b. セミナーの目的

セミナーの目的は以下の通り:

- 住民の固形廃棄物管理計画に対するオーナーシップを醸成する。
- 計画履行に対する関係機関の協力を得る。

- 計画実施に際し生じる財政負担などの課題を認識した上で、計画実施に向け関係機関の協力を促す。
- 関係機関が3R促進の必要性を認識し、計画実施に向けイニシアティブを促す。

c. セミナーの概要

c.1 実施機関

ラウトカ市役所/ナンディ町役場 保健局

c.2 日程および会場

日程: 2010年2月24日(水) (ラウトカ市役所)、
 2010年2月26日(金) (ナンディ町役場)

会場: ラウトカ市役所/ナンディ町役場 会議室

c.3 参加者

セミナーの目的を踏まえた上で、参加者を招集した。各セミナーの参加者リストは以下の通り。

Table 1: 参加者リスト(ラウトカ市役所)

No.	所属機関	名前
1	Department of Environment	Laisani Lewanavanua
2	Divisional Health Inspector Western	Apology
3	Health Inspector – Lautoka Rural Local Authority	Anish Chand
4	Carpenters Shipping Ltd.	Ajesh Chand
5	Matrix Environmental Solution	Peter Singh
6	President – Concerned Neighbourhood – Field 40	Rouhit Kumar & Janardhan Goundar
7	President – Concerned Neighbourhood – Andra Street	Anand Raju & Emmanuel Sami
8	Garbage Removal Services Contractor	Apology
9	Lautoka Market Vendors Association	Makereta Rika
10	Lautoka Chamber of Commerce	Arunesh Singh (Lautoka General Transport)
11	Lautoka Retailers Association	Patrina Singh (Williams & Goslings)
12	Waste Management Ltd.	Apology
13	Punjas & Sons Ltd.	Apology
14	Waste Recyclers [F] Ltd.	Ajnesh Prasad
15	Smorgan Steel Recycling [F] Ltd.	-
16	Natural Waters [F] Ltd.	-

17	Coca Cola Amatil [F] Ltd.	-
18	Training & Productivity Authority of Fiji [TPAF]	-
19	FRIEND	Jone Nawaikula
20	Eddie Hin Industries/Tappoos	-
21	Environ Clean	Apology
22	Fiji Sugar Corporation	Isoa Rokomatu & Istiker Akbar
23	Organisation	Name & Signature
24	Lautoka City Council	Josefa Vucago (S.A)
25	Lautoka City Council	Shiva Rajan (Actg C.E.O)
26	Lautoka City Council	Krishna Rai (Admins)
27	Lautoka City Council	Shalen Dass (Building Dept
28	Lautoka City Council	Gyaneshwar Rao (Actg Director Health Services)
29	Lautoka City Council	Rouhit Singh (Actg Snr Health Inspector)
30	Lautoka City Council	Shalend Singh (Actg Snr Health Inspector)
31	Lautoka City Council	Wally (Health Inspector)
32	Lautoka City Council	Jeremaia (Health Inspector)
33	Lautoka City Council	Mithun Prasad (Health Inspector)
34	JET	Mr. Junji Anai (Chief Advisor)
35	JET	Mr. Kusonoki (Waste Minimization & Recycling)
36	JET	Ms. Yurie Kawabata (3R Promotion)
37	JET	Ms. Keiko Kani (Solid Waste Education)
38	JET	Ms. Sireen Sharma (Team Assistant

Table 2: 参加者リスト(ナンディ町役場)

No.	Organization	Name
1	NADI CHAMBER OF COMMERCE	MR. CHANDAR PRAKASH
2	FIJI POLICE FORCE NADI	MR. VISHWA RAJ
3	WASTE RECYCLERS	MR. AMITESH DEO
4	TANOA INTERNATIONAL HOTEL	MR. MUNI PILLAY
5	NADI HEALTH OFFICE	MR. CHRIS
6	THE SALVATION ARMY	MR. VILEKESA BOGI
7	BLUE WATER LODGE	MR. MIKE
8	VOYUALEVU RESIDENCE	MR. ESIRA
9	DO - NADI	MR. JOVESA VOCEA
10	SANDAL WOOD LODGE	MS. ANGELA BIRCH
11	SOFITEL	MS. MEREONI LUTUCIRI
12	HEXAGON	MS. VOLAU

13	NADI CLUB	MR. KANDA SAMI NAICKER
14	MARTINTAR NADI	MR. AMZAD ALI
15	MATAVOLIVOLI	MS. MEREONI
16	MATAVOLIVOLI	MR. ALLEN TERRANCE
17	MATAVOLIVOLI	MR. TIMOCI
18	7TH DAY ADVENTIST	MR. JOEVILISI
19	NADI TEMPLE	MR. LATCHMAN NAIDU
20	THE JET	MS. TARIVINI RAYAWA
21	THE JET	MR. SHALEND
22	CAAFI	RT. MAIBULU LAIGAVOKA
23	FIRE AUTHORITY	MR. APENISA RAYAWA
24	CAFFI	MR. MOSESE RATUCIRI
25	CHURCH	MR. BULI TAMANIVALU
26	NTC	MR. PRADEEP LAL
27	NTC	MR. JOSEVA GAVIDI
28	NTC	MR. SHAMEEM
29	NTC	MR. SAKARAIA SERAU
30	NTC	MS. PREMILA CHANDRA
31	NTC	MS. NAFIZA ALI
32	NTC	MR. RAJESHWAR RAJ
33	JOCV	MS. YUMI
34	JET TEAM	MR. ANAI
35	JET TEAM	MR. KUSUNOKI
36	JET TEAM	MS. KANI
37	JET TEAM	MS. KAWABATA
38	JET TEAM	MS SIREEN SHARMA

c.4 プログラム

プログラムを以下に示す。

Table 3: セミナー プログラム

No.	時間	内容	発表者
	08:00 – 08:30	登録	
1.	08:30 – 08:45	開会の挨拶	Administrator
2.	08:45 – 09:00	基調講演	環境局CP
3.	09:00 – 09:15	Session 1: 目的、セミナーの実施要領の説明	保健局 局長
4.	09:15 – 10:00	Session 2: 計画骨子、技術システムの説明	保健局CP
5.	10:00 – 11:45	Session 3:	保健局CP

		固形廃棄物管理計画の概要	
	10:45 – 11:00	Morning Tea	
6.	11:00 – 11:45	Session 4: 財務分析結果の発表	保健局CP
7.	11:45 – 12:15	Session 5: 組織改善計画	保健局CP
8.	12:15 – 12:45	Session 6: 質疑応答	
9.	12:45 – 13:00	Session 5: 結論/閉会	保健局 局長

司会: 保健局

4.3.2 3Rアクションプラン

日程: 2010年10月25日(月) (ラウトカ市役所)、
 2010年10月29日(金) (ナンディ町役場)

a. 目的

- (1) 関係機関に対し、3Rアクションプランを周知する。
- (2) 関係機関に対し、3Rパイロットプロジェクトの進捗状況について説明する。
- (3) 3Eアクションプランをスムーズに実施するために、関係機関の協力を促す。

b. プログラム

No.	時間	内容	発表者
	08:00 – 08:30	登録	
1.	08:30 – 08:45	開会	SA
2.	08:45 – 09:00	Session 1: 背景 目的、セミナーの進め方の説明	保健局局长
3.	09:00 – 09:45	Session 2: 3Rパイロットプロジェクトの進捗状況の説明	保健局CP
5.	09:45 – 10:15	モーニング・ティー	
6.	10:15	Session 3: 3Rアクションプラン (1)	保健局CP
7.	– 11:30	Session 4: 3Rアクションプラン (2)	保健局CP
9.	11:30 – 12:00	Session 5: ディスカッション/質疑応答	保健局CP
	12:00 – 12:15	Session 6: ふりかえり/閉会	保健局CP
	12:15 – 12:30	閉会宣言	C.E.O.

4.3.3 3Rガイドライン、3R推進マニュアル

日程：2011年11月2日 - 3日

会場：ラウトカ市ウォーターフロントホテル

目的：3Rガイドライン、3R推進マニュアル最終版の発表

No.	時間	内容	発表者	Affiliation
第1日目: 11月2日 (水) 3Rガイドライン/3R推進マニュアル セミナー				
	08:00 - 08:30	登録		
1.	08:30 - 08:40	開会宣言 (1)	Mr. Jope Director	DOE
2.	08:40 - 08:50	開会のことば (2)	Mr. Hashimoto	JICA
3.	08:50 - 09:00	参加者による自己紹介	Ms Senimili	DOE
4.	09:00 - 09:10	前回ワークショップ (2011年2月実施済) のふりかえり	Ms Senivasa	DoE
5.	09:10 - 9:30	3Rガイドライン (1) <ul style="list-style-type: none"> 対象、3R推進の基本方針 3R推進の基本枠組み 	Ms Senimili Mr. Rahul	DOE
6.	9.30 - 9.55	リサイクル法案の発表	Mr. Shalend	LCC
7.	9.55 - 10:00	ワーキング・グループ・ディスカッション	Ms Senivasa	DOE
	10:00 - 10:15	モーニング・ティー		
9.	10.15 - 11.30	各ワーキング・グループによる発表	Mr. Jope	DOE
10.	11:30 - 11:50	3R推進マニュアルの概要 <ul style="list-style-type: none"> 目的 利用対象者 内容 ベースライン調査の概要 	Ms Laisani	DOE
11.	11:50 - 12:10	<ul style="list-style-type: none"> ごみフロー作成手法 	Mr. Shalend	LCC
12.	12.10 - 12.30	質疑応答		DOE
	12:30 - 13:15	昼食		
13.	13:15 - 14:30	3R推進マニュアルの概要 (1) ホームコンポスト (2) 市場ごみコンポスト (3) 剪定ごみチップ化・リサイクル	Mr. Gyneshwar Mr. Wally Mr. Rouhit	LCC/NTC
14.	14:30 - 14:45	質疑応答		
	14:45 - 15:00	アフタヌーン・ティー		
15.	15:00 - 16:00	3R推進マニュアルの概要 (1) 資源物回収 (2) 学校における3R 促進	Mr. Raj Ms Premila	LCC/NTC
16.	16:00 - 16:30	質疑応答		
	16:30 -	閉会		

No.	時間	内容	発表者	Affiliation
	19:00 – 20:30	カクテル・パーティ		
第2日目: 11月3日 (木) 志布志/J-PRISMセミナー				
	08:00 – 08:30	登録		
1	08:30 – 09:00	- セミナー第1日目のふりかえり - 質疑応答 - 本日のセミナーのプログラムの確認 - 志布志市専門家チームの紹介	Ms Senivasa	DoE
1.	09:00 – 10:00	- 志布志市3R政策の概要および経験の紹介 - 志布志プロジェクトの概要 - 質疑応答		志布志市職員
2.	10:00 – 11:00	- 志布志市3R研修の報告及び住民説明会の結果報告 - 質疑応答		研修参加者 (LCC, NTC、コミュニティ代表 (NTC))
	11:00 – 11:15	モーニング・ティー		
3.	11:15 – 12:00	- J-PRISMの概要 - 質疑応答	Ms. Senimili	DOE
4.	12:00 – 12:30	- 3R推進活動の実施状況およびアクションプランの発表	Ms Eseta Mr. Dip	シンガトカ町、バ町
5.	12:30 – 13:00	閉会		DoE
	13:00 – 14:00	ランチ		

4.4 ワークショップ

4.4.1 廃棄物管理計画骨子／パイロットプロジェクト実施にかかる合意形成 (2009年6月)

a. 背景/目的

C/P と専門家チームは、最終化したごみの流れ図に基づき廃棄物管理計画骨子(案)を作成した。廃棄物管理計画の作成にあたり、関係者が廃棄物管理の実態と課題を共有するとともに、保健部が提案する廃棄物管理計画の骨子(案)について議論し、必要な事項を追加するなどの修正を行って骨子に係る合意形成を図ることを目的としてワークショップを開催した。

b. 概要

b.1 実施機関

ラウトカ市役所/ナンディ町役場 保健局

b.2 日程/会場

日程: 2009年6月1日（月）
 会場: ラウトカ市役所 会議室

日程: 2009年6月2日（火）
 会場: ナンディ町役場 会議室

b.3 参加者

(1) ラウトカ市ワークショップ

コミュニティ代表（4名）、学校関係者（3名）、リサイクル業者（3名）、清掃業者（2名）、NGO（2名）、地方行政官（2名）、市場組合（1名）が招集され、市役所の関係者（11名：JOCV1名を含む）、専門家チーム（7名）が加わり、合計35名が参加した。

(2) ナンディ町ワークショップ

地方行政官（5名）、宗教関係（4名）、コミュニティ（4名）、個人（1名）、清掃事業委託業者（3名）、リサイクラー（6名）、ナンディ町（8名：JOCV1名を含む）、JICA フィジー事務所（1名）、専門家チーム（7名）の合計39名が参加した。

b.4 プログラム

ワークショップのプログラムは以下の通り。

Table 4: プログラム

No.	Time	Title	Presenter
	08:00 – 08:30	登録	
1.	08:30 – 08:40	開会宣言	Administrator
2.	08:40 – 08:45	基調講演	環境局
3.	08:45 – 09:00	Session 1: 目的 & ワークショップの実施要領	保健局局长
4.	09:00 – 09:30	Session 2: 固形廃棄物管理の現状と課題	保健局CP
5.	09:30 – 10:00	Session 3: 廃棄物管理計画骨子（案）の発表	保健局CP
6.	10:00 – 10:30	Session 4: 3Rパイロットプロジェクトの概要説明	保健局CP
7.	10:30 – 10:40	質問票への記入・回収	参加者
8.	10:40 – 11:00	モーニング・ティー	
9.	11:00 – 11:30	Session 5: 質問票への回答/質疑応答	参加者/保健局CP

9.	11:30 – 12:15	Session 6: 廃棄物管理計画骨子(案)に関するグループ・ディスカッション	参加者/保健局CP
10.	12:15 – 12:45	Session 7: ディスカッション内容の発表n	グループ代表
11.	12:45 – 13:00	結論/閉会	保健局 局長

司会: 保健局

4.4.2 廃棄物管理計画(案)にかかる合意形成 (2009年10月)

a. 背景

3R パイロットプロジェクトを始めて 1 ヶ月が経過した段階で実行性、持続性、発展性の観点からいくつかの重要な情報が得られた。基本計画を作成する上で関係者の間でこれらの情報を共有し、C/P が提案する 3R 促進の拡大計画について合意を得ることを目的として、ワークショップを追加的に実施した。

b. 概要

b.1 実施機関

ラウトカ市役所/ナンディ町役場 保健局

b.2 日程/会場

開催日: 2009年10月13日

場所: ナンディ町役場会議室

b.3 参加者

LCC、NTC、関係者(地区代表、リサイクル業者、収集業者等)、パイロット・プロジェクト地区住民代表など

b.4 プログラム

プログラムは以下の通り。

Table 5: プログラム

No.	セッション	内容
1.		登録
2.		ナンディ町役場Special Administratorによる開会宣言
3.		環境局による基調講演
4.	Session 1	ワークショップの背景、目的、実施要領の確認
5.	Session 2	資源物回収のモニタリング結果の発表

6.	Session 3	コンポスト活動（ホームコンポスト、市場ごみコンポスト、剪定ごみ回収。チップ化、コミュニティ・ベースの草刈作業）のモニタリング結果の発表
7.	Session 4	ナンディおよびラウトカの3R推進普及計画の発表
8.	Session 5	質疑応答
9.	Session 6	普及計画に係るグループ・ディスカッション
10.	Session 7	ディスカッション結果の発表
11.		ラウトカ市役所Special Administratorによる閉会宣言

司会: 保健局

4.4.3 3Rガイドライン、3R推進マニュアル（2011年2月）

a. 背景

以下に概説される 3R ガイドライン及び 3R 推進マニュアルは、DOE が JICA 専門家と共同して作成した。3R ガイドラインは、国家レベルで廃棄物減量化を達成するための 3R 活動を実施するための国の方針をしてまとめられたものである。活動の主体は様々な地自体で廃棄物管理を担う人たちであり、彼らは 3R ガイドラインを理解し、3R 推進マニュアルを利用する必要がある。ワークショップは、DOE と JET が地方自治体廃棄物管理職員に説明するために開催し、3R ガイドラインおよびマニュアルの最終化に向けて、地方自治体職員の意見を聴取することを目的とした。ワークショップは、ラウトカ市とナンディ町で行われている実際の活動を見る機会を参加者に与えるために、Lautoka 市で開催された。

b. 概要

Lautoka と Nadi の 3R 活動経験から、廃棄物減量化は適切な廃棄物管理体制の下で持続可能に実践されるべきものである。この前提に基づき、DOE は 3R ガイドラインをフィジー国における廃棄物減量化に係る国の方針、3R 推進マニュアルを 3R を推進するための手引き書として位置づけ、それぞれ草案を用意した。

3R ガイドラインおよび 3R 推進マニュアルは以下の内容から構成される。

3R ガイドライン

1. 背景と目的
2. 3R 目標と推進の方針
3. 3R 推進の考え方

3R 推進マニュアル

1. 序論
 - (1) 背景と目的
 - (2) 3R 推進マニュアルの内容と用途

2. 既存 MSWM の現状と課題
 - (1) ベースライン調査
 - (2) ごみの流れ図の作成
 - (3) 既存 MSWM の現状と課題の理解
3. 3R 推進
 - (1) 3R
 - (2) 推進の基本方針
 - (3) 3R 推進の方策
 - ① ホームコンポスト
 - ② 市場ごみコンポスト
 - ③ 剪定ごみのリサイクル
 - ④ 資源物分別回収
 - ⑤ 学校での 3R 活動

c. 概要

c.1 実施機関

環境局 (Ministry of Local Government, Urban Development, Housing and Environment)
 ラウトカ市役所保健局、ナンディ町保健局

c.2 日程/会場

日程: 2011年2月23 – 25日(3日間)
 会場: ラウトカ市 Tanoa Waterfront Hotel会議室

c.3 参加者

各地区の SA(8名中6名参加)のほか、各自治体の Senior Health Inspector、関係省庁、自治体に派遣されている環境教育隊員など計40名を超えた。

所属機関	詳細	人数
National government		
DOE	Director, Waste Management Unit, DoE-West, DoE-North	7
Department of Local Government		1
Department of National Planning		1
Central Board of Health		1
Special Administrator		
1. Special Administrator	Ba, Tavua	1
2. Special Administrator	Labasa, Savusavu	1
3. Special Administrator	Lautoka	1

4. Special Administrator	Lami, Nasinu	1
5. Special Administrator	Suva, Nausori,	1
6. Special Administrator	Nausori, Levuka	1
7. Special Administrator	Nadi, Sigatoka	1
8. Special Administrator	Ba, Tavua	1
Municipality		
1. Ba Town Council	Senior Health Inspector	1
2. Labasa Town Council	Senior Health Inspector	1
3. Lami Town Council	Senior Health Inspector	1
4. Lautoka City Council	Dept. of Health	2
5. Levuka Town Council	Senior Health Inspector	1
6. Nadi Town Council	Dept. of Health	2
7. Nasinu Town Council	Senior Health Inspector	1
8. Nausori Town Council	Senior Health Inspector	1
9. Savusavu Town Council	Senior Health Inspector	1
10. Sigatoka Town Council	Senior Health Inspector	1
11. Suva City Council	Senior Health Inspector	1
12. Tavua Town Council	Senior Health Inspector	1
13. Rakiraki Town Council	Senior Health Inspector	1
Local Authorities	Divisional Health Inspectors	3
Total		36

c.4 プログラム

No.	Time	Title	Speaker	Affiliation
第1日目: 2月23日(水)				
	08:00 – 08:30	登録		
1.	08:30 – 08:40	開会宣言(1)		DOE/PS
2.	08:40 – 08:50	開会宣言 (2)		JICA
3.	08:50 – 09:00	参加者による自己紹介	Ms. Lusi	
4.	09:00 – 09:30	プロジェクトの概要、 ワークショップの目的、実施要領	Ms. Senivasa	DOE
	09:30 – 09:45	モーニング・ティー		
5.	09:45 – 12:00	3Rガイドラインの概要	Ms. Lusi, Ms. Senimili Ms. Laisani	DOE/JET
6.	12:00 – 13:00	3Rガイドラインに係るディスカッション	Mr. Jope	
	13:00 – 14:00	ランチ		
7.	14:00 – 15:00	プロジェクトの進捗状況 (3R Promotionビデオの上映を含む)	Mr. Shalend, Ms. Premila	LCC/NTC
8.	15:00 – 17:00	現場視察		LCC

No.	Time	Title	Speaker	Affiliation
		(市場ごみコンポスト、剪定ごみチップ化・リサイクル、Vunato最終処分場改善)		
	19:00 – 20:30	カクテル・パーティー		
第2日目: 2月24日 (木)				
	07:00 – 07:30	ホテル集合		
	07:30 – 08:00	ナンディNamaka地区への移動		
1.	08:00 – 09:00	現場視察 (資源物回収)		NTC
2.	09:00 – 10:00	現場視察(ホームコンポスト、Matavolivoli 3R推進委員会との意見交換)、モーニング。ティー		NTC
	10:00 – 10:30	ラウトカ市へ移動		
3.	10:30 – 11:00	3R推進マニュアル(3RPM): 概要紹介 (第1章)	Ms. Senimili	DOE/JET
4.	11:00 – 11:30	3R推進マニュアル: 固形廃棄物管理の現状および課題の把握 (第2章, 2.1ベースライン調査)	Ms. Laisani	DoE/JET
5.	11:30 – 13:00	3R推進マニュアル: 固形廃棄物管理の現状および課題の把握 (第2章, 2.2 ごみフロー図)	LCC C/P, JET	JET
	13:00 – 14:00	ランチ		
6.	14:00 – 15:30	ごみフロー図作成トレーニング	C/P, JET	JET
	15:30 – 15:45	アフタヌーン・ティー		
8.	15:45 – 17:00	作成したごみフロー図の発表および各自治体の廃棄物管理の現状と課題の共有	Mr. Anai Group meeting	DOE/JET (F: Senivasa)
		閉会		
第3日目: 2月25日 (金)				
	07:30 – 08:00	登録		
1.	08:00 – 10:15	3R推進マニュアル: 3R推進活動 (ホームコンポスト、市場ごみコンポスト、剪定ごみチップ化・リサイクル)	LCC, NTC	DoE/JET (F: Senivasa)
	10:15 – 10:30	Morning Tea		
3.	10:30 – 12:45	3R推進マニュアル: 3R推進活動 (資源物回収、学校における3R活動)	LCC, NTC	LCC/NTC/JET
	12:45 – 13:00	ふりかえり	Ms. Lusi	DOE
	13:00 – 13:05	閉会	Mr. Jope	
	13:05 – 14:00	ランチ		

4.5 コミュニティ・ミーティング

資源物回収の拡大展開にあわせて、LCC 及び NTC の CP あるいは各 Council に雇用された 3R Promoter が戸別訪問を通じて、各種リーフレット（資源物回収カレンダー、ホーム・コンポスト補助金制度、剪定ごみ回収・チップ化）や資源物回収用サックを配布し、システムの概要を説明し、協力を促した。

戸別訪問時には、各 Council はコミュニティ・ミーティングの開催趣旨、日程、会場について記載した Circular を配布した。ミーティングは、住民の記憶が新しいうちに戸別訪問の実施日にできる限り近い日程で設定した。また、ひとりでも多くの住民が会場へアクセスしやすいよう対象地域を細分化し、地域ごとに開催した。会場には、住民代表や Council 職員の知人宅、学校、教会のホール、寺院などを利用した。

ミーティング当日は、開始前に CP が多目的トラック（MPT）で対象地域を巡回し、スピーカーでミーティング開催についてリマインドした。配布資料にはプロジェクト・ニュースレターを活用したほか、デモンストレーション用にコンポスターも用意し、プレゼンテーションで利用した。

プレゼンテーション内容は、基本的に以下から構成される。

- (1) 廃棄物管理の現状と課題（ごみ減量化・3R の必要性について）
- (2) 各 3R 推進システムの概要（①資源物回収、②ホーム・コンポスト補助金制度、③剪定ごみ回収・チップ化）

プレゼンテーションは、CP が持ち回りで実施し、参加者の属性に合わせて、ヒンズー語やフィジー語を織り交ぜながら説明が行われた。

プレゼンテーション語には、住民から様々な質問やコメントが寄せられたほか、時には 3R や廃棄物関連以外の内容に及ぶこともあった。住民説明会は、CP のプレゼンテーション能力を向上させるだけでなく、住民と自治体間のコミュニケーションの場としても活用された。



住民説明会 (Field 40, LCC)



住民説明会 (Matavolivoli, NTC)

4.6 週例会議

4.6.1 週例会議の開催と内容

週例会議は、専門家チームと C/P の意志の疎通を図り円滑なプロジェクト運営を行うために、プロジェクト開始直後の 10 月 22 日から開催した。第 1 回～4 回の最初 1 ヶ月間は、ラウトカ市とナンディ町のそれぞれで開いていたが、双方の活動を理解して自らの改善に資することと、専門家チームの時間を節約するために、第 5 回目（11 月 27 日）以降は合同で行うことにした。合同週例会議は持ち回りでいき、議長はそれまでの専門家から担当 Council の保健部部长が行うこととした。

週例会議は当初毎週木曜日午前 10 時からとしていたが、3RPP の一環としてナンディの Matavolivoli 地区で始めた資源ごみの回収日が毎週木曜日午前 10 時から 12 時としたため、2009 年 9 月第 2 週からは毎週水曜日の午前 10 時からに変更した。

JET が現地を不在にした第 2 年次から 3 年次への移行期間に、カウンターパートは 3 回の週例会議（第 50 回～52 回）を開催し、それぞれの 3R 推進に関する情報を交換した。

4 年次から、DOE の西部支所が設けられたことを受け、LCC、NTC、DOE（西部支所）が持ち回りで週例会議の場所を提供するようになった。

プロジェクト期間内で、合計 79 回の週例会議を開催した。

1. 前回週例会議の議事録確認
2. 直前 1 週間の活動報告
 - 3R 活動の報告
 - 資源物回収の結果
 - ホームコンポストの普及状況
 - 市場ごみコンポストの状況
 - 処分場の状況と対応報告
3. 次週の活動予定
4. 議題提出／議論
 - 3R 活動での課題
 - 回収した資源物の売却益はほとんどない
 - 商業地区では段ボールが多い
 - リサイクル業者からのクレーム
 - コンポスターが思うように普及しない
 - 市場ごみコンポストの製造方法
 - 3R アクションプランの内容
 - ワークショップ、セミナーの内容と役割分担
 - 事業進捗報告書の作成分担
 - その他
5. お知らせ（JCC／中間評価／終了時評価／訪問者等の予定、専門家の移動など）

4.6.2 週例会議の効果

週例会議では、前日までにそれぞれの C/P からパワーポイントで作成したプレゼン資料を専門家チームに送り、専門家チームが編集することになっていた。会議での活動報告は専門家チーム、LCC、NTC 及び DOE がそれぞれ発表し、参加者からの質疑応答を行って、問題点や解決方法について議論した。

この週例会議を通じて、C/P の取りまとめる力が格段に向上したことと、これを発表することにより説明能力も明らかに向上した。セミナーやワークショップのみならず、JCC においても自らの活動報告を行い、発表内容に対する質問に対して的確に答えられるようになったことでも、能力向上の効果は証明されると考える。

更に、週例会議を通じて共通する課題や好事例の共有など、隣接する自治体が協力してプロジェクトに取り組むことができるようになったことも、大きな効果と思われる。

4.7 本邦研修

本邦研修は、2 年次と 3 年次にそれぞれ半月ずつ実施した。研修場所はいずれも JICA 北九州研修所であったが、期間中 3 泊 4 日で志布志市を訪問し、3R 活動を視察した。志布志市は、人口規模が近い自治体であることから、C/P は容易に自らの自治体と比較できたことと、3R の先進的な活動をしている志布志市の実態をみることにより、プロジェクトの最終ゴールのイメージをつかむことができたことから、その後のプロジェクト活動に大いに役立つものであった。

以下にそれぞれの研修概要を述べる。

第1回本邦研修（2009年11月15日～11月28日）

研修生リスト

	Trainee		Position
1	Mr. Jope Davetanivalu	DOE	Acting Director, Department of Environment(DOE), Ministry of Local Government and Urban Development & Housing and Environment
2	Mr. Shalend P Singh	LCC	Acting Senior Health Inspector, Health Department, lautoka City Council (LCC) / Co Project Manager
3	Mr. Rouhit Karan SINGH	LCC	Health Inspector Health Department, lautoka City Council (LCC)
4	Mr. Sakaraia Serau	NTC	Acting CEO Nadi Town Council, Co – Project Manager
5	Mrs. Nafiza Ali	NTC	Assistant Health Inspector, Department of Health, Nadi Town Council (NTC)

日程		活動		講師
11/15	日		JICA九州センター（KIC）到着	
11/16	月	AM	研修ブリーフィング	
		PM	ジョブレポート発表会 & オリエンテーション	
11/17	火	AM	循環型社会構築に向けた法制度	Mr. Sashiwa KITA
		PM	循環型社会構築に向けた法制度	Mr. Sashiwa KITA
11/18	水	AM	日本の最終処分場の概要	Mr. Obase Kitakyushu city office
		PM	福岡市最終処分場の視察	Mr. Ijima Fukuoka city office
11/19	木	AM	北九州市の環境教育	Environment Museum
		PM	エコタウン視察	Mr. Matsuo Eco Town
11/20	金	AM	コンポスト学習	Mr. Takakura J-Pec
		PM	剪定ごみのコンポスト	Mr. Maki Social welfare association
11/21	土	AM	市民による河川浄化活動	Mr. Morishita We love Murasaki River
11/22	日			
11/23	月		移動 KIC⇒Shibushi	
11/24	火		志布志市視察（最終処分場など）	
11/25	水		志布志市視察 - 講義 & ディスカッション	
11/26	木	AM	志布志市視察 - 講義 & ディスカッション	
		PM	移動 志布志⇒KIC	
11/27	金	AM	アクションプランの発表	Mr. Anai
		PM	アクションプランの発表、閉講式	
11/28	土		Fijiへ出発	

4.7.1 第2回本邦研修（2010年8月30日～9月13日）

研修生リスト

	Name	所属	Position
1	Aisea Tui Draki	NTC & LCC	Special Administrator
2	Ms. Seinivasa Waqaramasi	DOE	Senior environmental officer, Western office

3	Siva RAJEN	LCC	C.E.O of LCC
4	Gyneshwar RAO	LCC	Director of Health Department, LCC
5	Wally ATALIFO	LCC	Health Inspector
6	Jeremaia MARAWA	LCC	Health Inspector
7	Premila CHANDRA	NTC	Acting Director of Health Department
8	Rajeshwar RAJ	NTC	Health Inspector
9	Haroon Shamim ALI	NTC	Engineering Dept.
10	Taniela SATURU	NTC	Litter Prevention Officer

研修スケジュール

		研修項目/訪問先	講師/担当
8/30	月	フィジー出発	
8/31	火	来 日	
9/1	水	AM	JICAオリエンテーション JICA
		PM	ジョブレポート発表会 KITA
9/2	木	AM	日本の廃棄物処理の概要 北九州市環境局
		PM	福岡市東部埋立処分場見学 KITA
9/3	金	AM	北九州市の環境教育 環境ミュージアム
		PM	北九州市エコタウン 自動車・ペットボトル（特別見学コース） 北九州市エコタウン
9/4	土	市民による河川浄化活動	紫川を愛する会
9/5	日	休 日	
9/6	月	（休日） 移動 北九州市 ⇒ 志布志市	
9/7	火	志布志市の廃棄物事業（分別排出及び収集、中間処理、最終処分場、住民協力、環境教育 等）の実態見学	専門家 研修同行
9/8	水	市役所が行ってきた活動（基本計画の作成、住民教育、施設整備、財務処置、収集作業、リサイクル業者の協力）の講義と意見交換	
9/9	木	AM	同 上
		PM	移動 志布志市 ⇒ 北九州市
9/10	金	AM	廃棄物減量化・資源化をテーマにアクションプランを作成する 作成指導評価会 JICA 専門家
		PM	ICA評価会 アクションプラン発表会 閉講式
9/11	土	休日	
9/12	日	離日	
9/13	月	フィジー(ナンディ) 着	

5 その他

5.1 ILO との連携

5.1.1 第1回現地活動（2009年6月13日～19日）

ILO タイ事務所より2名がラウトカ市とナンディ町に入り、以下の活動を行った。

川上 博士

Ton That Khai 博士

a. ミッションの目的

ミッションの目的は、JICA が進める廃棄物減量化・資源化プロジェクトと協力して、フィジー国におけるごみ収集作業員の作業環境を理解し、彼らの安全と衛生面の改善を図るためのトレーニング計画を作成することであった。ミッションは、2009年1月に東京でILO と JICA との協議結果と作業計画に基づいて実施した。

b. 活動結果

ミッションは、2日間のタイムアンドモーション調査と作業員への聞き取り調査を実施して、ラウトカ市とナンディ町の廃棄物収集作業の実態を把握した。この調査結果に基づいて、(1)ごみ置き場、(2)収集作業の安全、(3)作業環境、(4)コミュニティの協力、(5)防具の適切な使用による安全確保、(6)福利厚生施設、(7)作業編成、の技術的な7分野に対して安全と衛生を改善するための42項目の活動チェックリストを作成した。

ミッションは、把握した作業状況の結果を、合同週例会議の席で発表し、以下のフォローアップ活動計画を提案した。

- ILO 参加型訓練手法を用いて、バンコックで OSH トレーニングマニュアルを作成する。
- JICA 東京に対して、これを説明する。
- ドラフト訓練マニュアルを用いて、ラウトカ市とナンディ町とでパイロット訓練を実施する（2009年9月下旬）
- 訓練マニュアルの最終化（2009年10月～2010年1月）
- 最終版訓練マニュアルを用いた、トレーナー訓練ワークショップの実施（2010年2月）

Day		Activity	Place
14-Jun	Sun	到着	
15-Jun	Mon	AM: LCC表敬、プロジェクトのブリーフィング	Lautoka

		PM: NTC表敬、ブリーフィング	Nadi
16-Jun	Tue	AM: ごみ収集作業のタイムアンドモーション調査、公共清掃の視察	Lautoka
		PM: 作業員へのインタビュー、最終処分場運営管理業務の視察	Lautoka
17-Jun	Wed	AM: ごみ収集作業のタイムアンドモーション調査、公共清掃の視察	Nadi
		PM: 作業員へのインタビュー	Nadi
18-Jun	Thu	AM: とりまとめ	Lautoka
		2:00PM: 週例ミーティング (視察結果の共有)	Lautoka
19-Jun	Fri	補足調査	
20-Jun	Sat	出発	

5.1.2 第2回現地活動（2009年10月7日～8日）

ILO タイ事務所より Ton That Khai 博士がラウトカ市とナンディ町に入り、収集作業員の安全と衛生を改善するためのトレーニング・ワークショップを行った。

a. 目的

1. 既存の現地でのグッドプラクティスより学んだことに基づく収集作業員の安全と衛生を改善するための実効的手法を見いだす。
2. ラウトカ市とナンディ町において、安全で効率的な収集システムを確立するための自治体と、収集作業員、管理者及びコミュニティの協力体制を強化する。
3. 最終化のための訓練マニュアルの試行

b. 参加者: 約30名:

1. ラウトカ市及びナンディ町職員（10名）
2. 収集作業員（6～7名）
3. 収集会社代表者／作業管理人（3～4名）
4. ラウトカ市とナンディ町のコミュニティ代表者（10名）

c. プログラム

第1日目（10月7日）

0800 – 0830 登録

0830 – 0850 開講スピーチ (Lautoka & Nadi 自治体代表、JICA)

- 0850 - 0910 研修概要の紹介 (Khai)
0910 - 1200 ごみ収集現場に係るアクション・チェックリストの説明 (参加者)
0910 - 0930 ごみ収集現場への移動
0930 - 1030 チェックリストを用いた実地検証
1030 - 1100 研修会場への移動
1100 - 1200 初期グループ・ディスカッション (優良事例および改善すべき課題の抽出)
1200 - 1300 昼食
1300 - 1500 セッション 1: ごみの貯留と取り扱い (Khai)
1300 - 1340 研修講師によるプレゼンテーション
1340 - 1410 グループ・ディスカッション
1410 - 1450 グループ・プレゼンテーション
1450 - 1510 アフタヌーン・ティー
1510 - 1700 セッション 2: 車両と交通安全 (Khai)
1510 - 1550 研修講師によるプレゼンテーション
1550 - 1620 グループ・ディスカッション
1620 - 1700 グループ・プレゼンテーション

第 2 日目 (10 月 8 日)

- 0830 - 1010 セッション 3: 業務環境 (Khai)
0830 - 0910 研修講師によるプレゼンテーション
0910 - 0940 グループ・ディスカッション
0940 - 1010 グループ・プレゼンテーション
1010 - 1030 モーニング・ティー
1030 - 1200 セッション 4: 住民協力 (Khai)
1030 - 1100 研修講師によるプレゼンテーション
1100 - 1130 グループ・ディスカッション
1130 - 1200 グループ・プレゼンテーション
1200 - 1300 昼食
1300 - 1430 セッション 5: 福利厚生及び作業組織 (Khai)
1300 - 1330 研修講師によるプレゼンテーション
1330 - 1400 グループ・ディスカッション
1400 - 1430 グループ・プレゼンテーション
1430 - 1450 アフタヌーン・ティー
1450 - 1700 セッション 6: プロポーザル作成 (参加者)
1450 - 1520 改善に向けた実施 (Khai)
1520 - 1550 グループ・ディスカッション
1550 - 1630 グループ・プレゼンテーション
1630 - 1650 ワークショップの評価・検証
1650 - 1700 閉講式

5.1.3 第3回現地活動（2010年3月4日～5日）

ILO タイ事務所より川上博士がラウトカ市とナンディ町に入り、収集作業員の安全と衛生を改善するためのトレーナートレーニング・ワークショップを行った。

a. Objectives

研修終了時には、研修参加者は以下のことを理解していることが期待される：

- (i) 既存の現場の優良事例を学ぶことにより、ごみ収集業者の安全と衛生環境改善に向けた実用的かつ低コストな方策；
- (ii) Lautoka 及び Nadi における安全かつ効率的なごみ収集システムの構築に向けた自治体、ごみ収集業者監理者・現場作業員、コミュニティ間の協力関係の重要性；
- (iii) 他の収集作業員及びコミュニティ・住民に対する WARM 研修活用に向けた参加型トレーニング手法。

b. 参加者

1. Lautoka 市役所および Nadi 町役場の代表；
2. ごみ収集作業員の代表；
3. ごみ収集業者のマネージャー・監理者代表；
4. Lautoka および Nadi のコミュニティ代表；
5. ごみ収集システムの安全・効率化に係る関係・協力機関。

c. プログラム

Day 1 (3月4日)

0910 - 1200	ごみ収集現場に係るアクション・チェックリストの説明 (参加者)
0910 - 0930	ごみ収集現場への移動
0930 - 1030	チェックリストを用いた実地検証
1030 - 1100	研修会場への移動
1100 - 1200	初期グループ・ディスカッション (優良事例および改善すべき課題の抽出)
1200 - 1300	昼食
1300 - 1500	セッション 1: ごみの貯留と取り扱い (Khai)
1300 - 1340	研修講師によるプレゼンテーション
1340 - 1410	グループ・ディスカッション
1410 - 1450	グループ・プレゼンテーション

1450 – 1510	アフタヌーン・ティー
1510 - 1700	セッション 2: 車輻と交通安全 (Khai)
1510 – 1550	研修講師によるプレゼンテーション
1550 – 1620	グループ・ディスカッション
1620 – 1700	グループ・プレゼンテーション

1300 – 1330	登録
1330 – 1340	開講スピーチ (Lautoka & Nadi 自治体代表、JICA)
1340 – 1400	研修プログラムの紹介 (Kawakami)
1400 – 1530	セッション 1: 安全なごみ貯留とごみ収集車輻の安全管理 (Kawakami)
1400 – 1435	研修講師によるプレゼンテーション
1435 – 1500	グループ作業
1500 – 1520	グループ・プレゼンテーション
1520 – 1540	アフタヌーン・ティー
1540 – 1700	セッション 2: 作業環境と福利厚生 (Kawakami)
1540 – 1615	研修講師によるプレゼンテーション
1615 – 1640	グループ作業
1640 – 1700	グループ・プレゼンテーション

Day 2 (3月5日)

1400 – 1420	優良事例写真コンテスト(参加者)
1420 – 1610	セッション3: 改善実施 (Kawakami)
1420 – 1445	研修講師によるプレゼンテーション
1445 – 1510	グループ作業
1510 – 1530	アフタヌーン・ティー
1530 – 1550	グループ・プレゼンテーション
1550 – 1640	セッション4: WARMトレーニング・ワークショップを開催に向けた参加型 講師になるために
1550 – 1615	研修講師によるプレゼンテーション
1615 – 1640	相互ディスカッション
1640 – 1650	ワークショップの評価
1650 – 1700	閉会

5.2 JOCV との連携

2008年10月のプロジェクト開始以来、以下のJOCVがプロジェクトの対象となる自治体(LCC, NTC)に配属された。各JOCVの要望調査表には、プロジェクト活動と連携して

活動を実施していくことが明記されていたため、各人とも経験や得意分野を活かしながらプロジェクトに積極的に関与して活動を進めていた。各 JOCV の主な活動は以下の通り。

	Name/配属先/派遣時期	主な活動	プロジェクトとの関連
1	吉富 有美 ナンディ町役場配属 2009年3月～2011年3月	<ul style="list-style-type: none"> - 環境ロゴ・スローガン・キャラクター・コンクール開催 - 学校環境教育プログラム(Clean School Program)の実施、ガイドラインの作成 - Bula Festivalでの3R推進 - 資源物回収・ホームコンポストのモニタリング実施支援 - 3R委員会ミーティング及び住民説明会への参加 	<ul style="list-style-type: none"> - 優勝作品となったロゴ・スローガン・キャラクターは、プロジェクトで作成する環境教育教材に活用 - 学校環境教育プログラムのガイドラインを3R推進マニュアルに添付 - 専門家不在時のモニタリング結果の報告やプロジェクト状況の連絡
2	前田 雄輝 ラウトカ市役所配属 2009年3月～2011年3月	<ul style="list-style-type: none"> - 環境ロゴ・スローガン・コンクール開催 - 市場ごみコンポストのモニタリング実施 - ホームコンポストのモニタリング実施 - Vunato最終処分場での水質モニタリングの実施支援 - 学校環境教育プログラム(Clean School Program)の実施支援 	<ul style="list-style-type: none"> - 優勝作品となったロゴ・スローガン・キャラクターは、プロジェクトで作成する環境教育教材に活用 - コンポスト実施手法の3R推進マニュアルへの反映 - モニタリング結果に基づくコンポストによるごみ減量化効果の定量的な把握 - 処分場改善計画への水質モニタリングの位置づけ - 専門家不在時のモニタリング結果の報告やプロジェクト状況の連絡
3	笹岡 佳代 ナンディ町役場配属 2011年5月～2013年5月(派遣中)	<ul style="list-style-type: none"> - 市場ごみコンポストのモニタリング実施 - 学校環境教育プログラムの実施支援(ガイドラインの修正、西部地区への普及) 	<ul style="list-style-type: none"> - モニタリング結果に基づくコンポストによるごみ減量化効果の定量的な把握 - J-PRISMへの展開

上記以外にも、週例ミーティングにも毎回参加しプレゼン発表してもらうなど、JOCV にとっても活動成果を共有する良い機会になった。

また、対象自治体以外(スバ市役所、シンガトカ町役場)の環境教育隊員に対しても、3R ワークショップやセミナーへの招致、ベースライン調査の共有、プロジェクト現場視察の受け入れ、メールを通じた技術的アドバイスなどを行った。

専門家チームで3R 促進を担当する川畑が元フィジー環境教育隊員(16-1/環境局配属)で、現 JOCV とは同世代であったこともあり、隊員と専門家間のコミュニケーションは積極的に図れていた。



学校の 3R 活動をモニタリングする吉富隊員



市場ごみコンポストのモニタリングを実施する前田隊員



市場ごみコンポストのモニタリングを実施する笹岡隊員

6 結論と勧告

6.1 結論

専門家チームは、当初期待された個々の成果に対して達成度を JCC に報告し、JCC はプロジェクト目標が成功裏に達成されたことを承認した。以下に、プロジェクトの実施を通じて達成されたことをまとめた。

(1) 廃棄物管理体制の確立に向けた総合的な取り組み

本プロジェクトでは、適正な廃棄物管理体制の確立を最優先に考え、3R は適正な管理体制の下で実施されるとのコンセプトを貫いた。これにより C/P は、3R は特別な事ではなく、日常行われる廃棄物処理の工夫であることを認識し、3R 活動は既存システムの中で円滑に取り込まれた。

(2) 適切な対象グループの選定

2つの自治体を対象としたことにより、相互が意識し合い、協力する体制が確立された。

(3) 3R 推進に向けた C/P の高い能力と強い責任感

LCC と NTC の C/P は、Health Inspector の資格を持っていて、衛生、廃棄物に関する基礎的な知識を有していたため、専門家チームと高いレベルの議論を交わし、協働して計画を作成することができた。また C/P は、プロジェクトに対するオーナーシップと強い責任感を持っていたことから、住民への強力要請も具体的で効果的に実施できた。

(4) 3R を支えるコミュニティの自発性

3R 活動は、隣人同士が知恵を出し合い、協力し合ってごみの減量化・資源化に取り組む地域ぐるみの活動が有効であることから、コミュニティの自発性無くしては成り立たない。本プロジェクトで選定したパイロット地区は、住民がホームコンポスト、資源物分別回収などの活動に対して自発的に取り組み、その後の 3R 活動の拡大の拠点として、他地域のモデルになった。

(5) オーナーシップの醸成と能力強化の効果的な仕組み

週例会議での、活動報告、活動計画の情報交換は、個々の C/P の情報のとりまとめ、発表能力を強化しただけではなく、プロジェクトに対するオーナーシップを醸成し、かつ両自治体での経験を共有することで協力体制が確立された。

(6) 対策を考案するための試行錯誤のプロセス

住民参加を促しながら展開する 3R 活動では、参加率や資源物回収量は、行政サイドの活動に比例して増加するとは限らない。試行錯誤しながら効果的な啓蒙活動や回収システムの改善を地道に継続することが求められる。C/P はこのような試行錯誤のプロセスをよく理解し、期待通りにならないことに対しては改善を繰り返す術を身につけ実行する

ようになった。

(7) 有効な本邦研修

C/P は、我が国での 3R を通じての廃棄物減量化・資源化を成功させている志布志市を視察し、プロジェクトの目標到達時のあるべき状態を想像することができるようになった。これにより、個々の C/P が、現在の状況の良否を判断できるようになった他、次に行うべき事を主体的に考え実行できるようになった。

6.2 勧告

(1) 廃棄物処分場の適正な運営

3R 活動を通じて廃棄物の減量化を推進するものの、最終処分場は今後とも不可欠な施設であることから、適正に運営・維持管理し、周辺環境への影響を最小限にすることが肝要である。しかしながら、処分場を適正に運営するには適切な人材、機材、資材が不可欠で、これらを確保するためには相応の費用が必要である。従って、ラウトカ市に対して、必要な費用を確保し、処分場を適正に運営・維持管理することを勧告する。

(2) プロジェクト効果を持続するための必用な資金の確保

“廃棄物を減らすためには、相応の費用が必要である”との認識は、本プロジェクトで周知された。フィジー国では本プロジェクトで確立された 3R モデルを、まずは西部地区から、続いて全国へと拡大する計画である。計画実現のために、3R 推進の拡大に合わせて、自治体レベル、国レベルには適切な資金を確保することが求められる。

(3) 廃棄物管理基本計画の実施

ラウトカ市とナンディ町は、3R モデルとして、他自治体を先導することが期待される。このためには、両自治体にとって、プロジェクトを通じて既に用意された 3R に軸を置く廃棄物管理計画を忠実に実行することが求められる。

(4) オーナーシップの醸成と能力を強化する効果的な仕組みの継続

プロジェクト期間中に実施された週例会議は、オーナーシップの醸成と能力強化に有効であることが検証された。従って、今後 3R 活動を拡大するに際して、定例会を開催して関係者間の情報交換、協力体制の強化等を図ることを勧告する。

(5) 3R 推進のための省庁間作業部会の役割の強化

3R 推進には多くの関係者と機関が関わることから、地方自治、環境、教育等を司る省庁間の連携が、今後の展開に不可欠である。従って、地方自治体が円滑に 3R 活動を拡大するために、省庁間作業部会での役割を明確にし、強力なリーダーシップを発揮することが望ましい。

添付資料

添付資料 1 : ラウトカ市 (LCC) 活動報告

添付資料 2 : ナンディ町 (NTC) 活動報告

添付資料 3 : 環境局 (DOE) 活動報告

添付資料 4 : RD 及び MM

添付資料 5 : JCC 議事録

フィジー国廃棄物減量化・資源化促進プロジェクト

ラウトカ市（LCC）活動報告書

目 次

ACTIVITY 1: DEVELOPMENT OF SWM PLAN FOCUSING ON 3RS.....	1
Activity 1-1 Survey the current status of SWM.	1
Activity 1-2 Conduct a field survey on Lautoka City Vunato Landfill site (Lautoka Landfill).....	5
Activity 1-3 Trace the current waste flow from generation to final disposal and identify issues to be addressed.	7
Activity 1-4 Develop frameworks of SWM.	8
Activity 1-5 Build a consensus on the frameworks of SWM among stakeholders. ...	9
Activity 1-6 Develop draft SWM plans based on the frameworks of SWM.....	9
Activity 1-7 Finalize SWM plans.	10
ACTIVITY 2: CAPACITY DEVELOPMENT FOR SWM THROUGH PILOT PROJECT.....	10
Activity 2-1 Conduct a community survey.....	10
Activity 2-2 Select pilot areas on the basis of the community survey.....	11
Activity 2-3 Develop a pilot project plan on 3R.....	12
Activity 2-4 Develop a pilot project plan on the partial improvement of Lautoka Landfill	15
Activity 2-5 Conduct trainings, on the job trainings, etc. for the staff of Lautoka City Council and Nadi Town Council to implement pilot project.	18
Activity 2-6 Complete the Environmental Impact Assessment (EIA) process required for the pilot project on the partial improvement of Lautoka Landfill.	21
Activity 2-7 Conduct the pilot project on 3R at pilot areas.	21
Activity 2-8 Conduct the pilot project on the partial improvement of Lautoka landfill.	24
Activity 2-9 Review and evaluate the 3R pilot projects.	29
Activity 2-10 Review and evaluate the Pilot Project for landfill improvement.	30
Activity 2-11 Preparation of 3R-PP separate collection for recyclables in commercial area	31
Activity 2-12 Conduct Pilot Project on separate collection for recyclables in commercial area.	33
Activity 2-13 Conduct OJT for operation and maintenance of Lautoka landfill.....	35
ACTIVITY 3: OBTAINING THE CAPACITY FOR 3R PROMOTION ACTIVITIES AT WHOLE AREA OF LCC & NTC.....	36
Activity 3-1 Develop a 3R promotion action plan for the whole area of Lautoka City and Nadi Town.	36
Activity 3-2 Conduct trainings, on the job trainings, etc. for the staff of Lautoka City council and Nadi Town council to implement 3R promotion.	36
Activity 3-3 Implement 3R promotion.	37
Activity 3-4 Review and evaluate 3R promotion.	41
Activity 3-5 Monitor the progress of communities' perception, behavior change of the people by conducting the Public Opinion Survey.	44
ACTIVITY 4: AWARENESS RAISING OF RESIDENTS THROUGH ENVIRONMENTAL EDUCATION ACTIVITIES.....	48

Activity 4-1	Review on environmental educational tools/programmes in Fiji, Japan and other countries.	48
Activity 4-2	Develop effective educational tools/programmes.	48
Activity 4-3	Conduct trainings, on the job trainings, etc. for the groups & personnel concerned on 3R promotion in Lautoka and Nadi Town.	49
Activity 4-4	Introduce the educational tools/programmes in the pilot project areas.	49
Activity 4-5	Evaluate the educational tools/programmes.	49
Activity 4-6	Improve the educational tools/programmes.	50
Activity 4-7	Implement activities to raise awareness through using the educational tools/programmes in Lautoka City and Nadi Town.	51

ACTIVITY 5: DEVELOP AND RECOMMEND A 3R MODEL FOR FIJI ... 53

Activity 5-1	Review all the process & results of the activities for 3R promotion by the project and extract findings.	53
Activity 5-2	Develop draft guidelines, manuals on 3R model for Fiji, etc. for its promotion.	54
Activity 5-3	Finalize the guidelines, manuals, etc.	54
Activity 5-4	Conduct seminars to present to other municipalities the guidelines and manuals.	54

ACTIVITY 1: DEVELOPMENT OF SWM PLAN FOCUSING ON 3RS

Activity 1-1 Survey the current status of SWM.

Baseline Survey

Eight kinds of baseline surveys were conducted by contracting out to private sectors in Fiji. Some of the surveys were put together and contracted out as one package because they were considered better to be conducted by one contractor judging from the survey timing and methods.

Table 1: List of Baseline Survey and Contractors

Baseline Surveys	Contractors
Waste Amount and Composition Survey (WACS)	WesEng Consulting
Final Disposal Amount Survey (FDAS)	
Time and Motion Survey (T&M)	WesEng Consulting
Public Opinion Survey (POS)	Environment Consultants Fiji (ECF)
Compost Demand and Market Survey (CDMS)	
Recycling Activity Survey (RAS)	
Community Survey	WesEng Consulting
Topographic Survey in Lautoka Landfill	Cadastral Solutions Ltd.

Most of the surveys mentioned above were to be completed by the end of January 2009, and basic data for a waste flow chart was also to be collected.

a. Waste Amount and Composition Survey (WACS)

a.1 Objective

In order to prepare sustainable solid waste management plans for LCC it is necessary to properly grasp the current waste flows. WACS was conducted in order to grasp the amount of waste generation and its composition in LCC.

a.2 Contents

In WACS, 43 samples from 13 generation sources were taken from LCC with the waste amount survey being conducted over 8 days. This survey was to be conducted in both dry and rainy seasons, and waste generation rate was to be surveyed at 13 generation sources in LCC. Waste composition of the 13 generation sources was also surveyed. WACS was conducted for dry and wet seasons.

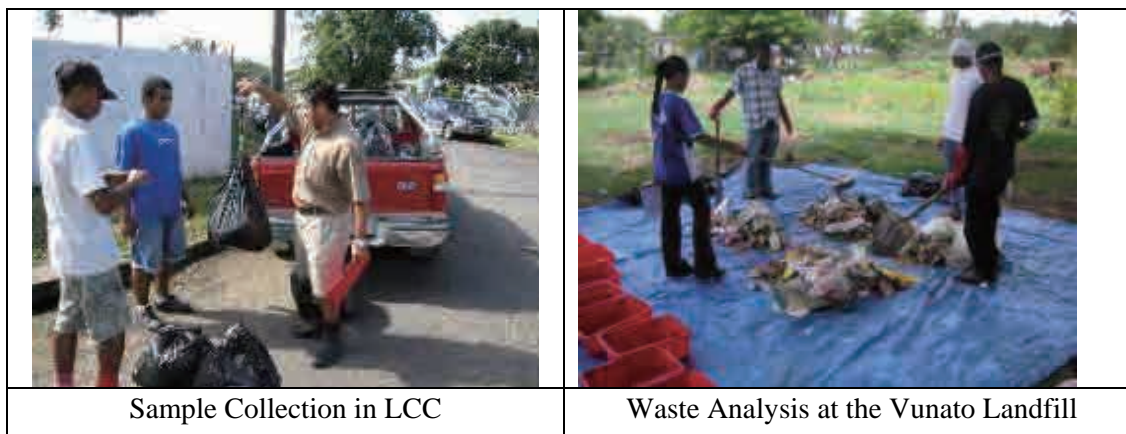


Figure 1: Scene of WACS

b. Final disposal Amount Survey (FDAS)

b.1 Objective

To grasp how much waste generated in Lautoka is disposed at the final disposal sites

b.2 Content

Number of collection trucks bringing in waste from Lautoka to the final disposal sites and their weights were surveyed using a truck scale hired from a private company over a week.

b.3 Implementation of Survey

FDAS was conducted over the term from 17 to 21 November. A truck scale hired from South Pacific Fertilizer Ltd. in Lautoka was used for this survey.



Figure 2: Scene of Final Disposal Amount Survey (FDAS)

c. Time and Motion Survey

c.1 Objective

To understand current conditions of waste discharge, collection and haulage in Lautoka.

c.2 Content

Follow-up survey of the collection trucks in Lautoka interviews with the collection workers were conducted. This was conducted in the household area (two trucks) and in the commercial area (one truck), and details of the collection service were recorded. Route map was also prepared. In this follow-up survey, two people recorded the collection route and the work details.

c.3 Implementation

It was conducted over the term from 10 to 12 of February in Lautoka.

d. Public Opinion Survey (POS)

d.1 Objective

To grasp to what extent the public and business establishments are satisfied with the current solid waste management, and their needs, manners during storage and discharge, and opinions on waste collection fee

d.2 Content

Inquiry items for questionnaire survey were defined and interviews to 300 samples taken from households and business establishments in Lautoka and Nadi were conducted. Analysis of survey results, as well as preparation of a database was conducted.

d.3 Implementation

In the household survey, interviews were undertaken in the commercial, residential, and Border (or Peri-unban) areas in Lautoka and Nadi. In the business establishment survey, the business establishments within each council were categorized into six types to select a survey sample, and interviews were held with 56 businesses in Lautoka and 47 in Nadi.

Table 2: Number of Samples for Household Survey

	Lautoka	Nadi	Total
Business area	10	30	40
Residential area	90	50	140
Border area	10	10	20
Total	110	90	200

Table 3: Number of Samples for Business Establishment Survey

Types of business surveyed	Lautoka	Nadi
Shop	14	9
Restaurant	10	10
Office	16	10
Hotel	5	10
Market	1	1
Other (Supermarket)	10	7
Total	56	47



Figure 1: Location of Samples in LCC

e. Compost Demand and Market Survey (CDMS)

e.1 Objective

In order to promote waste reduction and recycling, it is effective to compost organic waste, which accounts for about 70 percent of total amount of waste discharged in Lautoka. However, in order to establish a system in which composting is sustainable, it is necessary to learn how the compost produced would be used. This survey was conducted in order to grasp demand of compost and its marketability in Western division.

e.2 Content

A survey was conducted using the latest statistics in the Western Division of the type and amount of agricultural good being produced and the location of farms. Moreover, interviews with 50 farmers around Lautoka and Nadi were conducted and prices of the products, cost and amount of fertilizer used, and opinions on compost were summarized. Then, compost demand and marketability were studied.

e.3 Implementation

Interviews with 50 farmers in and around Lautoka and Nadi were conducted. This survey started in February, as its progress was affected by the flooding following a cyclone in January. The data collected are currently being processed.

f. Recycling Activity Survey (RAS)

f.1 Objective

To collect data on recyclable waste and its amount in Lautoka and Nadi, to draw waste flow based on the data, and then to use it for establishing an appropriate solid waste management system for the Lautoka and Nadi sides

f.2 Content

Interviews with 60 stakeholders concerned in recycling activities in Lautoka, Nadi, Sigatoka, and Suva were conducted, and data processing was also conducted.

f.3 Implementation

Interviews were requested with 60 representatives of various groups, as shown below, but some did not accept. So interviews were held with 45 people.

Activity 1-2 Conduct a field survey on Lautoka City Vunato Landfill site (Lautoka Landfill).

This survey includes interview to staff from Department of Health, LCC, field survey, and topographic survey. The results of the survey are as described below.

a. Responsible Organization

Department of Health, LCC takes responsibility for doing operation and maintenance work for Vunato (Lautoka) Landfill.

Department of Health, LCC	<ul style="list-style-type: none"> • Operation and maintenance work for Vunato Landfill
Engineering Department, LCC	<ul style="list-style-type: none"> • Management of waste brought to Vunato Landfill and collection of the fees charged for waste directly brought to the landfill (one person) • Rolling of the landfilled waste (one person) • Security (four persons: two shifts, two persons each shift)

b. Outline of the Lautoka Landfill (area, location and its facilities)

LCC was given the right to use an area of 50 acres (20 ha) in the mangrove forest of Vunato area for landfill by NLTB (Native Land Trust Board), and it started landfill in 1968. Vunato Landfill has 8 sections. Area of every section is as shown below.

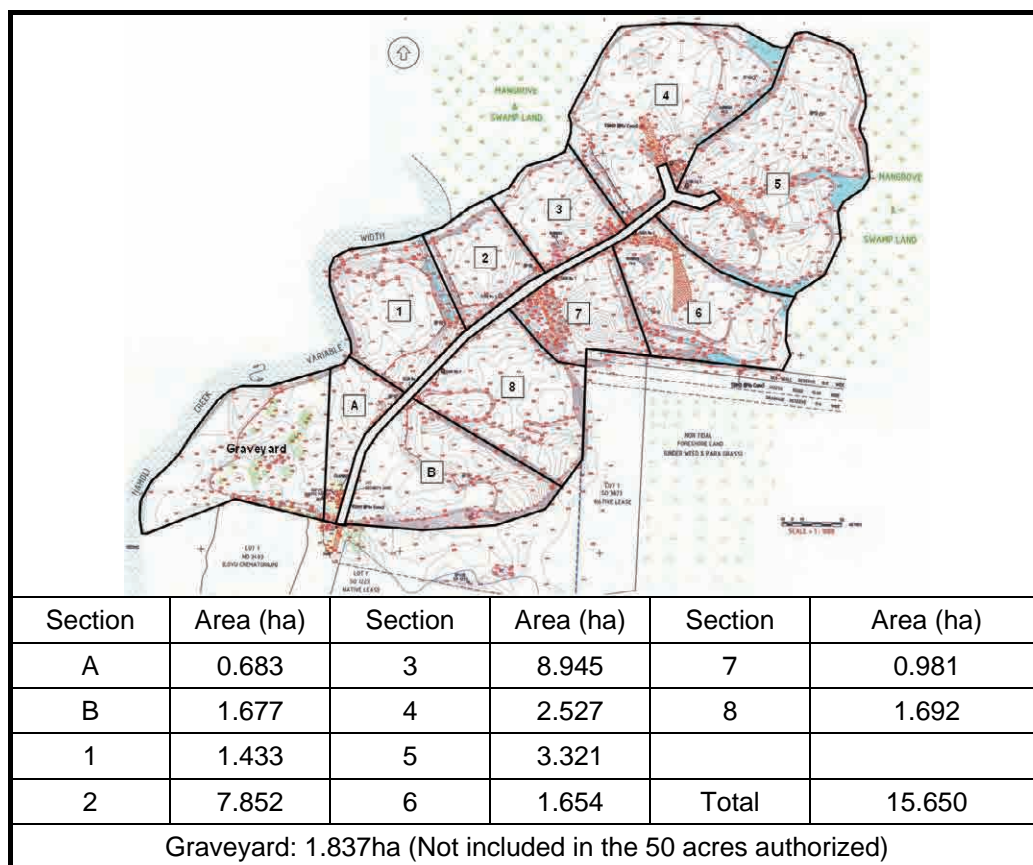


Figure 3: Outline of Vunato (Lautoka) Landfill Site

c. Landfill method, soil covering, leachate, septic tank, sludge management, etc.

Vunato (Lautoka) Landfill has 8 sections, area of which ranges 0.8 - 3.3 ha. The waste brought in to the site is unloaded in a section and it is rolled by bulldozer. When the rolled waste is piled up to 50 cm in thickness, the section to be landfilled is switched to other section. The waste piled up to 50 cm in thickness is left for about six months. In the waste left, organic substances in it are decomposed (aerobic decomposition) and water content is evaporated. Soil covering is not done at present as it is expensive.

As far as the field survey could ascertain, leachate flow to the outside was not found. As there are a lot of creatures such as fish, frogs, crabs, and so on living in the creek and mangrove forest of the landfill's outer peripheral area, the effect of the leachate may be limited.

d. Environment in and around landfill (Surface water, groundwater, traffic volume, etc.)

The landfill is in swamp of the mangrove forest. There are 9 waterways for fire protection in the site. The waterway in Section No.1 is connected with Namoli Creek, but the other ones are blocked off, being filled when sea level rises where the water remains to stagnate. The rain water in the landfill is infiltrated into waste and drained vertically. If it rains severely, it flows to the drain along the access road in the site.

The landfill site and its surroundings are affected by sea water, and ground water is not used

in this area.

e. Waste pickers (Number, age, sex, race, income, residential area, children's school attendance, etc.)

LCC gives permission for entry to Vunato Landfill to waste pickers. The entry rate is FJ\$20/month. Each agent can have a maximum of seven waste pickers to enter the landfill site. The waste picker pays FJ\$5/week to the agent.

There is almost the same number of male and female waste pickers. There are seven waste pickers. One worker was Indian, and others were Fijians. No children worked. Their income is around FJ\$100/week.

They visit the landfill every day. Almost workers reside around the landfill site.

f. Future plan for landfill site (Schedule to be used, landfill management plan, termination plan, redevelopment plan after termination, etc.)

The future plan of the landfill, including scheduled use, landfill management plan, termination plan, and redevelopment plan after termination could not be confirmed. Only the landfill area: 50 acres (20 ha) was confirmed.

g. Landfilling equipment (number, specification, years of use, lease, etc.)

LCC retains one bulldozer (Caterpillar D6) at the landfill site. How many years it had been used was not confirmed.

h. Maintenance (maintenance program, equipment for repair, number of maintenance workers, capacity of the workers, contents of the work, etc.)

The maintenance work for equipment is contracted out to private sector. Cleaning and inspection works for the equipment were not done on a daily basis.

i. Topographic Survey

Topographic survey on the existing landfill area (about 20 ha) was conducted. A topographical map (1/1,000) for the landfill site was prepared.

Activity 1-3 Trace the current waste flow from generation to final disposal and identify issues to be addressed.

a. Designing of Waste Flow Chart

Waste amount was estimated based on the WACS, and final disposal amount was estimated based on the FDAS. And the waste flow, including the items of self-disposal, recycling, illegal dumping, etc. was to be estimated based on the POS and RAS.

The cyclone hit the West Division in the beginning of January affected the progress of the POS and RAS interviews. Therefore the start of these interviews was delayed for half a month. It was in the middle of February when necessary data was obtained. The waste flow was designed based on the results of the POS and RAS.

b. Identification of the Waste Issues

The waste issues of LCC was identified based on the results of the above-mentioned baseline surveys, waste flow, and other field surveys.

LCC
1. Characteristics of waste that can be seen in Fiji
2. Scattered waste
3. Green waste disposed by households.
4. High cost for public area cleaning service
5. Unfair fee collection system adopted at the landfill site
6. Some waste disposed inappropriately
7. Merit and demerit of the landfill method in which aerobic decomposition and evaporation work
8. Medical waste disposal

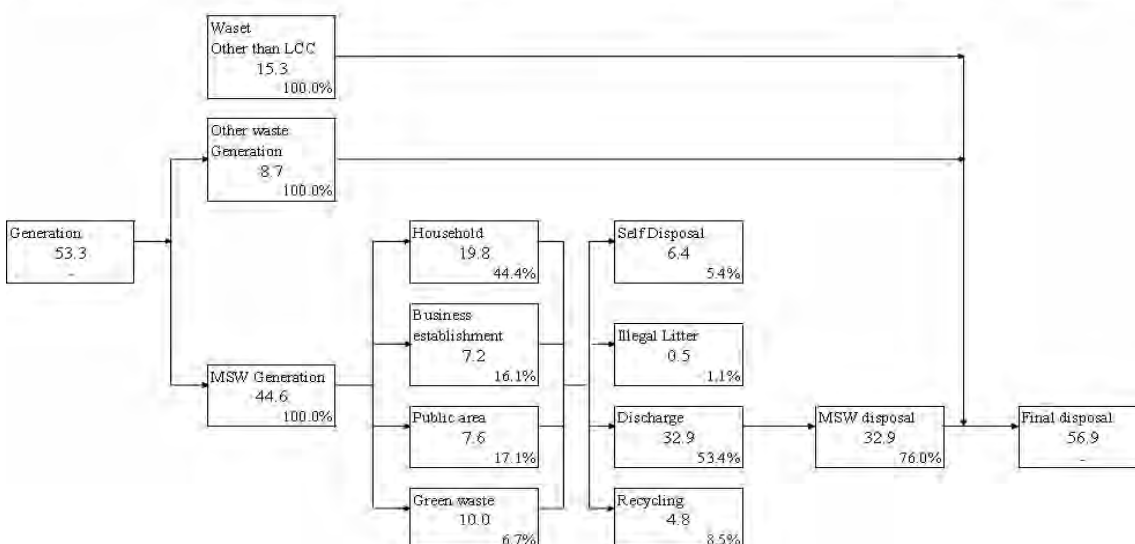


Figure 4: Waste Flow in Lautoka City

Activity 1-4 Develop frameworks of SWM.

JET in consultation with the C/Ps developed the frameworks of the SWM master plan including the fundamental goal and target year of the master plan, forecasted the future population and GDP growth rate as factors to estimate future waste amount and composition.

The numerical target of the master plan was set based on the waste flow which was finalized considering the results of baseline surveys and data forecasted by using the factors mentioned above.

Two workshops were held with the key stakeholders who are involved with solid waste management for the purpose of consensus building. These workshops were in addition to initial workshop that was held on June 1, 2009 in LCC chambers.

Activity 1-5 Build a consensus on the frameworks of SWM among stakeholders.



In order to build a consensus among stakeholders on the framework of the SMW master plan, which was prepared in the first fiscal year, the Project held series of workshops with relevant stakeholders. Counterpart staffs from Lautoka City Council were assigned tasks to present each sessions to the stakeholders based on the programs with the assistance of JET.

During the workshop, the C/P reported the results of baseline surveys, and they explained the current status in the LCC’s waste management based on the results and the issues addressed. The framework of the SWM master plan targeting year 2017 was also discussed.

Following this, the Project proposed the plans for the 3R pilot projects. This was proposed in order for the Project to examine the possibility of the SWM master plan from the aspects of feasibility, continuity and expandability.

Finally, the participants were also given time to share their views and provide constructive suggestions regarding the SWM master plan.

The stakeholders who attended the workshop included representatives from NGO’s, FSC, Field Forty and Andhra 3R PP Committee/members of community, DOE, recycling companies, Rural Local Authority, market vendors association , Councils, cleansing contractors, JOCV Volunteer, Lautoka Chamber of Commerce, Lautoka Retailers Association and JET .

	
<p>The Special Administrator of LCC, MR Josefa Vucago deliberating the opening address.</p>	<p>DHS of LCC, Mr Gyneshwar Rao making presentation</p>

Activity 1-6 Develop draft SWM plans based on the frameworks of SWM.

JET and C/P discussed the results of the pilot projects including preparation, implementation etc. They discussed how the draft SWM master plan should be prepared in accordance with the framework of SWM which was agreed to at the first stakeholders workshop. They held meetings to discuss these matters three times.

The issues addressed in the 3R promotion pilot projects were shared through the three meetings. They were recognized to be significant issues. Then, the second workshop was held jointly by the two councils to discuss ways of cooperating on envisaged strategies for the expansion of the project. This was an opportunity for various stakeholders, including those from the pilot area, to exchange opinions on these matters.

Activity 1-7 Finalize SWM plans.

The Japanese Expert Team (JET) after mutual consultation with the Counterparts has reviewed the Solid Waste Master Plan (SWM M/P) which was adopted in March 2010. It shall be noted that the original SWM M/P was initially formulated based on the results of the baseline survey conducted by JET, planning framework confirmed among the stakeholder in the first workshop held on June 2009 and the 3R expansion plan agreed by the stakeholders in the 2nd workshop held on October 2009. The SWM M/Ps which was prepared by the JET had been finalized through the series of mutual meetings with the counterparts and JET. The finalized SWM M/P was explained to the stakeholders in the seminar held on 24th and 26th February, 2010 in LCC and NTC respectively.

However, data retrieved from the computerized weighbridge highlight differing Final Disposal Amount (FDA) compared to the initial data which was estimated during the FDA Survey. Also, some lessons and challenges has been experienced during the 3R Expansion to whole of Veitari Ward since July 2010 for instance the expected number of composter sales was not achieved. Furthermore, it has been noted that amount of recyclables collected from VDS is now measured. Hence, there was need to review the SWM M/P by analyzing and incorporating these findings.

The reviewed SWM M/P now shows a slight decrease in MSW amount generation and target recycling rate.

ACTIVITY 2: CAPACITY DEVELOPMENT FOR SWM THROUGH PILOT PROJECT

Activity 2-1 Conduct a community survey.

a. Objective

The objective of this survey was to collect the following materials:

- Basic materials necessary for selecting 3R pilot project site.
- Basic materials necessary for studying about how the 3R activities will be promoted and disseminated throughout the whole of Lautoka and Nadi

b. Content

Main works included community survey and preparation of maps of the areas.

b.1 Community Survey

The 10 communities shown below were surveyed. The community names, location of the activities, the activities' areas, number of participants in the activities, and the community leaders were surveyed. These items surveyed were plotted on the area maps.

Table 4: Community Activities in LCC and NTC

Community	LCC	NTC
1. Primary school zone	16	9
2. Secondary school zone	16	2
3. Church	43	13
4. Temple	10	3
5. Mosque	4	4
6. Mothers' club	11	4
7. Mandali (Hindu)	57	7
8. Neighborhood watch zone	11	-
9. Mataquali	11	8
10. Sub-Division	133	63

b.2 Preparation of Area Maps

Locations of the following wards were plotted on a topographical map, and population and number of households were surveyed by ward.

Ward	Area
Vetari Ward:	Natabua, Natabua Sea Side, Field 40, Rifle Range, Balawa Estate, Vunato, Navutu, CBA
TavakubuWard:	Topline, Banaras, Natokowaqa, Golf Link Crescent, Tavakubu Stage.1 Kermode, Tavakubu Stage 2 Kashmir
Simla Ward:	Drasa Vitogo, Simula
Waiyavi Ward:	Namoli Village, Waiyavi Stage 1, Waiyavi Stage 2, Waiyavi Stage 5, Waiyavi Stage 6

Activity 2-2 Select pilot areas on the basis of the community survey.

The 3R pilot project sites were to be selected based on the results of community surveys, any information about the community, and on hearings with the community leaders.

In Lautoka, at first 6 NWZs (Neighborhood Watch Zone) were selected from the viewpoints of area characteristics, income level, number of households, etc. Then, it was confirmed whether the leaders in each zone have interest in the 3R pilot project as well as any conditions in the site.

As a result, the following sites were selected as candidate sites. From these candidate sites, Field Forty area was selected as 3R PP site.

Table 5: 3R Pilot Project Site

	Names of the Pilot Project Sites	Population	Nr of Households
LCC	1. Field Forty Road	850	170
	2. Golf Link Crescent	500	100
	3. Howrah Crescent	550	110

Activity 2-3 Develop a pilot project plan on 3R.

a. Target of 3R Pilot Project

- LCC gains further capacity to do solid waste management (SWM) appropriately through the 3R pilot project (hereinafter, PP). (PDM Output 2)
- LCC gains further capacity for promoting 3R activities in the whole area of Lautoka City through 3R PP. (PDM Output 3)
- Awareness of residents in Lautoka City is raised through environmental education activities on 3R promotion. (PDM Output 4)
- The 3R model adapted to the characteristics of Fiji is established and suggested. (PDM Output 5)

b. Concept

b.1 Practicability

- Stakeholders such as residents, community, LCC, collection companies, recycling companies accept implementation of PP.
- A new system is developed based as much as possible on the experiences of existing and successful recycling systems.
- Get residents participating as much as possible by employing the support of existing community groups.

b.2 Sustainability

- The system needs to contribute to reduction of waste amount and preservation of the environment.
- Has little impact on current waste management in terms of financial and institutional aspects.
- There needs to be an incentive for the stakeholders

b.3 Expandability

- PP needs to be a model of 3R activities and to be expanded to the whole area of LCC.
- 3R activity is disseminated to the whole area of Fiji through this model.

c. Current Status on 3R and Problems addressed

In order to plan 3R Pilot Projects, particular consideration needs to be given to current status of recyclable materials and organic waste. The Project studied such matters, with the following results.

c.1 Recycling of Recyclable materials

(1) Recyclable items and recycling activities are limited.

- The waste recycled at present include plastic (PET) and glass bottles, and metal. Total generated amount of these three items is estimated at 1.6t/d (3.8%). It is too small.

- Main recycling activities include recycling at the disposal site by waste pickers and collection of recyclable materials by the collection company.
 - And, in order to separate, a new collection system for recyclable materials needs to be established. This leads to rise of current SWM cost.
 - Capacity of the existing collection companies is not high.
- ⇒ Therefore, it is expected to be difficult to introduce the system in which residents do separation and the LCC side collects the recyclable materials separated, judging from the basic concept of 3R PP.

(2) However, aggregation of recyclable materials at the levels of community, school, etc. and establishment of a system to collect recyclable materials, may make the current recycling activities to become more active.

c.2 Recycling of organic waste

The main organic waste in Lautoka includes kitchen waste generated from households, market, restaurants, hotels, etc., green waste, and grass and wood generated by road sweeping, park cleaning and drain and grass cuttings. Table 8 describes current status on disposal of these waste and possibility of recycling.

c.3 The LCC side's Roles in 3R PP

The items of 3R PP candidate activities and the Lautoka side's roles in 3R PP are as described below in Table.

Table: The LCC side's Roles in 3R PP

	Candidate Activity for 3R PP	Activity Items	LCC	JICA
On-site (Community)	Recycling Materials (pet and glass bottle, metals)	To coordinate with residents and community in the pilot site	⊙	○
		To study on how to discharge and collect	⊙	⊙
		To provide collection vehicle		⊙
		To send a driver, procure fuel, do maintenance work	⊙	
		To consider how to transact profit on sale	⊙	○
	Making fuel and compost using Green Waste	To coordinate with residents and community in the pilot site	⊙	○
		To establish a system to lend shredder	⊙	⊙
		To provide shredder		⊙
		To procure fuel and do maintenance work	⊙	
	Making compost using Kitchen Waste	To coordinate with residents and community in the pilot site	⊙	○
		To instruct about how to make compost and how to use	⊙	○
		To design composter	⊙	⊙
		To provide composter		⊙
Area Cleansing by Participatory Approach	To coordinate with residents and community in the pilot site	⊙	○	
	To do environmental education activity	⊙	○	
	To develop environmental education tool	⊙	○	
	To prepare environmental education materials and tool	⊙	⊙	
On-site (Cleaning-site)	Public Waste Chipping at site	To provide collection vehicle and shredder		⊙
		To send a driver and procure fuel	⊙	
		To do maintenance work for collection vehicle and shredder	⊙	
	Green Waste Chipping at site	To prepare collection vehicle and shredder		⊙
		To send a driver and procure fuel	⊙	
		To do maintenance work for collection vehicle and shredder	⊙	
Off-site (Green Waste)	Potential to make compost using bagasse and mill-mud generated through sugar manufacture	To discuss with FSC and SPF on the conditions of woodchip (amount, potential timing to use, how to share expenditure)	⊙	○
		To do demonstration	⊙	○
	Potential to make compost by mixing sewage sludge and woodchip	To do combination of sewage sludge and chip, demonstrate composting	⊙	○
	Potential to make compost by mixing market waste and woodchips	To discuss with the market place side (separation of organic waste, etc.)	⊙	○
		To transport organic waste to the dump site	⊙	○
		To mix organic waste generated at market place and woodchip and demonstrate composting	⊙	○
	To use woodchips for fuel (to use woodchips for fuel of boiler operated by wood fuel and used by the business establishments in LCC)	To discuss with business establishment on the conditions of woodchip (amount, potential timing to use, how to share expenditure)	⊙	○
	Potentials to use woodchips for gardening at hotel and to use them as mulching for green zones in the public facility	To discuss with hotel industry on the conditions of woodchip (amount, potential timing to use, how to share expenditure)	⊙	○
		To list public areas for woodchip to be used as	⊙	○

Activity 2-4 Develop a pilot project plan on the partial improvement of Lautoka Landfill

a. Evaluation of the current landfilling management

a.1 Landfilling management

- (1) LCC got permission for using an area of 50 acres (20 ha) as a landfill site. It started landfilling in 1968 and the landfilled area has been expanding. However, its boundary line has not been defined, although its area was defined.
- (2) There are 8 landfill sections. If landfill in a section has been achieved to thickness in 50 cm, the section to be landfilled is switched to other section. The section landfilled to a thickness of 50 cm will be left for about six months. Landfilling in other section starts after it has been confirmed that the smell, which is generated when the landfilled waste is decomposed, is not emitted.
- (3) The waste brought in to the landfill site was unloaded at the entrance area of the section, and it is rolled by bulldozer. However, it is not efficient as it needs rolling more than 50 m in length. Moreover, the waste brought in to the landfill site blocks entry to the section, while the bulldozer is not operated.
- (4) Soil covering is not done. There is no soil that can be purchased at a low price. When sanitary landfill at level 2 is adopted and soil covering is done every day, it will need an additional FJ\$1,800/ year (\$2.5/ ton) for operation. As the current management cost is estimated at FJ\$255,908, the additional cost accounts for 20 percent of the current cost.
- (5) One bulldozer does rolling work. Although its maintenance work is contracted out to the private sector, inspection on a daily basis is not done.
- (6) There are six personnel working under the supervision of Department of Health, LCC. One is responsible for management (collection of fees); one is an operator; and other four are guards.

a.2 Management of the waste brought in to the landfill site

- Number of collection trucks and their owners are recorded, but amount is not grasped.
- Food waste, animal corpses, and medical waste are disposed in the landfill site.

a.3 Facility

- There is an administration office, in which electricity and water are supplied. There are no facilities such as peripheral dam for landfilling, drainage, fence protecting from waste disperse, and buffer zone.

a.4 Surroundings of the landfill

- The landfill site is located in a mangrove forest.
- A lot of creatures such as fish, crabs, etc., live in and around the landfill site and in the waterways within the site.
- As thickness of landfill is 50 cm, aerobic decomposition may work in the landfill and amount of evapotranspiration may be more. Therefore, amount of

leachate may be less. As far as the field survey was conducted, there was no trace of leachate confirmed.

a.5 Evaluation of the current management

- (1) The current level of sanitary landfill is categorized in Level 1, because the waste brought in to the landfill site is rolled and compacted constantly and fire control management is done.
- (2) The current landfill method is categorized as an aerobic method. Its merits and demerits are:
 - Merits: environment-friendly, little odor, less leachate
 - Demerits: soil-covering is not done, therefore waste is dispersed and landscape becomes worse.
- (3) The landfill site is maintained at a steady level. But, its disposal cost is higher than other disposal sites.

Total operation cost: F\$255,908 (2008), Unit Cost: F\$12.3/ton

Disposal cost at the Lautoka Landfill will become higher, if it is improved. Contractors may haul the collected waste to other disposal sites, even if the other sites do not appropriately dispose waste. Therefore, other councils may not haul waste to the Lautoka Landfill site. Some guidance and regulations may be needed.

- Lautoka Landfill: 77F\$/7ton truck or 231F\$/21m³ truck
- Sigatoka Landfill: 45F\$/21m³ truck

b. Setting of the sanitary landfill level

Target Level: 1.5

Adopting the Level 2, in which soil covering is done every day, would be difficult due to its cost. However, improvements to the landfilling have to be made. Therefore, the current method will be improved and a more appropriate method of landfilling will be suggested.

c. Purpose of the improvement:

Appropriate management system for landfilling is established in order to reduce waste and prolong the operation term of the current landfill, and it is agreed among the stakeholders.

(1) Strengthening of management system

- Definition of landfill site.
- Establishment of data management system.
- Preparation of an appropriate collection fee schedule.
- Preparation of landfill plan

(2) Establishment of appropriate management system

- Improvement of access road.
- Setting of on-site access road.
- Improvement of aerobic and evaporation methods

(3) Mitigation of negative effect on the surroundings

- Setting of buffer zone.
- Setting of a section for disposing ash generated from medical waste (apart from the

section for general waste).

- Establishment of environmental monitoring system

d. Concept

- (1) Practicability
 - To be conducted in the existing landfill
 - To be conducted by C/P
- (2) Sustainability
 - To be sustainably managed by the facility and system, both of which are improved by C/P
- (3) Expandability
 - To be expanded to the whole area by C/P: the landfill method improved in a section is adopted for the whole area of the landfill site.
 - To establish appropriate method, in which aerobic decomposition and evapotranspiration work, sanitary conditions are kept at a certain level, and negative effect on the surroundings is mitigated as much as possible.

e. Improvement plan for Lautoka Landfill (draft)

The facilities improvement is planned based on the conditions that the LCC will carry out the works directly from the technology transfer point of view. The excavator necessary for this works is recommended to be procured or leased for the pilot project.

Table 6: The LCC side's Roles in the Improvement Plan

Work Items	JICA	LCC
1. Improvement of access road	○	◎
2. Improvement of on-site approach road	◎	○
3. Arrangement of buffer zone (South side)	◎	○
4. Arrangement of the section for disposing ash generated from medical waste	○	◎

f. Operation and Maintenance Plan (draft)

Table 7: The LAA Side's Roles

Work Items	JICA	LCC
1. Introduction of truck scale and establishment of data management system	◎	○
2. Preparation of appropriate fee schedule	○	◎
3. Establishment of the planned landfilling management		
(1) Preparation of landfilling plan	◎	○
(2) Management of on-site road	◎	◎
(3) Improvement of the current landfill method, in which aerobic and evapotranspiration methods are adopted	○	◎
4. Establishment of environmental monitoring system		
(1) Water analysis in and around the site (simplified water analysis kit)	◎	○
(2) Condition of waste dispersion	○	◎
(3) Inspection of leachate	○	◎
(4) Change of habitat environment of creatures	○	◎



Figure 5: Plan of the Improvement of VDS

Activity 2-5 Conduct trainings, on the job trainings, etc. for the staff of Lautoka City Council and Nadi Town Council to implement pilot project.

On the job training for C/Ps of LCC was conducted by JET to implement pilot projects in 3R PP area and starting the pilot market waste composting project. In order to carry out these pilot projects C/Ps had field visits to other sites to observe and gain the practical aspects of 3R activities. Regular sessions with JET especially in regards to pilot project preparations was also an integral aspect of on the job training for C/Ps. This ensured capacity building from 3R expansion point of view.

These aspects of OJT are discussed below:

a. Preparation for the 3R pilot project

This included initial planning, basic concept and design, review of the plan and examination of the recyclables collection system (for both the LCC and NTC sides)

JET discussed the recyclables collection system with both the LCC and NTC sides, and confirmed the following:

- ①. The LCC and NTC sides collect the recyclables in the pilot sites using a multi-purpose truck once a week for the first few months.
- ②. After having grasped the recyclable items and amount of the recyclables through the pilot project, the frequency and methods of collection are

examined. Then, the best system for collecting recyclables will be established.

- ③. After the system has been well established, the recyclables collection would be contracted out to a recycling company (Recycler). The area of collection will be expanded in this way.

•
b. Discussion with the community representatives

JET and C/Ps discussed with the representatives from Field 40 and Neighborhood Watch Zone in Andhra on 11th June. Field 40 is a candidate pilot site selected jointly by the JET and C/P sides in the first fiscal year. They grasped the status in the communities in detail and obtained information for reviewing the pilot project plan.



Figure 6: Scenes of the Committee Meeting

c. Discussion with recycling companies (for both the LCC and NTC sides)

The Project had a meeting with recycling companies as they are essential organizations for establishing a recyclables collection system. They discussed the recyclable items, price, collection method, etc. The Project visited Waste Recyclers (Fiji) Ltd. and Smorgon Steel Recycling (Fiji) Ltd., both of which were operating in the Western Region, Coca Cola and Foster's Beer are collecting their own PET bottles and aluminum cans as part of their CSR activities,.

As a result of discussion with the recycling companies, it was identified that Waste Recyclers (Fiji) Ltd. (hereinafter, WR) could accept the most recyclable items. The Project decided to request cooperation in the pilot project operation to WR.

The Project had repeated discussions with WR. Then, WR was to accept other plastics, paper, and cloths in addition to PET, metals and bottles. However, it was found they could not receive payment for PET and glass bottles and paper. Also, the Project confirmed that the collected items were delivered to WR's warehouse in LCC. It also confirmed that the collected items were measured in the presence of the committee member and C/P.

d. Preparation for the 3R pilot project

The LCC C/P and JET had repeated committee meetings with the community representatives from Field 40, the site for the 3R pilot project. They discussed preparation for the 3R pilot project implementation.

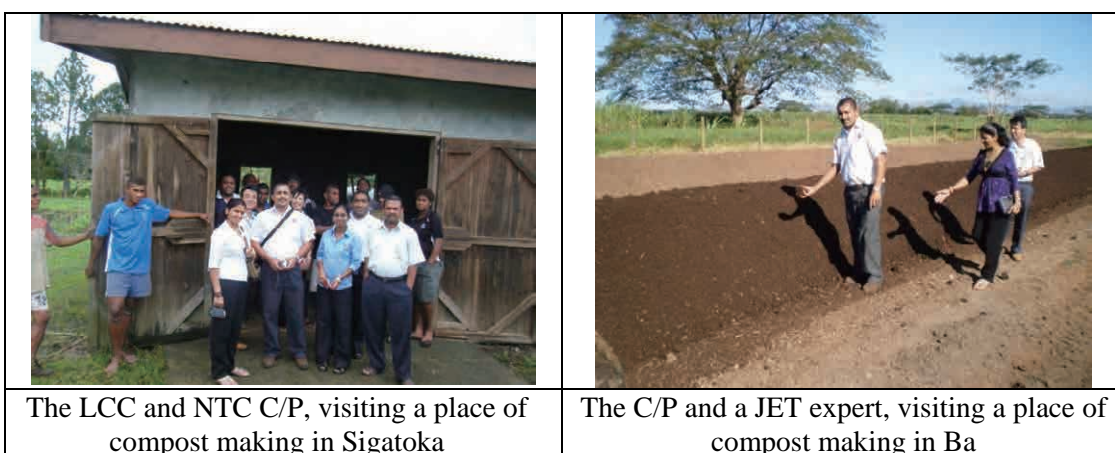
d.1 Examination of compost making

d.1.1 Observation of the existing facilities for composting

As both the LCC and NTC sides did not have experience in making compost, the C/P and JET visited sites making compost. They visited a composting facility operated by OISCA (an NGO in Japan) in Sigatoka on 13 July. They also visited such place in Ba on 17th July.

In Sigatoka composting of vegetable waste was being conducted. Bokashi was made by mixing the produced compost with mill-mud, foul dung, and sawdust. It was identified that they had enough skill for home composting to be expanded. The JET and C/P sides requested Mr. Yoshida, an expert in OISCA to do technical guidance, and the request was accepted.

In Ba, organic fertilizer was produced on a large-scale using mill-mud discharged from sugar mill. Useful information on usage (sale) of compost was collected.



d.1.2 Collection and separation of market waste

The Project commenced the composting of vegetable waste generated at market in Lautoka. This was conducted for the purpose of establishing an off-site recycling system for organic waste. On 20th July the work for collecting waste and separating into vegetable waste and other waste was initiated. As of the end of July, it was identified that quality organic waste was separated out, but very few plastic bags and aluminum cans were mixed in the separated waste. The Project decided to continue awareness-raising activities.

The Project also attempted composting of vegetable waste carried into Vunato Landfill from the market. It did composting on the old waste taken from the landfill. However, it became rotten due to rain as the provisional place for vegetable waste was situated in a low lying area.

The Project decided to continue the work for collecting waste and separating into vegetable waste generated at markets. And, it decided to suspend composting of vegetable waste. JET decided to add the work for establishing a compost yard in the improvement work for Vunato Landfill so that they could get vegetable waste dried and matured in the yard.

	
<p>The LCC C/P, announcing to separate waste into vegetable waste at Lautoka market</p>	<p>The LCC C/P, observing the status of the collected market waste</p>
	
<p>Vegetable waste carried in Vunato Landfill</p>	<p>Surface of the waste is dried, but odor is generated because it is rotting inside.</p>

Activity 2-6 Complete the Environmental Impact Assessment (EIA) process required for the pilot project on the partial improvement of Lautoka Landfill.

LCC with the assistance of JET formulated the Environmental Management Plan (EMP) for the improvement works of the VDS. Environmental Management Plan (EMP) is assessed to be proceeded as the appropriate contingency plan for monitoring the landfill environment and its surroundings before/ during the improvement and after the improvement/ during its operation.

LCC submitted the environmental management plan for the improvement of VDS to DOE on 23rd June. DOE issued a document of approval for the improvement to LCC on 26 August. After this the LCC and JET jointly initiated the improvement.

Activity 2-7 Conduct the pilot project on 3R at pilot areas.

LCC conducted the pilot project on 3R at 3R PP area based on the 3R Pilot project Plans and knowledge gained through OJT for C/Ps through the assistance of JET. The following activities were conducted as to enable a successful implementation of 3R Pilot Projects:

The following campaigns were conducted for citizens and stakeholders so as to raise their awareness.

- a. **Environment slogan and logo contest (planned by the JOCV staff, implemented by the C/P, and supported by JET)**

330 citizens participated in the environment slogan and logo contest, which were planned by

the JOCV staff. The JOCV and C/P jointly selected the best slogan and the best logo. The Project adopted the selected works for designing T-shirts, signboards, leaflets, etc. They were to be used for promoting the Project. LCC awarded cash to the winner at the launch ceremony for the 3R pilot project.

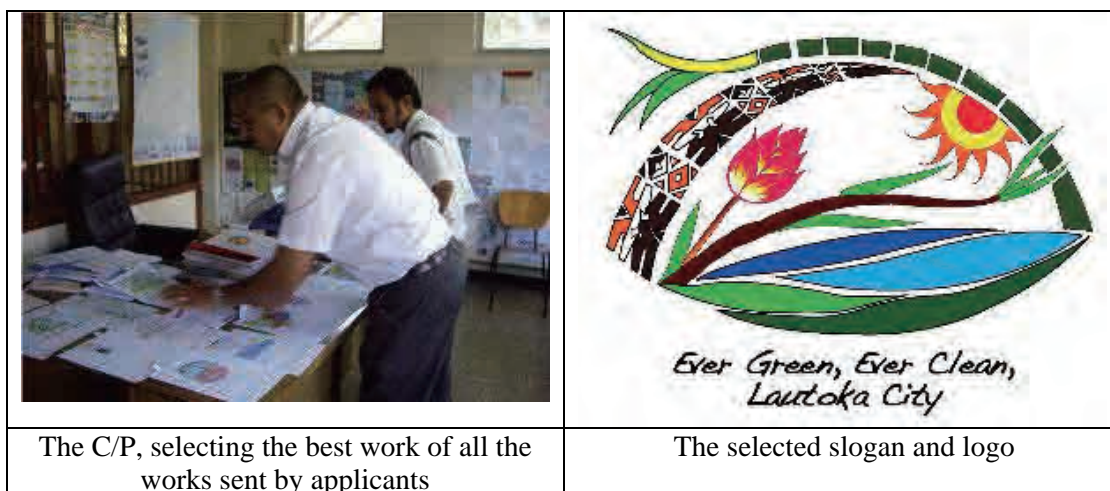


Figure 7: Scene of selection of the best environment slogan and logo, and the selected works

b. Installation of the signboards guiding to the pilot sites

At the road entrance of the Field 40 , the signboards guiding to their pilot sites were installed before they were initiated.

c. Distribution of T-shirts

JET prepared two types of T-shirts with the logo selected in the above-mentioned contest. They were distributed to the pilot site residents. On the launch date the residents participated in the ceremony with the T-shirts.



d. Start of the recyclables collection

The collection timing for the recyclables in Field 40 was defined to be at 10:00 to 12:00 every Friday. The first service was provided on 4th September.

52 out of the 122 households (42.3 percent) discharged PET bottles, other plastics, metal, paper, and cloths using the special sack, which was distributed by the C/P. The total amount of the collected recyclables was estimated to be 103 kg.



e. Market waste composting pilot project

A compost yard was established in Vunato Disposal Site (VDS). The waste generated at market was categorized into two: vegetable waste and other waste. The shopkeeper was requested to separate by that way. The vegetable waste was hauled into VDS on 2nd September, and the composting of the vegetable waste resumed. On this date, the Administrator and C.E.O declared to separate the waste generated at Lautoka market into vegetable waste and other waste.

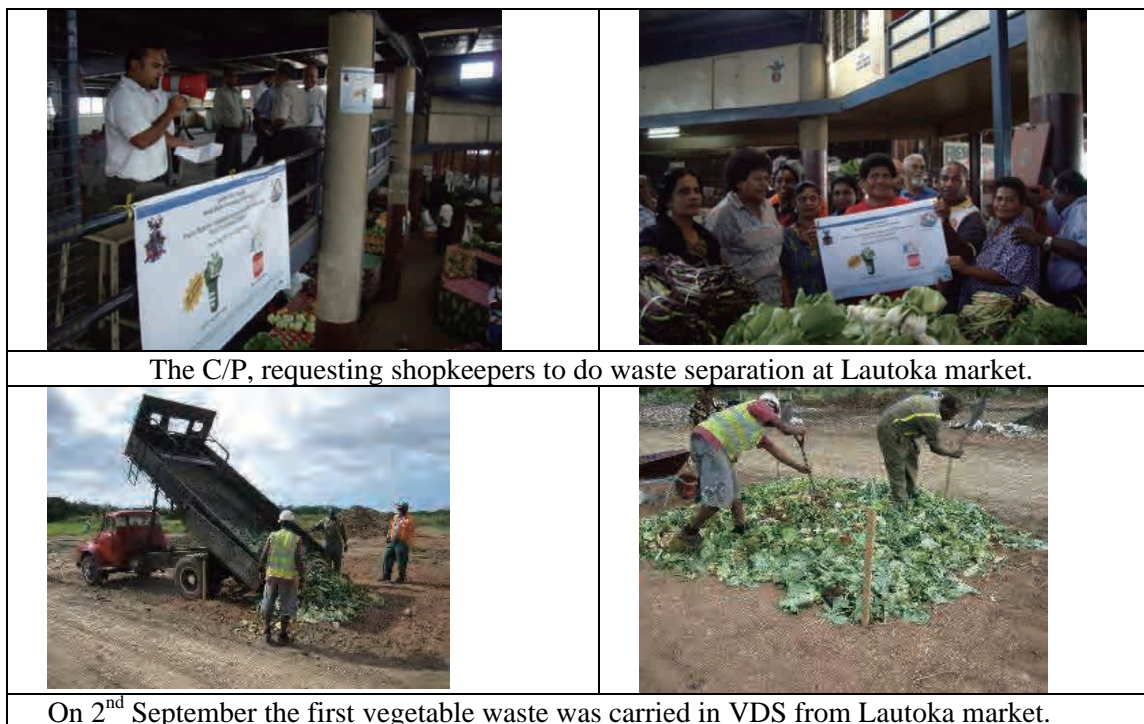


Figure 8: Figure: Scenes of initiation of market waste separation, and composting of the vegetable waste

f. Launch ceremony of the 3R pilot project in Field 40

Launch ceremony of the 3R pilot project was held at a public park in Field 40 at 15:00 on 4th June. The minister and DOE officials from Ministry of Local Government and Urban Development & Housing and Environment, the Special Administrator from NTC, etc. were invited to this ceremony.

After the opening addresses, personnel from the Department of Health in LCC explained the outline of the 3R pilot project as well as the result of the recyclables collection conducted that morning. Following this, a multipurpose truck, grass cutting machines and composters, all of which were procured by JICA, were handed to the Minister of Local Government and Urban Development & Housing and Environment and the Special Administrator.

Lastly, a representative resident from Field 40 declared “we will participate in the 3R promotion project.”

Activity 2-8 Conduct the pilot project on the partial improvement of Lautoka landfill.

a. Improvement plan for Vunato Disposal Site (VDS) and establishment of management system



a.1 Finalization of the draft improvement plan for VDS

The JET and C/P sides proposed to divide the landfill area into 6 sections and disposal area for special waste. Although the landfill area was divided into 8 sections in its original plan, it was proposed to divide 6 sections in line with the draft improvement plan prepared in the first fiscal year. The 6 sections were to be used as the pilot project site, where buffer zone, divider, access road, and movable road (concrete slab) were established directly by the C/P side. In the pilot project, it was also to be examined how leachate generation and management cost would be controlled by landfill volume and soil covering. This was to be conducted for ensuring the sustainable management method for landfill.

a.2 Checking of boundary

VDS is adjacent to native land, but the boundary dividing them was not defined. On 12 August JET discussed the boundary proposed by themselves with the Divisional Manager from Western Native Land Trust Board, the Divisional Surveyor from Western Land Department, Commissioner Western Division, the Special Administrator of Lautoka, and C.E.O of Lautoka City Council. Then, their proposed boundary was approved. Concrete piles were to be installed on the boundary by the LCC side.

Location survey was conducted on 20th August, and provisional piles were installed. Concrete piles were to be installed later.

	
<p>The C/P, checking the provisional pile</p>	<p>The waste, spilled out beyond the boundary (left side of the pile)</p>

a.3 Preparation of the environmental management plan

Before the improvement for VDS was initiated, the LCC side prepared the environmental management plan (EMP) for the improvement of VDS. The LCC side discussed with DOE on how to prepare an EMP. DOE advised that monitoring method should be well described in the EMP. The EMP was submitted to DOE on 23rd June. It describes particularly about how to do monitoring.

a.4 Establishment of system for monitoring water quality

Before the improvement for VDS the LCC side conducted water examination for the purpose of obtaining baseline data. The examination was contracted out to the University of South Pacific (USP). The JET and C/P sides fixed five locations of examination. They were instructed about how to take sample by the USP side.

After the water examination by USP, it was to be conducted by the Project. It will conduct the water examination using water test kit procured by JICA. In case that remarkable change in water quality was identified, further examination was to be requested of USP.

b. Establishment of implementation system

b.1 LCC side's implementation system

The C/P and JET sides discussed the implementation system for VDS before the improvement started. The following were confirmed:

The improvement for VDS includes rehabilitation of access road, fabrication of movable road (concrete slab), improvement of the area except section six, construction of facility for storing equipment (garage), establishment of rest space with roof and concrete floor for workers. These works were estimated to be FJD 96,925. It was to be procured by the LCC side.

Management of VDS was to be done directly by the Department of Health. The managing organization was transferred from the Department of Engineering to the Department of Health. Figure 7 shows the management system for VDS. Necessary staff will be hired for ensuring the management system.

One building engineer from the Department of Building was to be assigned to the Department of Health for three months and to engage in the improvement of VDS. The engineer will support JET to supervise the improvement.

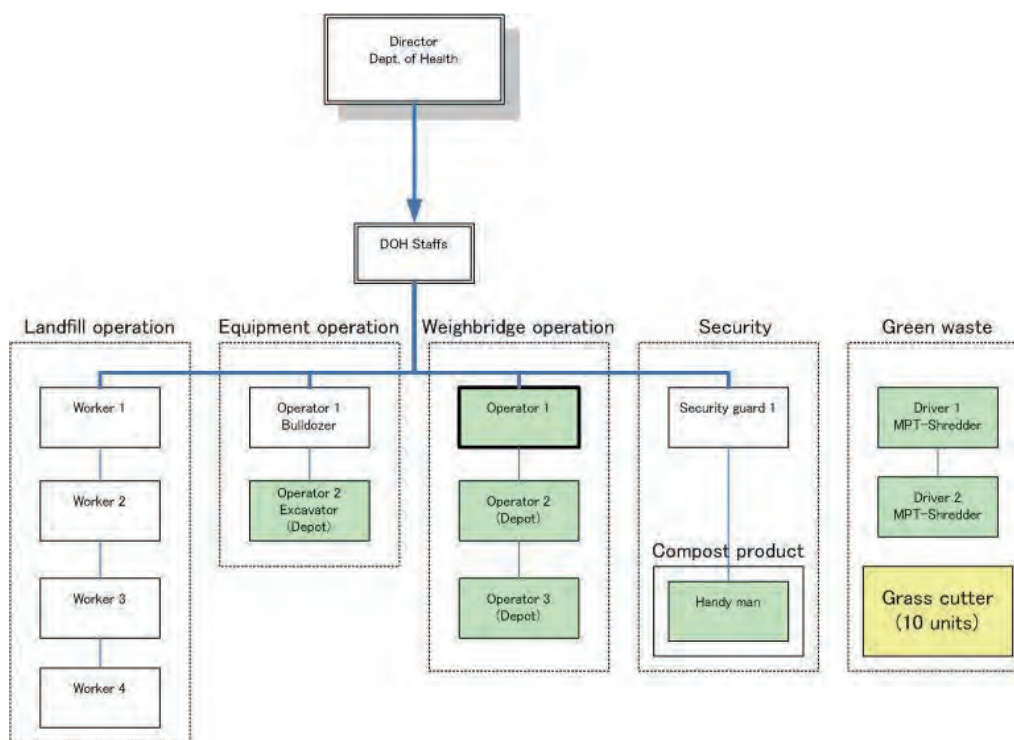


Figure 9: Figure: Management system for the improvement of VDS

b.2 Installation of track scale

b.2.1 Data collection for data management system

The data to be inputted in the data management system had been collected before the track scale was operated. The data includes collection vehicle's number, vehicle's owner (local government or company name), vehicle type, vehicle's manufacturer, etc.

b.2.2 Establishment of track scale

The weighbridge materials were carried in on 16 July and its assembly was completed by 22 July. Following this, indicators, PC and printers were installed. On 12 August it was calibrated using sample weight.

The surrounding area of the landfill was flooded this January, with the water level rising to about 50 cm above ground level. Therefore, the level of the track scale was set at 1.0 m from the ground level. However, in this case the driver's eye level would be about 3.0 m. It was expected that the driver could not confirm the slope edges. Therefore, safety poles were installed on both sides of the track scale. Stairs connecting the track scale to ground was also built.

Although the ceremony for handing over the track scale was to be held on 4th September, its operation had started about a week before. When the ceremony was held, the C/P side was able to completely operate it by themselves.

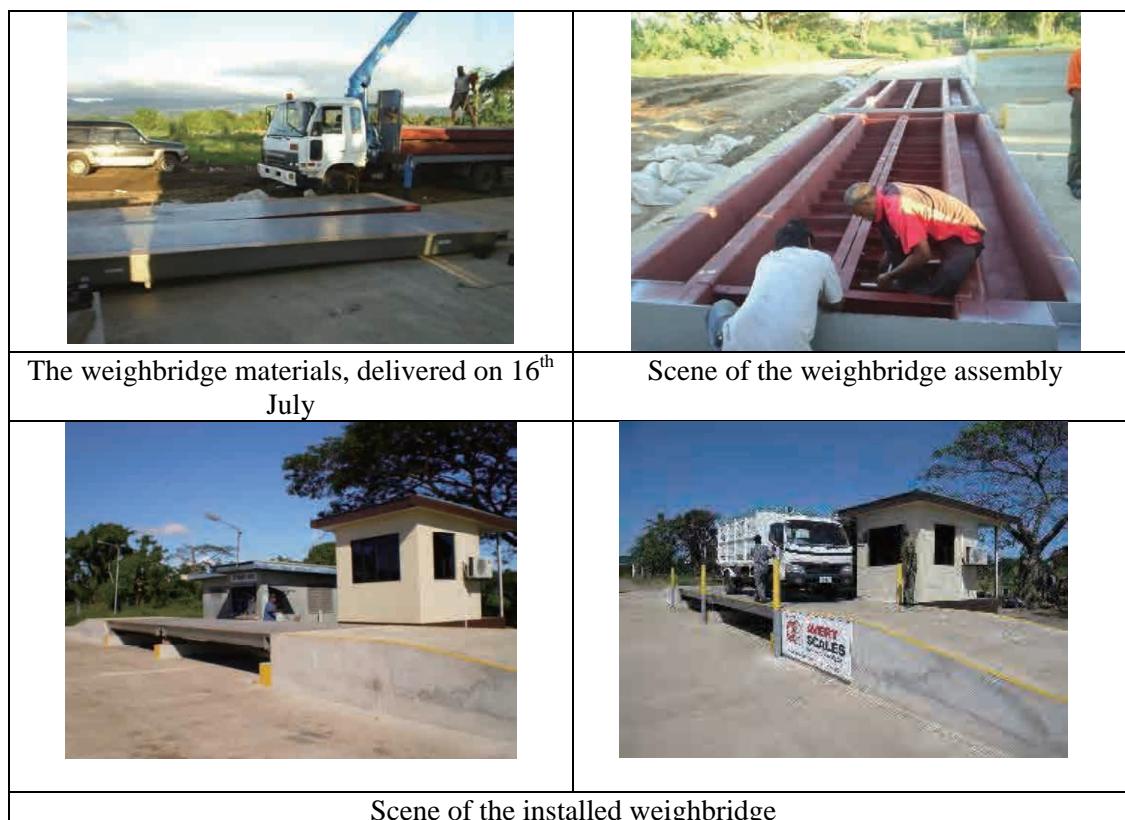


Figure 10: Shows installation of track scale

b.3 Ceremony of deliveries of track scale and excavator

On 4th September, a handing over ceremony of truck scale and excavator, both of which were procured by JICA, was held at VDS. The participants in the ceremony include the minister, DOE's director and DOE manager from the Ministry of Local Government and Urban Development & Housing and Environment, an official from Central Board of Health, the Administrator of NTC, the Resident Representative of JICA Fiji Office, etc. The ceremony was held in grand style.



Figure 11: Scene of the ceremony of deliveries of track scale and excavator

c. Implementation of the improvement of VDS


The improvement of VDS was initiated from the works for establishment of buffer zone and

divider. The establishment work for recycling area, necessary for the 3R promotion pilot project, had been done. All works for improvement were conducted in line with the overall improvement plan shown in Figure 10.

The improvement is currently being carried out directly by the Department of Health in LCC under the instruction of JET.



c.1 Establishment of compost yard for market waste

In the planning stage for the improvement of VDS, the work for establishment of the compost yard was not included. It was added later. This work includes establishment of the composting space and construction of the road to get access to the space.

	
<p>Establishment of compost yard started on 25th August. First, the old landfill waste was removed; then, the access road was constructed by leveling three layers of earth.</p>	
	
<p>Compost yard just before its work was completed</p>	<p>Compost yard (completed on 1st September)</p>

c.2 Buffer zone and divider

Buffer zone and divider are built using the stabilized landfill.

	
<p>Establishment of buffer zone started from the north side. It is to be built using the old landfill and be covered with earth.</p>	

Activity 2-9 Review and evaluate the 3R pilot projects.

a. Recyclables collection

JET has conducted monitoring to confirm the status in discharge of the recyclables, amount of the collected recyclables, and recyclable items. They visited Field 40 every recyclable collection days (Fridays). The following is the data collected in September, the first month of the pilot project operation.

Field 40 (LCC)

Average rate of the households who participated in the recyclables collection to all the households: 33.7%

- Average amount of the recyclables collected: 88.6 kg
- Amount of the recyclables discharged: 73 g/person/day

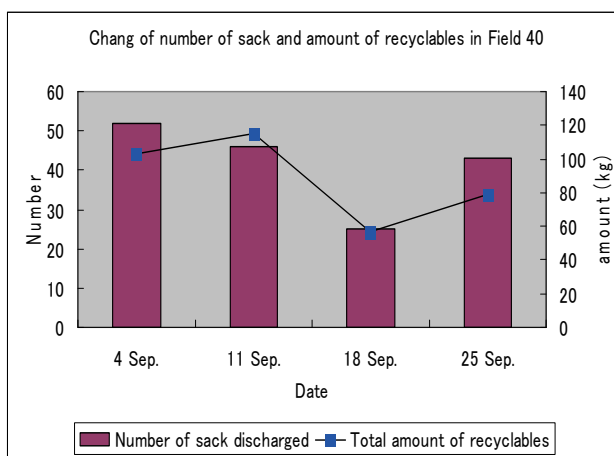


Figure 12: Change of number of sacks discharged and total amount of recyclables (Field 40)

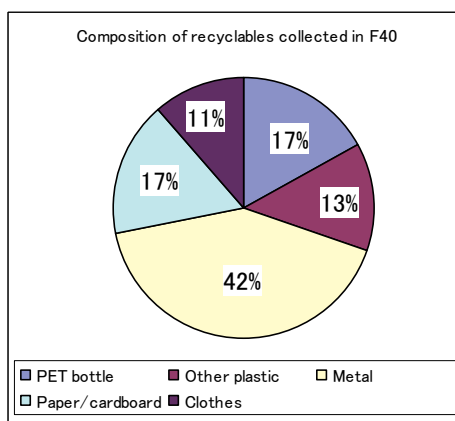




Figure 13: Breakdown of the recyclable items (Field 40)

b. Composting of market waste

Composting of market waste resumed on 2nd September. Total amount of the waste disposed at composting plant in September was estimated to be about 10 tons. This is expected to

contribute to reduction of amount of the organic waste disposed in the landfill. Therefore, it is also expected to contribute to reducing amount of leachate and offensive odor.

	
<p>Vegetable waste carried in by the multipurpose truck, procured by the Project</p>	<p>Compost yard as of 28th September. Volume of vegetable waste is considerably reduced due to evapotranspiration.</p>

Activity 2-10 Review and evaluate the Pilot Project for landfill improvement.

Since the installation of the fully computerized weighbridge system, improvements have been made in respect to overall operations and management of the Vunato Disposal Site. These include revision of disposal fees now based on tonnage of waste disposed, computerized printing of weight receipts for customers, on job training of other counter part staffs relating to operation of system, transparent and fair means of charging disposal fees and accountability of income received at VDS. The notable improvement has been the achievement in respect to data base of disposal records which is quite exhaustive and detailed. This includes disposal records of waste disposed in accordance to various categories, date, time, vehicle number, weight, customer, origin of waste for daily, monthly, or any time frame.

The weighbridge is also used for weighing purposes by private, commercial vehicle owners for other purposes at rate of \$20.00 per weigh. Approximately \$2400.00 per month is generated only through the commercial weighing. This income can be used for annual certification and calibration of the weighbridge and also for maintenance work for the computerized system.

Lately, the system has been updated to record separate weight of amount of recyclables taken away from the VDS by waste collectors. An average of 17 tones/month of recyclable materials is collected from the VDS by waste collectors for recycling purposes.

All these changes has resulted in significant increase in income from tipping fee. This income is anticipated to be used for VDS improvement works, operation and maintenance costs.

Observations and monitoring has revealed that the operation under the open evaporation method which includes minimum compaction and spread of waste at height of half metre has proven to be very effective particularly in respect to fly and odor nuisance and generation of leachate.

However, since VDS is located over a high water table area and is located near the mangrove swamp, a proper all weather access way is very vital from the attendants office right upto the last disposal area (section 4). Due to the main access way in the dump section being not

maintained on regular basis, the continuous rain has drastic impact on the operation and condition of the dump.

During such time, trucks faced difficulties transporting waste into the disposal area. Thus, wastes are either disposed at the entrance of the secondary access and even on the main road during worse conditions. Thus, increasing the pushing costs for the council.

It has been also noted that a machine has to present at the end of the secondary access way to keep on making space for trucks to properly dispose wastes at the end. The absence of operator or machine at times results in wastes being disposed on the road, thus making it difficult to be cleared and pushed. Even the special waste like poultry waste which need to be covered immediately cannot all be disposed off properly as the waste trucks is unable to reach the special waste pits. Hence, this results in foul stench being emitted from the VDS.

Therefore, regular maintenance works especially access improvements is outmost priority for sound landfill operations.

Activity 2-11 Preparation of 3R-PP separate collection for recyclables in commercial area

Following a successful implementation of 3R PP activities at the residential area, it was imperative that a similar pilot project activity be undertaken at the commercial area in particular the separate collection of recyclables. It was necessary to undertake this pilot project since range of recyclables material being generated, suitable storage, discharge and collection system for CBD needed to be experienced or observed before the effective 3R expansion plan could be formulated targeting the expansion of the separate recyclable collection service to the whole city.

Hence following preparatory activities were undertaken for introduction of Separate collection service for recyclables in section of CBD area:

1. Meeting with recyclers.
2. Selection of boundary of CBD to implement separate recyclable collection pilot project activity.
3. Meeting with representatives of businesses.
4. Planning and Formulation of plan suitable concept and system of separate recyclable collection in CBD. This outlined the number of business establishments to target, target recyclables, discharge manner, container, timing, collection and transportation mechanism, monitoring etc.
5. Developing educational and awareness raising tools like leaflets, recyclable collection calendar, stickers, posters, circulars etc.

Waste Minimization and Recycling Promotion Project
in the Republic of Fiji

Health Department
Lautoka City Council
P.O. Box 135, Lautoka
Phone: 656 0483

Notice from Lautoka City Council
Separate Collection Service of Recyclables

Lautoka City Council will start separate collection service of recyclables for commercial sectors from July, 2010. If you sort the following items shown below and discharge in a plastic container, the Council will collect them for free. The purpose of the new collection system is to decrease the amount of waste which is disposed of at landfill site and to improve our environment dramatically.

All the items collected should be clean, so that it is possible to reuse or recycle them. The council asks you to clean collected items according to the instructions summarized below. If they are too dirty to clean like oil bottles, please discharge them with garbage waste.

Frequency: once a week
Monday
If public holiday falls on Monday, the next weekday.
Please refer to calendars below.

How to store
Please keep recyclables in a plastic container of any size with a discoloured sticker. Bulky cardboards should be tied with string.

How to discharge
Place your container with a sticker on the curb side or back lane of shops between 10 a.m. and 11 a.m.

Targets Items

- PET Bottles Plastic Bags**
Rinse with water. Remove caps.
- Hard Plastics**
Must be washed. Remove caps & lids.
- Glasses bottles & Jar**
Rinse with water. Remove caps.
- Metal: Any kinds of metal such as brass, copper and iron, but small size items.**
- Food Cans must be washed and free from food residue!**
- Old Clothes**
Must be dry and not dirty.
- Paper: Newspaper, Office Paper, Magazines**
No paper scrap! No dirty paper.
- Cardboard**
Unfold and tie if it's bulky. Be with string. Must be dry and not dirty. Fishmeal carton boxes are not accepted.

Stop Open Burning!

Calendar 2010
7 July, 8 August, 9 September, 10 October, 11 November, 12 December
Collection Day of Recyclables

3R Promotion Pilot Project JICA ACTIVITY

6. Training of 3R promoters for dissemination of information.
7. Conducting awareness raising activities which included:
 - a) 3R campaign at Commercial area (Sugar City Mall)
 - b) Awareness meeting with women representatives of businesses.
 - c) Awareness meeting with representatives of Businesses (Lautoka chamber of commerce and Lautoka retailers Association).
 - d) Shop to shop visits for distribution of nylon sacks, stickers, leaflets and circulars.
 - e) Development of 3R music with announcement.





Activity 2-12 Conduct Pilot Project on separate collection for recyclables in commercial area.

Following the preparations for 3R – PP separate collection for recyclables in commercial area, the council in partnership with Waste Recyclers Fiji) Ltd started actual collection of Recyclables targeting **198 establishments** from the part of the CBD area which commenced from 5th of July, 2010.

a. Plan and Basic Concept of Pilot Project

The Pilot Project on separate collection for recyclables in commercial area was conducted based on the following basic concept and systems:

a.1 Number of business establishment and recyclables collection day at part of CBD implemented PP for separate collection of recyclables

Table 8: Condition PP area for commercial in part of CBD

Area	No. of business establishment	Collection day
Part of CBD	198	Every Monday

a.2 System for Recyclable collection Pilot Project for CBD

Table 9: Basic System for Garbage and Recyclable collection at CBD

Target items	Regular garbage collection	Recyclables collection
Target items	Except recyclables	PET bottle (for beverage), Plastic shopping bag Hard plastic, Metal Paper (newspaper, magazines, office paper) Cardboard, Cloths, Glass bottle
Collection Frequency/collection day of the week	Daily collection except Sunday	Once a week Every Monday

Discharge container	Containers with lid	Any type of containers basically Nylon sack (with 3R logo) distribute only first time Plastic-made container and wheel bin are promoted for discharge of recyclables Bulky cardboards should be discharged by tying it with string
Discharge time	by 9:00 a.m.	10:00-11:00am
Collection time	9:00-10:00 a.m.	11:00am-12:00 pm
Discharge place	Curb side or back lane of the shops	Curb side or back lane of the shops

a.3 Collection Mechanism

Items		Strategy
Collection	Implementation body	The Recycler carried out collection initially for a a trial period of 1 month. Since then Council continued with collection work using MPT.
	Workers	One Driver AT least two collectors
	Equipments	Collection truck belonging to recycler during trial period and councils MPT afterwards.
	Profits	All profits to be paid to the council.

a.4 Sorting and Storage

Items	Sorting System
Sorting	- Place: Recycler's depot - Staffs: Recycler's staffs

a.5 Monitoring system for separation and collection

Monitoring Items
1) Discharge day of week.
2) Discharge place.
3) Collection crew counts the household discharged recyclables by discharge container.
4) Collection crew refuses the mixed non recyclables and dirty recyclables.
5) C/Ps monitor the discharge manner at initial stage (at least 2 months)
6) Recyclers submits monitoring sheet filled up recyclables amount and profits.
7) Amount of recyclables collected.
8) Other observations regarding the discharge manner.

Activity 2-13 Conduct OJT for operation and maintenance of Lautoka landfill.

LCC has selected 3 workers and trained them regarding the operation of the weighbridge including operation of computerized system of charging dump users, operation system of VDS and market waste composting concepts. C/P staffs of health department have been also trained to operate the weighbridge and at times they cover up for the weighbridge operate whilst he is on leave.

The workers at the VDS have been given on job training on market waste composting and operation of landfill equipments. This has been done to ensure that workers are multi skilled and can cover up for other workers whilst they are on leave. This includes operation of heavy machineries, wood chipper and D6 Bulldozer.

LCC C/P staffs have also acquired significant level of training in respect to technical issues associated with the improvement works in particular :

- Formation of buffers, dividers and periphery banks.
- Construction of movable concrete slabs for access.
- Setup of concrete slabs for access into the improvement sections.
- Monitoring of water quality and also monitoring other environmental parameters.
- Operation system of computerized weighbridge and processing and analyzing of weighbridge data.

Co Project Manager successfully participated and completed the above **Regional Training on Landfill Management held in Port Vila, Vanuatu from October 10 – 14, 2011**. The training was organized and funded by Japan International Cooperation Agency and SPREP under the JPRISM Project. The overall purpose of the training was to train the counterpart staffs on semi aerobic method of landfill that is being implemented in Port Vila and share the experiences of other disposal methods around the Pacific Region.

The capacity building training has broaden the C/P staff’s knowledge in terms of managing the operations of the landfill and the knowledge gained will be imparted to the fellow colleagues.

	
<p>Trickling filter</p>	<p>OJT for VDS first weighbridge attendant</p>

ACTIVITY 3: OBTAINING THE CAPACITY FOR 3R PROMOTION ACTIVITIES AT WHOLE AREA OF LCC & NTC

Activity 3-1 Develop a 3R promotion action plan for the whole area of Lautoka City and Nadi Town.

The 3R Action Plan was formulated and finalized following the two weeks Group Focused training in Japan on 3R Promotion for 10 C/P staffs from Fiji. This 3R action Plan is scheduled be presented to the Stakeholders on 25th November, 2010. The 3R Action Plan stipulates specific policies for respective 3R activities.

3R Action Plan has been formulated targeting the expansion policy, implementation system, schedule and budget focusing primarily on the following four core components of 3R's:

- Separate Collection of Recyclables.
- Home composting.
- Market waste Composting
- Green waste collection and Chipping Service
- Lautoka Clean Schools Programme

The detailed information is outlined in the copy of the 3R Action Plan

Activity 3-2 Conduct trainings, on the job trainings, etc. for the staff of Lautoka City council and Nadi Town council to implement 3R promotion.

Total of 8 counter part staffs from the council have so far attained knowledge on 3R promotion as a result of their exposure in Kitakyushu and Shibushi Cities during the 2 weeks group focused training. Other forms of OJT training opportunities have been gained from the JET consultants during the course of the project. The participation of the staffs during the Joint Fortnightly meetings also offered opportunity to share and gain knowledge from each other. C/P staffs have acquired necessary training during the last 2 years of the project and they are now equipped to implement the 3R Expansion Plan to the whole of the city area.

Some basic training gained includes:

- Conducting community meetings.
- Preparation of presentations and conducting presentations to members of public.
- Preparation of educational and awareness raising tools like leaflets, pamphlets, posters, circulars, notices, media awareness materials, tender documents etc.
- Interpretation of monitoring results of recyclable collection.
- Carry out all monitoring works including home composters, recyclable collection, market waste composting, environmental monitoring at VDS , green waste chipping etc.
- Conduct basic baseline surveys like Public Opinion Surveys, community surveys etc and interpret results.
- Organise, facilitate and coordinate seminars.
- Prepare manuals.
- Conduct awareness raising of target population especially by house to house visits and announcements.
- Implement Clean schools Programme focusing on 3R's concept.

Activity 3-3 Implement 3R promotion.

a. Establishment of Home Compost Subsidy System

LCC is of the view that it is crucial to decrease the amount of organic waste which accounts for around 60% of household waste generated. Therefore, both municipalities established a “Home compost subsidy programme” in July 2010 to encourage their ratepayers to use compost bins which are manufactured locally in Fiji and sold at costs of FJD 55. Council provides a subsidy of FJD 25 when ratepayers purchase a bin from the Councils. Each Council also conducted various advertising and awareness activity to promote this noble initiative.

The Pilot Project proved that home composting using compost bin was very effective. Three hundred and eighty (380) households in LCC are practicing home composting under the pilot programme, and the amount of kitchen waste being recycled is estimated to be **107 g/person/day**, or about 20% of the household wastes being generated. It is also expected that composting will reduce the costs for the municipality because it lessens the amount of garbage going into the waste stream. Thus, LCC positioned the promotion of home composting as a core activity in the Solid Waste Management Master Plan.



b. Lautoka Clean Schools Programme

The aim of the Clean Schools Pilot Programme was to spread the message of good waste management practices to schools, particularly to students who are regarded as effective agents of change and influence, and to create awareness among children about waste minimization in the home and community. This pilot began in July 2010 and participating schools (26 schools in LCC) were required to implement 3R activities through three sets of activities: environmental awareness activities, school composting, and recycling.

Key factor for success was that 3R Project counterparts in LCC monitored the Clean Schools Pilot Programme and also conducted awareness sessions with students during school visits. Competitions were also organized where all participating schools were rewarded with certificates of participation and other awards by the Minister of Environment during a special award ceremony. LCC/NTC are now working with Ministry of Education to expand the concept to all other schools from other municipalities in the Western Region.

		
<p>Winning school representatives with guests and council staffs</p>	<p>Separate bins placed in classroom</p>	<p>Kids practicing compost</p>

c. Expansion of Recyclable collection to whole of Veitari ward

Separate collection of recyclables was conducted in the residential and commercial areas of Veitari Ward. Target recyclable items for separate collection was limited as it depends on the items which recycling company can accept, including PET beverage bottles, plastic shopping bags, hard plastics, metals including tin cans, paper (newspaper, magazines, office paper), cardboard, cloth (textiles) and glass. Councils provided collection service on fortnightly basis in residential and on weekly basis for commercial areas.

Council visited each household and business to provide a specific nylon bags with the “3R” logo imprinted, and a recycling leaflet with calendar, which provides guidance on participating in the system. At the same time, people are requested to separate waste into recyclables and non-recyclables at source and to discharge at the curbside on designated times and days, which are indicated in the leaflets.

The Council-owned truck in LCC collects recyclables using unique appealing music announcements to remind the citizens of the collection day. The collection workers monitor the quality of the recyclables being discharged and record the number of households participating in the initiative. Non-recyclables and unclean materials are rejected and the workers provide necessary guidance for the discharger. The recyclables collected are then taken to the recycling company where they are sorted by category, weighed, baled, and exported overseas for recycling.

The results of monitoring of the pilot project implemented in LCC revealed the average discharge rate of recyclables as **6.2 g/person/day** at households and **217 g/BE/day** at business establishments (BE).

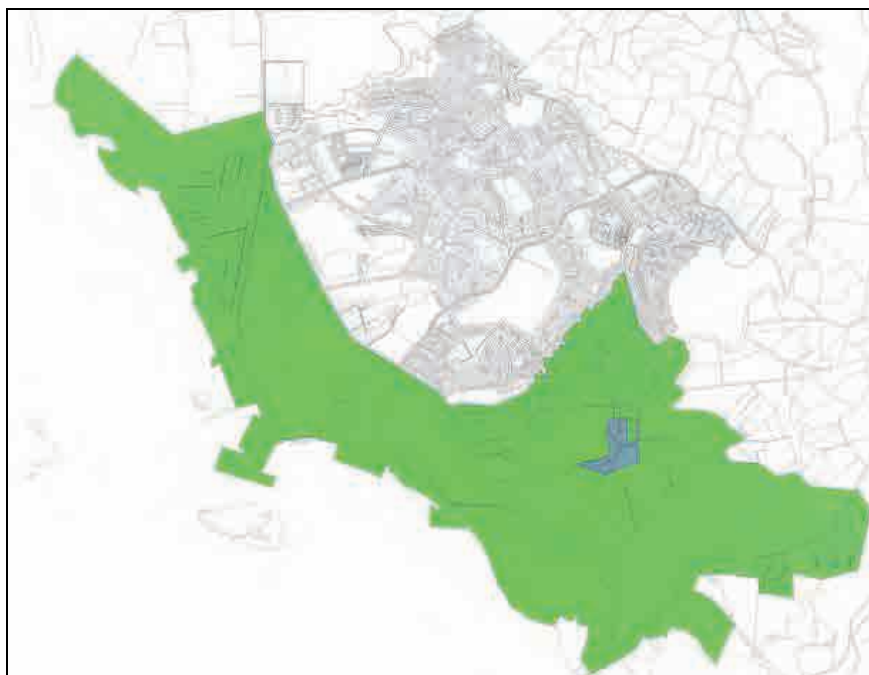


Figure 14: Figure: showing 3R expansion to whole of Veitari Ward

Table 10: showing the basic concept of Recyclable Collection Expansion in stage 2

Target items	Recyclables collection
Target items	PET bottle (for beverage), Plastic shopping bag Hard plastic, Metal Paper (newspaper, magazines, office paper) Cardboard, Cloths
Collection Frequency/collection day of the week	Fortnightly collection for residential area (Mondays for Namoli and Fridays for F/40) Weekly for Commercial and schools on Mondays.
Discharge container	Nylon sack (with 3R logo) distribute only first time Bulky cardboards should be discharged by tying it with string
Discharge time	by 8:00 a.m. for Residential From 10.00 am to 11.00 am for commercial Request basis for schools.
Collection time	8:30-11:30 a.m. for F/40 11.00 am – 1.00 pm for commercial
Discharge place	Curb side

	
<p>Recyclable materials</p>	<p>Storage of recyclables at residential area</p>
	
<p>Residents discharging recyclable sacks on collection day</p>	<p>Recyclable collection and monitoring work</p>

d. Implement Market Waste Composting

The market waste composting pilot was undertaken by both LCC and NTC. Both Councils provided separate bins in the Vegetable Markets for discharge of green waste and other waste that cannot be composted. Awareness was also created among the market vendors regarding segregation of compostable waste. In the case of LCC, total market waste generated is 3.3 tons/day. An average of 800 kg/day of compostable waste is segregated and transported to the composting yard located at Vunato Disposal Site (VDS) to be composted.

The “heap method” of composting has been established under the project whereby the dry organic waste (e.g., old wood chips, saw dust) is used for the base material and also for covering which assists in moisture regulation, controlling odors, flies and birds, and introducing microorganism to catalyze the compost. The compost heap is also covered with plastic sheet to retain moisture or protect from excessive moisture during heavy rainfall. The pile is then left to ferment for 3 weeks and then turned over every week by an excavator. Each compost heap is also monitored for moisture content, temperature and pH.

Once the compost is fully matured (about five to six months), it is sieved, weighed and packed in 10 kg bags for sale at price of FJD3.00 whilst the production cost is FJD2.64/10kg. The compost is purchased by the citizens as flower and vegetable gardening is popular in Lautoka and response from citizens has been encouraging. The analysis of the compost quality revealed nutrient content as Nitrogen: 1.3(%), Phosphorous: 2.1(%), and Potassium: 1.2%, with a carbon to nitrogen ratio of 7.2.



e. Implement Green Waste Chipping Service

The Green Waste Collection and Recycling Pilot commenced in October 2009 as an initiative to prevent the accumulation of such waste in backyards, minimize open burning and littering in public places, reduce the amount of waste going to the dumpsite, and reduce the collection and transportation cost of green waste.

A wood chipper is used to reduce green waste to wood chips which can be effectively recycled as mulching material in gardens, used in market waste composting for moisture control, used as base material for home composting, or sold as fuel for industrial boilers.



Activity 3-4 Review and evaluate 3R promotion.

a. Home Compost Subsidy Programme

The position of the council to adopt the Home compost subsidy programme is timely and will yield positive results. It has been noted that the council managed to sell all the composters purchased under the subsidy programme and this highlights that the residents are responding

to the awareness activities and have also realized the importance of practicing home composting.

Monitoring results reveal that controlling the moisture is very essential ensuring effective home composting. Excess moisture in home composters tend to generate foul odor and maggots which at times discourage the residents especially those who are involved in composting for the first time. Hence, address this issue and creating awareness on this issue has been very important.

Council also noted that there was no delivery of compost bins to residents upon payments. Hence some kept it for long time before installing and some did not set up composter properly. This resulted in council providing the incentive to deliver, setup and supply 1 bag of chips to be used for moisture control.

It can be noted that the gap between the Plan and actual number is getting increased. Hence, more awareness raising is needed to be conducted. Also alternative method of composting need to be promoted like drum composter and more monitoring work by counter part staffs need to be done to monitor the progress of newly installed composters.

b. Market Waste Composting

The market waste composting has been implemented since September 2009. The following lessons has been noted in respect to market waste composting:

The use of tarpaulin has been very effective in moisture control both to retain moisture during dry spell and also to prevent excessive moisture entering the heaps during the rain.

The heap method of composting is very effective whereby fermentation progresses well and moisture is retained.

The old stock of wood chips is very useful for composting as it is used as base material and also for covering the newly compost. It supplements additional microorganisms, contributes to balance of C: N ratio and also acts as moisture control.

The demand of compost is not encouraging. Hence more awareness is needed.

The change of marketing cleaning contractors agreement to sort and load market waste has proven to be very effective as only one worker (driver) is enough to transport waste to VDS for composting.

Monitoring work is now conducted by 3R workers.

It can be concluded that market waste composting can be easily implemented by other municipalities provided they have space for composting which is not far from the market.

No major nuisance is observed from market waste composting provided proper procedure is followed.

c. Expansion of 3R Promotion

The expansion of 3R promotion to whole of Veitari ward and all schools has been viewed as successful though the participation rate and engagement by the community has not been upto expectation. Considering the sustainability aspects, it can be concluded that counter part

staffs have acquired extensive experience and the ability to successfully sustain the 3R promotion to other areas as per the 3R Promotion Action plan.

d. Lautoka Clean Schools Programme.

Monitoring results reveal that all schools actively participated in the environment awareness raising division. The creativity displayed by students was exceptional. Furthermore, most schools have introduced the concept of separate bins at classroom level for papers, plastic, pet bottles, compost or organics, cans and a one bin for non recyclable waste. The schools have established 3R committees involving teachers, leaders and students who monitor that students dispose of wastes separately in the designated bins. The bins are then emptied in separate bigger storage containers at a common place once a week which is then collected by the council for recycling.

Council is of the view that children as excellent agents of change can easily grasp this new phenomenon regarding 3R's initiative and at the same time influence their parents in the various communities to adopt this good environment friendly practices.

However, following lessons were noted from the clean schools programme:

It has been noted that involvement of Ministry of education is vital especially engaging the ministry to send circulars to schools.

Monitoring revealed that Schools with active 3R teachers performed extremely well compared to others. Hence, school teachers have major role to play in order to sustain the programme. Students possess enormous talents and are always eager to explore new experiences. Hence, they need a teachers to guide them and act as catalyst in propelling this initiative to new heights.

Continuous monitoring by council is needed to sustain the interest of the schools and also to tackle challenges with the schools.

Site visits especially to VDS is an eye opener and creates a positive impact for students to do something about the waste generation.

e. Green Waste Collection and chipping Service

It has been noted from the lessons learnt that :

- Request for the service from households has been very limited so far only 29.54 ton. shredded from July 2010.
- Pruning work conducted as part of public area cleansing is undertaken irregularly.
- Therefore, it seems difficult to ensure the stable supply of generated chips to FSC.
- Chips is mainly effectively utilized as mulching materials and for home composting setup and market waste composting.
- Routine green waste collection and chipping work should be established.
- Awareness activity to disseminate the service (newspaper? radio?)
- Implementation should be recorded

Activity 3-5 Monitor the progress of communities’ perception, behavior change of the people by conducting the Public Opinion Survey.

The comparison of the four Public Opinion Surveys carried out for the residents of the Field forty Pilot Project Area generally revealed that residents have gradually made positive changes regarding they perception towards environmental issues.

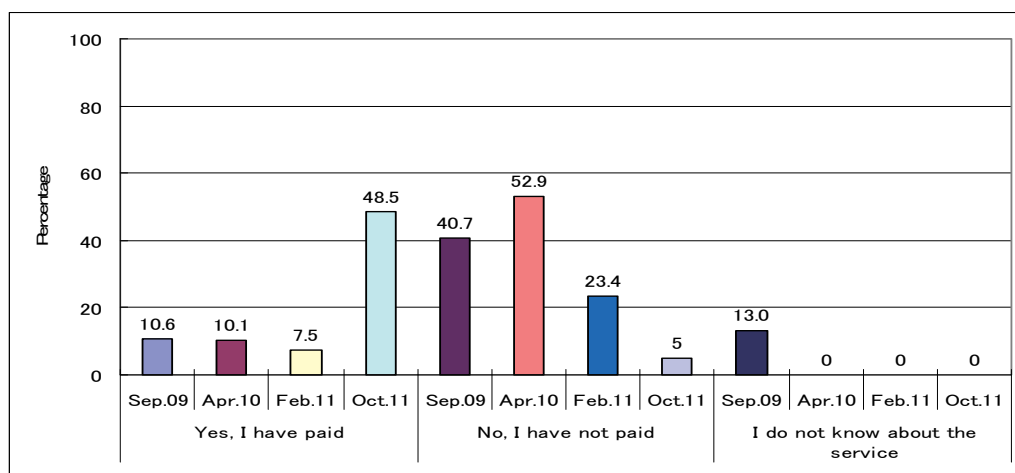
According to the responses to following questions, some positive behavioral changes have been noted as summarized below:

a. Survey on the Current Waste Management

The survey results indicate that generally the citizens tend to reveal contrasting views regarding their knowledge on waste management issues. More positive effect of the pilot project in terms of their perception and knowledge could not be established via the POS.

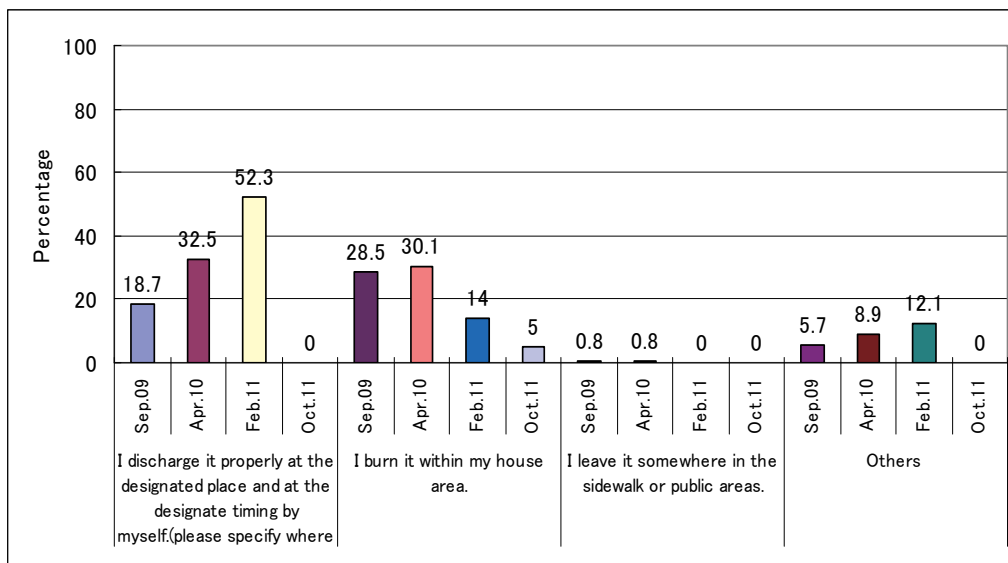
b. Survey on Green Waste Collection and Service

- **Have you ever paid for the green waste collection service?**



The above result indicate that percentage of response to “yes” increased dramatically in F40 which indicates that citizens are aware of the service and are eager to properly dispose their green waste

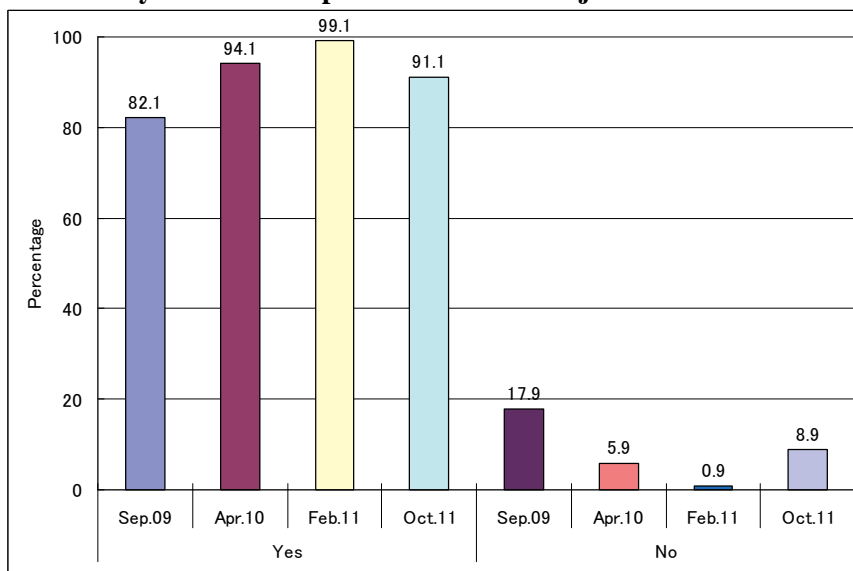
• **How do you discharge green waste?**



The above result indicates that burning of green waste has declined from 28.5% in September 2009 to 5 % in October 2011.

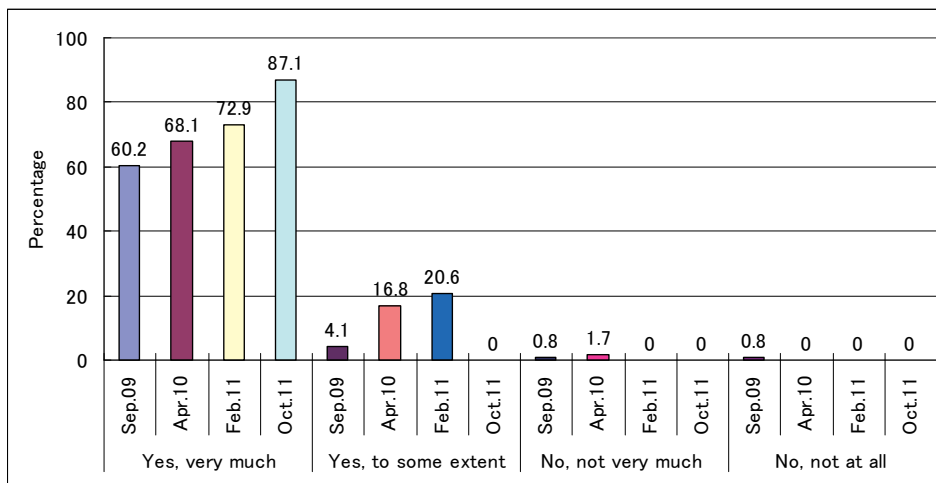
c. **Survey on Recyclables Collection Service**

- **Do you know the collection service of the recyclables including PET bottles, plastics, tin cans, aluminum & steel cans and spray cans, metal, paper, cardboard, glass bottles and jars, and old clothes, that are collected once a week by Council as a part of the JICA Project?**



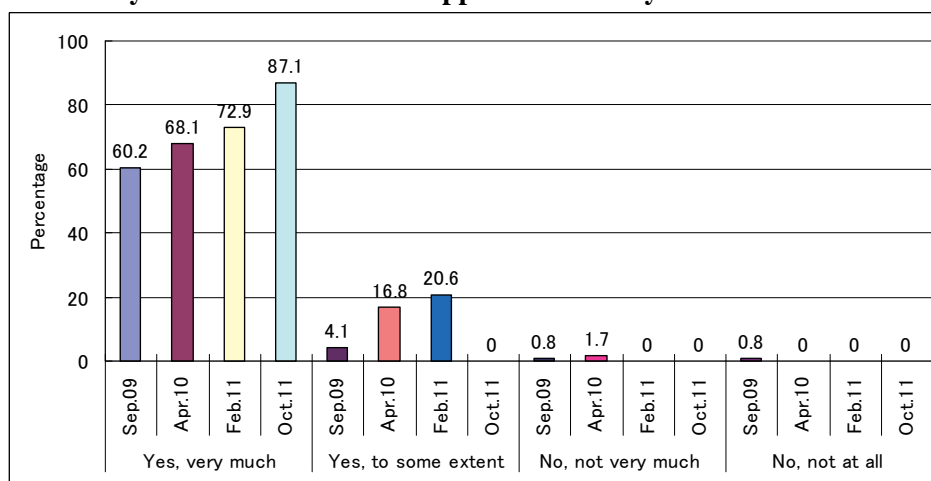
The above indicates that generally, there has been a steady increase in the awareness of the citizens regarding the separate collection service, though a slight decrease has been noted in October 2011. This may be attributed to settlement of new tenants within the 3RPP area.

d. Have you ever used the collection service of the recyclables that are collected once a week by Council as a part of the JICA Project?



The above result is encouraging to note whereby it indicates that percentage of citizens using the separate collection service increased steadily from September 2009 (60.2%) to 87.1 % in October 2011.

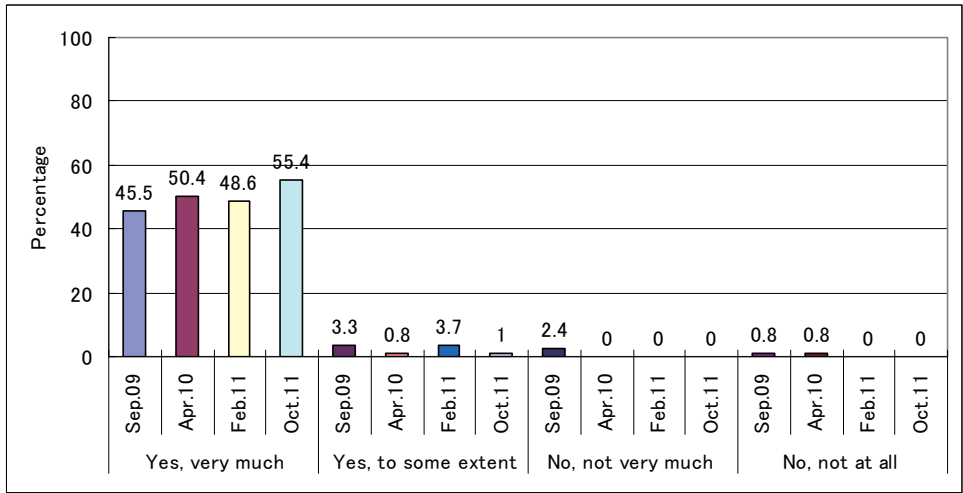
- Would you like to continue to support in the Recyclables collection service?**



It can be noted that the percentage of response “yes, very much” has increased steadily indicating that the activity can be sustained as the citizens are eager to participate in discharging the recyclable materials.

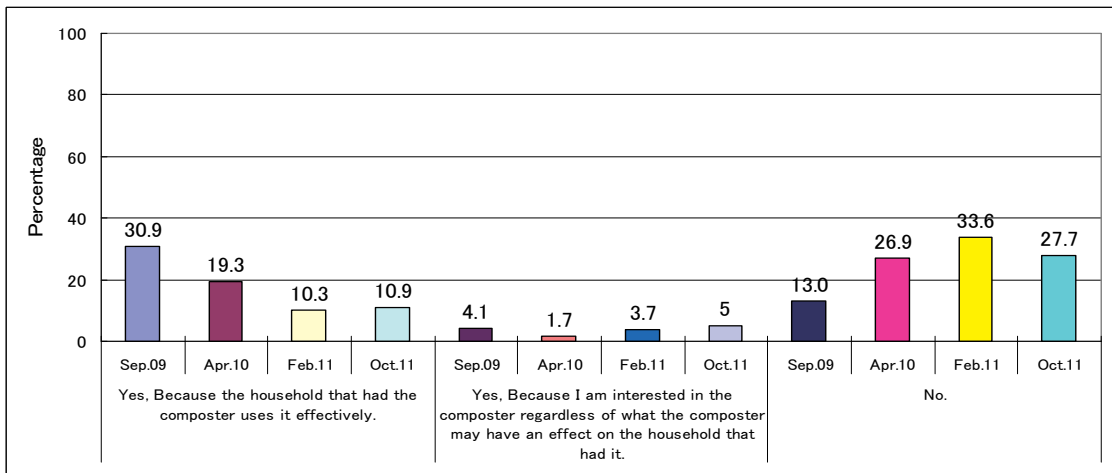
e. Survey on Current Status of Home Composting

- Would you like to continue to use the composter?**



It can be noted from above results that residents using the composters have the desire to continue to use the home composter as they might have experienced the benefits of composting.

• **Would you like to own a composter?**



It has been noted that the above result indicate that citizens who have yet to own a composter are not keen to own a composter. This may be due to the fact that initially the composters were handed out for only \$5.00 whereas the price has increased to \$30.00.

ACTIVITY 4: AWARENESS RAISING OF RESIDENTS THROUGH ENVIRONMENTAL EDUCATION ACTIVITIES

Activity 4-1 Review on environmental educational tools/programmes in Fiji, Japan and other countries.

Two municipalities, Beaverton (Oregon, US) and Halifax (Canada), which have separate collection system of recyclables along with garden waste collection service were selected, and their recycling systems and educational programs were analyzed together. In addition, container collection of recyclables and garden waste treatment in Guam, 3R programs in Shibushi City and a community-based group collection system in Mitaka City were reviewed as a reference. At the end of the report, the current condition in Lautoka and Nadi were analyzed.

Both Beaverton and Halifax simplified the separate collection and recycling systems as much as possible, so that residents can easily join their systems. Their educational materials, distributed to households and business establishments, make it easier for readers to understand the collection and recycling systems, with a lot of illustrations. On the other hand, in Shibushi, a small city with a traditional village-like community, community groups take critical roles, and the municipality implements a complicated collection system in cooperation with community groups and residents.

Activity 4-2 Develop effective educational tools/programmes.

a. Procedures

Since the basic approach of the 3R pilot project is community based, and a community committee is given a critical role, the C/P and expert team first tried to provide necessary information through the committee. The committee, however, is not active enough to take a leading role, so Lautoka health department workers conveyed the necessary information at community meetings and by handing out leaflets and other education materials.

Several committee meetings were arranged during the preparation period in order to finalize the pilot project plan, and the community meeting was organized once before the start of the new collection system in order to explain the PP and ask residents for their active cooperation.

The Launching ceremony was organized in order to make the pilot project known widely and increase people's awareness of solid waste management in Lautoka.

After the new collection systems started, the health department conducts regular monitoring in order to check the number of households who join the new collection activities and their discharge manners.

b. Educational materials

Various leaflets such as notice leaflet, recycling leaflet, documentaries and garden waste leaflet, were prepared before the start of the PP, and additional leaflets are made after the PP started based on the result of the monitoring.

Activity 4-3 Conduct trainings, on the job trainings, etc. for the groups & personnel concerned on 3R promotion in Lautoka and Nadi Town.

Total of 8 counter part staffs from the council have so far attained knowledge on 3R promotion as a result of their exposure in Kitakyushu and Shibushi Cities during the 2 weeks group focused training. Other forms of OJT training opportunities have been gained from the JET consultants during the course of the project. The participation of the staffs during the Joint Fortnightly meetings also offered opportunity to share and gain knowledge from each other. C/P staffs have acquired necessary training during the last 2 years of the project and they are now equipped to implement the 3R Expansion Plan to the whole of the city area.

Some basic training gained includes:

- Conducting community meetings.
- Preparation of presentations and conducting presentations to members of public.
- Preparation of educational and awareness raising tools like leaflets, pamphlets, posters, circulars, notices, media awareness materials, tender documents etc.
- Interpretation of monitoring results of recyclable collection.
- Carry out all monitoring works including home composters, recyclable collection, market waste composting, environmental monitoring at VDS , green waste chipping etc.
- Conduct basic baseline surveys like Public Opinion Surveys, community surveys etc and interpret results.
- Organise, facilitate and coordinate seminars.
- Prepare manuals.
- Conduct awareness raising of target population especially by house to house visits and announcements.
- Implement Clean schools Programme focusing on 3R's concept.

Activity 4-4 Introduce the educational tools/programmes in the pilot project areas.

The council was able to make optimal utilization of the various educational tools developed under the project to implement activities to raise the awareness of the residents in Pilot project areas. The educational tools like circulars and leaflets were distributed during house to house visits whilst the presentation materials were utilized during the community meetings. Home composting manual and recycling calendar was particularly effective in disseminating the awareness to the citizens of the 3R PP area.

Activity 4-5 Evaluate the educational tools/programmes.

Education materials were prepared by the C/P staffs and JET. The education materials included leaflets for 3R expansion in Andhra Street, home composting manual, council newsletters, circulars for market vendors on waste separation awareness and 2 project newsletters. The C/P staffs also prepared power point presentations for community meetings, joint weekly meetings, and stakeholder's workshop in consultation with the JET.

Therefore, evaluation of the educational materials and program are given as follows:

a) Community Meeting

Community meetings is perceived as idealistic, it has been experienced from pilot project activities that approximately 30 percentage of the community members only turn up for community meetings. Though the information is disseminated and filters into the community at large, not all members receive the awareness. Nonetheless, C/P will continue with the community meetings whereby it has been observed that influential members and community leaders are present who are targeted to disseminate the information on behalf of the council.

b) House to House Visits

This means of education and awareness has been noted to be most effective whereby the C/P have the opportunity to meet the community members face to face and explain the information needed to be disseminated more effectively. Through house to house visits, Council is sure that 100% of the community members are made aware of the target activities and the response from the community is more positive.

c) Announcements and Music (Melody) from MPT (Collection vehicle)

This means of the awareness and notification has been also proven to be very effective in particular prior to collection of recyclables whereby residents respond more positively. The residents get accustomed to the melody in particular and understand that it is meant for discharge of recyclables on road side.

d) Leaflets and Circulars

Significant improvements have been noticed in respect to the standard of leaflets and circulars prepared since the inception of the project. C/P staffs have gained considerable knowledge in respect to formulating such education tools.

Activity 4-6 Improve the educational tools/programmes.

The council in cooperation with JET members prepared the following educational tools and programmes for effective awareness and dissemination of information on 3R promotion.

- a. Television Commercial Advertisement on Recyclable collection.
- b. Television Commercial Advertisement on Home Composting.
- c. Green waste collection and recycling circular.
- d. 10 minutes Home composting demonstration video.
- e. 10 minute recyclable collection video.
- f. 6 Volumes of project Newsletters.
- g. Updated the 3R information on Department of Environments web site(3R web).
- h. Calender for separate collection service of recyclables for Veitari ward.
- i. Green waste collection service circular
- j. Home composting manuals
- k. Recycling poster

Activity 4-7 Implement activities to raise awareness through using the educational tools/programmes in Lautoka City and Nadi Town.

The council was able to make optimal utilization of the various educational tools developed under the project to implement activities to raise the awareness of the residents as follows:

- Community meetings
- 3R Booths and display during various public events.
- Media awareness through Fiji One, Mai TV, City Star and Lautoka Sun.
- 3R Awareness for whole of Veitari Ward through House to House Visits
- 3R Awareness to Special Administrators and Chief Executive officers of All councils during the Local government forum.
- Awareness to school students and teachers visiting Lautoka for educational visits etc.



The table below indicates some of the activities implemented using the educational tools developed under the 3R project:

	Target Group	No. of people
1	Community Meeting at CBD on 1/12/2010	15
2	Community Meeting at Field 40 on 8/12/2010	25
3	Community Meeting at PRB Natabua on 8/02/2011	30
4	Community Meeting at Natabua Primary School on 9/02/2011	40
5	Community Meeting at Navutu Village on 10/02/2011	70
6	Community Meeting at Rifle Range on 16/02/2011	30
7	Community Meeting at Howrah crescent on 17/02/2011	35
8	Community Meeting at Balawa on 18/02/2011	30
9	Community Meeting at Namoli Village on 22/02/2011	15
10	ODA Press tour on 9/12/2010	15
11	JOCV Mission on 04/02/2011	5
12	Stakeholders from Sigatoka Town Council	12
13	Lautoka Central Primary School Art display	500
14	Natabua Primary school Annual Prize Giving day	700
15	Golden Age Homes (kitchen hands and Gardeners)	5

	Target Group	No. of people
16	Natabua Prison (Kitchen hands)	5
17	Special Administrators/CEOs Local Government Forum	40
18	Students of Nasau Training Centre	60
19	3R Guideline and Manual Workshop for all Municipalities	45
20	Andhra Primary School (3R Awareness talk during school assembly)	700
21	3R booth display during PSC week celebrations – 2011	200
22	3R booth display during Fiji Day Celebrations - 2011	500
23	Students of Nasau Training Centre (3R awareness presentation and site visit to VDS) – 2011	60
24	Facilitated 3R Guideline and Manual Workshop for all Municipalities on November 2, 2011. 3R Presentation and training was also done by C/P staffs of LCC/DOE/NTC	100
25	3R Display Booth organized at Girit Centre during the Fiji Art and Living Foundation festival on June 24th and 25th, 2011.	300
26	Market Compost sales awareness organized at Sugar City Mall July 2nd, 2011.	200
27	Conducted market waste separation and litter awareness for market masters and all market vendors on July 1, 2011.	300
28	Organized and facilitated visit by Shibushi project Team led by mayor of Shibushi City, Mr Honda on 4/7/2011 to VDS.	10
29	Facilitated visit by NTC C/P to market and composting facility to observe market composting practices on June 24, 2011.	3
30	Created awareness on use of Home composter during the 1st year anniversary celebration of Rakiraki Township. LCC donated 5 composters to Rakiraki during the celebration and also created awareness to staffs of Rakiraki Town Council on Home Composting and Market waste composting.	150
31	3R Display Booth organized at University of Fiji during the Sustainability and Learning Action Forum on July 15th – 16th, 2011.	100
32	3R Awareness to students of all the 26 schools through the Clean Schools Program	13500
33	3R Awareness to Kindergarten students during the Pre School Celebrations	250
34	3R Awareness talk and Site visit of VDS to students of USP (2011)	65
35	3R Presentation (Green Waste Chipping, Home Composting and Market Waste composting) at the International Renewal Energy Forum at USP, Suva.	400
36	3R Awareness talk at the Adi Salusalu Festival on October 28, 2011.	200
37	3R Presentation to Students of Gandhi Bhawan Primary School on October 17, 2011.	65
38	Awareness for staffs of Natabua Prison on Heap method of Composting for kitchen, grass and garden waste.	10
39	VDS Site Visit by Shibushi City Expert Team on October 31, 2011.	8
40	Community Meeting in Collaboration with Shibushi City Expert Team at Field forty on October 31, 2011	80

	Target Group	No. of people
41	VDS Site Visit by Okinawa Water Business Team on November 4, 2011	11
42	3R Rap Radio programme from end of October for a month	National level
43	3R Awareness through installation of 3R Bill Board at Drasa Avenue Round about.	National level
44	3R media awareness via Fiji sun, Fiji Times and City Star	National level
45	Radio interview on 3R via Mix FM (2011)	National level
	Total	18,879 + NL

Note: National Level Implies difficult to estimate number of citizens reached during the awareness however such activities targeted the citizens nationwide.

ACTIVITY 5: DEVELOP AND RECOMMEND A 3R MODEL FOR FIJI

Activity 5-1 Review all the process & results of the activities for 3R promotion by the project and extract findings.

Review of 3R promotion activities were conducted as deliberated in detail under Activity 2-9 and Activity 3-4. The findings of the review of 3R promotion activities was then reflected in the 3R Guideline and 3R manual.

c. Overall Evaluation of 3R Promotion

For instance, review of the 3R promotion activities revealed home composting is the most practical and applicable 3R initiative followed by market waste composting. Detailed documentation of the review findings can be referred to in the 3R Manual.

Table 11: Overall Evaluation of 3R Promotion

Activity	Technical aspect	People's acceptability	Financial aspect	Waste minimization	Total (order of priority)
Home composting	+1	+2	+1	+1	+5 (1)
Market waste composting	+3	+1	+2	+2	+8 (2)
Green waste chipping and recycling	+2	+3	+3	+3	+11 (3)
Separate collection of recyclables	+4	+4	+4	+4	+16 (4)

Activity 5-2 Develop draft guidelines, manuals on 3R model for Fiji, etc. for its promotion.

The JET in mutual consultation with C/P staffs developed the draft framework of the 3R Guideline and 3R Manual. Lessons learnt and challenges faced from implementing 3R promotion was reflected in the 3R Guideline and 3R Manual. The objective of the 3R Guideline is to:

- Reveal the National Policy on 3R promotion to the person in charge of SWM
- The person in charge of SWM (LA) to implement the Guideline in his jurisdiction

3R Guideline consists of the following content.

1. Background and Objectives
2. 3R Targets and Policy of Promotion
3. Basic Accord for 3R Promotion

The objective of the 3R manual is to **provide the technical and practical information which guides Local Authorities to promote the 3Rs** according to the 3R Guideline which serves as the national policy on waste minimization.

Activity 5-3 Finalize the guidelines, manuals, etc.

The JET in mutual consultation with C/P staffs of DOE/LCC/NTC have finalized the 3R Guideline and 3R Manual. This was achieved after series of discussions with stakeholders and commitment of C/Ps of DOE/LCC/NTC and JET members.

Activity 5-4 Conduct seminars to present to other municipalities the guidelines and manuals.

The 3R Guideline and 3R manual was presented to all the waste management personnel from the respective municipalities including some Chief Executive Officers and Special Administrators on November 2, 2011 at Tanoa Waterfront Hotel, Lautoka.

Since the above documents will serve as the national policy to implement 3R practices to achieve waste minimization nationwide and the driving force for this activity will be waste management personnel working at various local authorities, it is essential that they understand the 3R Guideline and utilize the 3R Promotion Manual.

The Seminar was therefore held by DOE and JET in partnership with C/P staffs of LCC/NTC to explain this proposal to local authority waste management personnel in order to promote 3Rs using 3R Promotion Manual in accordance with 3R Guideline as a national policy on waste minimization in their respective regions.

The 3R Guideline was presented by Doe staffs and C/P of LCC whilst the 3R Manual was presented by the LCC/NTC C/P staffs. Proposed Waste disposal and recycling Legislation was also presented and discussed.