作成資料１１：ACCP 第 1 回全体会合参加者インタビュー調査（2018 年 6 月 27～29 日）

2018 年 9 月 30 日作成

総括　森　郁夫

Country/City Profile 作成のためのインタビュー調査（2018 年 6 月 25、27、29 日）

１．調査対象者

ACCP 年次会合参加者の内、旅程に余裕のあるものを抽出し、ウェブ質問回答結果をもとにインタビュー調査を実施した。対象となったのは、マラウィ、アンゴラ、コンゴ、タンザニア、セネガル（Country Profile）、スーダン、マラウィ、ブルキナファソ、コンゴ、マダガスカル、ナイジェリア、ニジェール、エジプト（City Profile）の計 13 名であった。

Country	Name of Participant	Organization
Sudan	Malik Bashier Mohamed Elhissin	Khartoum Cleaning Corporation
Malawi	Patrick Medius Nyirenda	Environmental Affairs Department
Malawi	EMMANUEL SHADRECK KANJUNJUNJU	BLANTYRE CITY COUNCIL
Angola	Maria Salvadora Lopes Correia Ortet de Vasconcelos Magalhães	Ministry of the Environment - National Waste Agency
Burkina Faso	SaÏdou NASSOURI	Commune de Ouagadougou
Congo	LEYONO Borel Hermann	Mairie Centrale de Brazzaville
Congo	MAPAKOU HYACINTHE	DIRECTION GENERALE DU DEVELOPPEMENT, DE L'HABITAT ET DE L'ARCHITECTURE
Tanzania	Mukuki Abdallah Hante	President's Office, Regional Administration and Local Government
Madagascar	ANDRIANAIVO Jaona	Commune Urbaine D'antananarivo
Nigeria	ABDULLAHI, ATIKU ABUBAKAR AUDU	Abuja Environmental Protection Board
Senegal	OUSMANE NDAO	Ministère de la gouvernance territoriale, du développement et de l'aménagement du territoire
Niger	Korombeize Mahamadou	Niamey town
Egypt	Adel Gaber Ahmed Shama	Alexandria Governorate

２．調査結果

調査結果は Country Profile, City Profile としてまとめた。以下、インタビュイーに関する所感などを記載する。

1) Sudan, Khartoum, Mr. Malik Bashier Mohamed Elhissin

- Interviewee は、JICA 技プロの CP であったため、ごみ量ごみ質など含む廃棄物管理の事

情は良く理解。

- ニーズとしては、１）トレーラーが現在 20 台あるが、キャパが追い付いておらず、追加が必要、２）オペレーションワーカーに対するキャパビルとトレーニングセンターが必要、３）SWM Regulation があるが、法の執行力の強化が必要、４）住民啓発、特に清掃活動などに住民を参加させたい、とのことであった。

2)Malawi, Mr. Patrick Medius Nyirenda

- Patrick 氏は質問票への回答も大変によく理解しており、極めて的確かつ詳細な情報聴取ができた。このため、Malawi（国）のプロファイルはかなり詳細な内容になっている。

3) Malawi, Blantyre, Mr. EMMANUEL SHADRECK KANJUNJUNJU

- Interviewee は、長年 Blantyre 市で SWM に従事しており、ごみ量ごみ質や財政データなども持参してインタビューに挑むなど意欲も高く質問事項に的確に回答できる能力を有していた。これまでインタビューした中では一番情報量・質ともに高く、後日写真やデータもメールで送信してくれた。
- ニーズとしては、１）ごみ収集率が 45%と低く、ごみ収集車やコンテナが足りていない（特にスクワッターエリア)、２）法による Waste Generator に対するエンフォースメントが必要、３）ごみ分別と共にリサイクル産業の育成、４）ごみ収集料金支払いに関する住民啓発が必要、とのことであった。

4) Angola, Ms. Maria Salvadora Lopes Correia Ortet de Vasconcelos Magalhães

- インタビュイーは言語の問題と現ポストについたばかりということで、プロファイル記載以上の情報は出てこなかった。
- ACCP がどのような活動なのか理解が難しいということで､ケニア･ナイロビでの TICAD IV からの経緯や当該分野における日本の協力などを説明した。

5) Burkina Faso, Ouagadougou, Mr. SaÏdou NASSOURI

- インタビュイーは当該市の廃棄物管理の現状をよく理解しており、かつ、知識を有していた。
- アフリカ開銀の支援により、CTVD (center of treatment, valorization and disposal)を整備しているということであった。

6) Congo, Brazzaville, Mr. LEYONO Borel Hermann

- インタビュイーは当該市の廃棄物管理のよく理解していた。
- 一部の廃棄物サービスが民間セクターにより実施されている。民間は中央政府と契約を交わしているとのことで、市職員であるインタビュイーにとってはコントロールが出来ずに歯がゆさを感じているようであった。

7) Congo, Mr. MAPAKOU HYACINTHE

- 今後の 2 大都市である Brazzaville と Pointe-Noire では、中央政府との契約で民間会社が廃棄物サービスを提供している。一方、廃棄物管理基本法などが整備されてないということで、支援エリアとしては法制度整備が考えられる。

8) Tanzania, Mr. Mukuki Abdallah Hante

- Vice President's Office (VPO) - Union and Environment が廃棄物を含む環境管理全般の法策定などを所管するが、Interviewee は地方行政を所管する President's Office - Regional

Administration and Local Government, Division of Urban Development の Director であったためそれほど廃棄物管理の知識は持ち合わせていない印象。

- 世銀をはじめ多くのドナーが支援中。特に廃棄物管理分野では 2010－2020 年に世銀が Tanzania Strategic Cities Project (TSCP）を実施し、7 つの新規処分場建設と重機の供与が行われている。また 2013‐2019 年には同じく世銀が Urban Local Government Strengthening Program (ULGSP)を実施し、18 の自治体で open dump site から controlled dump site への改善事業とごみ運搬車の供与が行われている。Dar-es-Salaam でも Metropolitan Development Project (DMDP)が実施中で、新規処分場建設と機材供与が提案されている。また DANIDA が、国、地方両方のレベルで SWM のキャパビル支援を実施中。
- タンザニアは世銀をはじめ多くのドナーが廃棄物分野で支援しているので、支援は足りている感があり、ニーズを聴取してもあまり具体的な玉が出てこない印象であった。

9) Madagascar, Antananarivo, Mr. ANDRIANAIVO Jaona

- 同市の廃棄物サービスは民間が実施している。民間は中央政府と契約しているとのことで、同市はコントロールできないとのことであった。

10) Nigeria, Abuja, Mr. ABDULLAHI, ATIKU ABUBAKAR AUDU

- インタビュイーは当該市の廃棄物管理の現状をよく理解し、かつ、知識も高い。JICA 技プロの CP であり、技プロの内容やその意味合いもよく理解していた。

11) Senegal, Mr. OUSMANE NDAO

- インタビュイーは中央政府職員であるが、仕事のほとんどはダカールに関することで、車両の調達も担当しているとのこと。
- 廃棄物管理基本法などが整備されておらず、これらに係るニーズがあるとのこと。

12) Niger, Niamey, Mr. Korombeize Mahamadou

- 収集機材が不足しており、収集頻度は週に 1 回とのこと。
- 集めるごみの 50%が sand ととのこと。砂漠化の激しさが窺われた。

13) Egypt, Alexandria, Mr. Adel Gaber Ahmed Shama

- インタビューイーは質問票の回答者ではなく、言語の問題もあってほとんど対面での情報聴取はできなかった。ただ、インタビューに対応するために部下からの記述による情報を持参してきていたため、それを補足情報としてプロファイルに反映した。

14) 全般

- 回答する個人の知識・能力により、その情報の質がかなり左右されるものであるとの印象が強かった。

作成資料１２：廃棄物管理環境教育ガイドブック第1回ワークショップ概要（2018年6月29日～7月1日）

1.1　アフリカ廃棄物分野・住民啓発活動ガイドブック検討ワークショップ（第１回）の開催

1.1.1 実施概要

a.　　背景

アフリカの多くの都市では、急増する都市人口に廃棄物収集サービスの提供が追い付いておらず、不衛生な居住環境が課題となっている。収集サービスを機能させ、衛生環境を改善するには、住民に「ポイ捨てをやめる」、「決められた場所や時間にごみを捨てる」などといった行動変容を促す必要があるが、行政から住民に対して、十分な情報提供や啓発活動が行われておらず、結果として、住民の関心や協力が得られていない。このような背景のもとで、アフリカ地域の廃棄物管理や環境教育（ブラウン系）分野で活動する青年海外協力隊を対象としたワークショップを開催する。

b.　　目的

本ワークショップの目的は以下のとおり。

- アフリカにおける廃棄物管理の課題や取組み、啓発活動の手法について理解を図り、隊員活動に役立てる。
- 「アフリカ廃棄物分野・住民啓発活動ガイドブック」作成に向け、各自が取り組んでいる住民啓発活動の内容や課題を共有するとともに、ワークショップ形式で啓発プログラム案の開発を試行的に行い、ガイドブックへの反映に資する。

c.　　開催期間と場所

- 期間：2018 年 6 月 29 日（金）～7 月 1 日（日）
- 場所：JICA モロッコ事務所

d.　　参加対象者

参加対象者は、以下の 9 名。

隊次	国	氏名	職種	要請内容	配属先
282	カメルーン	廣木　瀬菜	環境教育	教育	ジャ・ロボ県初等教育事務所
283	カメルーン	加藤　和美	環境教育	教育	オセアン県初等教育事務所
291	カメルーン	平田　萌	環境教育	教育	ンヴェラ県初等教育事務所
293	ケニア	石黒　雄資	環境教育	ブラウン	キアンブカウンティ環境・水・天然資源事務所
284	スーダン	吉田　晴乃	環境教育	ブラウン	医療科学技術大学
291	スーダン	森　達朗	環境教育	ブラウン	ハルツーム州ハルツーム郡清掃管理事務所
293	スーダン	七條　孝司	環境教育	ブラウン	ハルツーム州カラリ郡清掃管理事務所

292	ブルキナファソ	江川　裕基	環境教育	ブラウン	中央西部地方事務所
284	ボツワナ	山本　匡位	廃棄物処理	ブラウン	クウェネン・ディストリクト・カウンシル

e. ワークショッププログラム

ワークショップの開催に先んじて、参加予定者に対し、簡易なアンケートによるニーズ調査を実施した。その結果を踏まえ、以下のとおりワークショップのプログラムが作成された。なお、当初ワークショップのプログラム内で実施が予定されていたサイトビジットは、6月26日に先行して開催されたACCP第一回年次会合への視察先（SALEトランスファーステーション、Oum Azza - RABAT資源化センター）に同行することとなった。

1日目：**発表、講義、ワークショップ**

内容	講師	時間
開会式&自己紹介		09:00-09:15
発表：任地での活動・課題&ごみ処理状況	隊員9人×約10分	09:15-10:45
講義：横浜市の廃棄物管理と環境教育	横浜市資源循環局・竹原	11:00-12:30
講義：開発途上国における廃棄物管理改善にどう取り組むか（ごみ量・ごみ質調査入門を含む）	JICA地球環境部・吉田	13:30-15:00
問題分析ワークショップ：ごみ問題をどのように捉えるか、それに対する対応策をどのように発見するのか、環境教育隊員の活動を如何に計画すのか	JICA地球環境部・吉田	15:15-16:15
講義：JICA廃棄物管理ポジション・ペーパーとキャパシティ・デベロップメント	JICA地球環境部・山本	16:30-17:30

2日目：**講義、グループワーク**

内容	発表者	時間
講義：途上国でのごみ教育・住民啓発活動事例	エックス都市研・長安	9:00-10:00
講義：活動推進のコツ（オーナーシップ/モチベーション向上法等）	エックス都市研・田中	10:00-11:00
講義：行動変容を目的とした啓発プログラム開発の考え方	JICA地球環境部・小島	11:00-12:00
グループワーク：廃棄物問題の解決に向けた行動変容を促すために、効果的なアプローチとは？	隊員：2グループに分け議論	13:00-17:00

3日目：**グループワーク&発表**

内容	発表者	時間

グループワーク：啓発プログラム開発	隊員 2 グループ	9:00-12:00
グループワーク：啓発プログラム発表	隊員 2 グループ	13:00-14:00
質疑応答&ディスカッション	隊員、JICA、コンサルタント	14:00-15:00
ふりかえり・修了式	隊員、JICA、コンサルタント	15:00-16:00

1.1.2 ワークショップ実施に対する所見

ワークショップの実施におよび、「アフリカのきれいな街プラットフォーム年次会合及び青年海外協力隊連携ワークショップに関するアンケート」調査結果を踏まえ、所見と今後改善すべき点などについて、以下のとおりまとめる。

a. 発表・講義

導入の協力隊員の発表に関しては、先の ACCP 年次会合で準備したエクスポジションの資料を使用して行ったため、自己紹介（隊員の活動内容）と廃棄物管理にかかる基礎情報の紹介が同時に行われ、若干聞いている側にとって理解がしにくかった。各隊員の活動は、自ら作成した教材や資料、写真などを使用して、現地の廃棄物管理の状況とは別に紹介するコマがあったほうがより現状把握がしやすく、各隊員間での情報共有や教材のシェアがさらに進んだと思料される。

講義の内容構成については、若干技術補完研修などで協力隊員が学んだ内容と重複もあったと思われるが、全体的にみて途上国における廃棄物管理の基礎、日本の自治体の廃棄物管理方法、住民啓発の活動事例などが包括的に網羅されていたと思われ、隊員の満足度も高いものであった。またニーズ調査で特に要望のあった日本の廃棄物管理の歴史や変遷については、JICA ネットのマルチメディア教材を提供するなどで対応した。

b. グループワーク・発表

グループワークを行う際のグループ分けに関しては、啓発対象の違い（住民か学生か）に分けて行ったが、実際のプログラム開発に際しては、まず国ごと（特にスーダンからの参加者 3 名とカメルーンの参加者 3 名）に分けて検討を行ったため、隊員からは他国のボランティアと一緒にひとつのプログラムを作成するということができなかったのが残念であったという声がいくつかあった。状況の全く違う他国の隊員だからこそ、刺激し合える意見交換をしてひとつの形にできたら、もっとお互いに面白いプログラムを作成でき、多くの気づきがあったかもしれないとのことである。隊員の中には折角このようなアフリカ各国の隊員との接触の機会があったので、もっと普段一緒に議論を交わすことのできない他国隊員との交流や刺激を要望しているということも考慮すべき点である。

同様に、各自の作成したプログラムに対し参加者から意見をもらえたことは大変ありがたかったという一方で、時間が許せば、他隊員のプログラムをひとつずつ順番に一緒に作る、という作業をしてみたかったという意見もあった。

また参加者からは、行動変容モデルの用語の言い回しが理解しにくいという意見が多くだされ、

議論の中で参加者の解釈の仕方にも違いが見られたり、事例に引っ張られたアイディアが多く出されたりしたため、より分かり易い表現の仕方を工夫すべきである。

c. 全体

その他、ワークショップ全体を通じた協力隊員からのフィードバックを以下に列挙する。

- 今回のワークショップでは、講義とプログラムの開発をメインとしたが、住民啓発ガイドブックの構成や内容について議題するセッションも入れれば、隊員のガイドブック作成に対する具体的なイメージづくりやインプットの仕方について理解や議論が進んだと思われる。月例の環境テレビ会議の時間や発言の機会は限られているため、ワークショップでそのようなコマを設けても良かった。

- 最終日にワークショップそのものに対する振り返りの発表や共有する時間があれば尚よい。

d. ワークショップ参加への意欲・受講態度

講義やグループワークに際して、参加者は疑問やコメントが生じた場合には、その都度非常に積極的に質問を行っており、講義で得られた知識をさらにワークショップで補完する努力も見られた。講師陣からも参加隊員の知識欲と熱心な態度に対して好評を得た。よって研修員の参加意欲は高く、受講態度も良好であったと評する。

1.1.3 研修成果の活用

前述の通り、参加隊員は何れの講義、グループワークにおいても積極的かつ的確な質問を行い、ワークショップの集大成であったプログラム発表会での発表のための準備も全員が意欲的に行っていた。このことから、ワークショップの目的に掲げた項目については、十分に理解されたものと考えられる。

ただし、今回は住民啓発ガイドブック作成に関する議論をする余裕がなかったため、各隊員がガイドブック策定にむけた具体的なイメージは持てないままで終わった感がある。ワークショップでどのように隊員の知見や経験を活用できるかについても、もう少し明確なイメージが示せれば、なお本ワークショップの目的がより有効に達成されたと思われる。

作成資料１３：横浜研修生インタビュー調査（2018 年 8 月 18 日）

2018 年 9 月 30 日
追記：森　郁夫

アフリカ地域廃棄物管理情報収集・確認調査

業務：横浜課題別研修生へのインタビュー調査（国内作業）
日時：2018 年 8 月 18 日（土）
場所：JICA 横浜
調査実施者：森、岡本（エックス都市研究所)、チュンガ（建設技研インターナショナル）

１．目的
インタビュー調査結果をもとに、カントリー・プロファイル及びシティ・プロファイルを作成する。

２．方法
インタビュー対象者或いはインタビュー対象者と同組織の職員が 6 月のモロッコ ACCP 年次会合参加時に寄越した Web 質問票回答、及びインタビュー対象者が横浜研修参加のために作成したカントリーレポートをもとにプロファイル案を事前に作成し、その内容を確認する形でインタビュー調査を実施した。
ただし、Liberia, Moronvia からのモロッコ年次会合への参加者は無かったので、横浜研修生に Web 質問を実施した。

２．インタビュー対象者
ACCP メンバー（フォーカルポイント）である下表の研修生を対象にインタビュー調査を実施した。

No.	Country, City	Name
1	Botswana, Kweneng	Mr. MOKETE Happy
2	Egypt (central gov.)	Ms. RASLAN Doaa ahmed barbary ahmed
3	Ghana, Tema	Mr. NOI-ADZEMAN Solomon Nuetey
4	Kenya, Kiambu	Ms. KAMAU Mary Nyokabi
5	Liberia, Moronvia	Mr. SANNOR Hafiz Amadu Varlee
6	Namibia, Windhoek	Mr. KOUJO Friedrich
7	Zambia, Lusaka	Mr. MULWANDA Edgar Chilanzi
8	South Africa (central gov.)	Ms. MBATHA Simphiwe Gcwele Nomvula

３．結果、考察
1) Botswana, Kweneng, Mr. MOKETE Happy
- フランチャイズ実施地域は、きれいになっている模様。ただし、料金徴収を任されている自

治体の能力が十分でなく、持続性に問題を抱えているようだ。

2) Egypt (central gov.), Ms. RASLAN Doaa ahmed barbary ahmed

- 中央レベルの廃棄物管理組織は立ち上がったばかりで、人材の充実が必要。
- KfW, GIZ, EU の支援を受けている。

3) Ghana, Tema, Mr. NOI-ADZEMAN Solomon Nuetey

- 処分場の建設に関して世銀の支援を受けている。

4) Kenya, Kiambu, Ms. KAMAU Mary Nyokabi

- 最近、選挙により市長が変わり、それに伴い廃棄物セクションでも人事異動があった。
- UN-Habitat により福岡方式処分場が建設されたが未使用。
- 重機及び収集車が日本の支援にて調達された。

5) Liberia, Moronvia, Mr. SANNOR Hafiz Amadu Varlee

- 衛生埋立処分場あり。
- 世銀等の支援あり。

6) Namibia, Windhoek, Mr. KOUJO Friedrich

- 廃棄物管理はかなりよく為されているようだ。
- 衛生埋立処分場あり。

7) Zambia, Lusaka, Mr. MULWANDA Edgar Chilanzi

- 1 軒が支払っていたら、周辺の数件がそれに便乗するなど、料金徴収が難しい。
- 衛生埋立処分場あり。ただし、即日覆土などは為されていない。

8) South Africa (central gov.), Ms. MBATHA Simphiwe Gcwele Nomvula

- インタビュイーは廃棄物管理の知識が豊富。
- 中央レベルでは関係機関と協働で法制度整備をしている。法律は数多くあり。

9) 全般

- ウェブ質問回答に加えて、研修参加者のカントリー・レポートの情報があったので、事前にある程度充実したプロファイル案を作成でき、インタビュー調査が効率的に行えた。
- カントリー・レポートの項目がプロファイルの項目と類似していたため、目的とする情報を効率良く、的確に掴むことができた。
- インタビュー調査対象者の廃棄物管理に係る知見はかなり高く、専門用語を交えた質疑応答を支障なく行えた。

４．今後について

インタビュー結果を反映してプロファイル（案）を作成し、JICA 現地事務所を通じての確認を依頼する。

以上

作成資料１４：ACCP パンフレット　英文、仏文、日文（2018 年 8 月 21 日）

アフリカのきれいな街プラットフォーム（ACCP）とは

アフリカのきれいな街プラットフォームは、アフリカの国々がきれいな街と健康な暮らしの実現を目指して、廃棄物管理の知見共有、SDGs達成、投資促進を行うためのプラットフォームです。2018年6月時点で32か国・60都市が加盟しています。

設立の背景

2016年8月、ケニアのナイロビで開催された第6回アフリカ開発会議（TICAD VI）の一環として、「アフリカ廃棄物管理セミナー」が開かれました。アフリカから行政及び民間の関係者約180名が集まり、アフリカの都市における適切な廃棄物管理の重要性を確認しました。セミナーはアフリカ諸国及び開発援助機関の間での知見共有とネットワークづくりのためのプラットフォームの設立など、更なる協力の促進を宣言して閉会しました。ナイロビでの宣言に基づき、日本国環境省、JICA、国連環境計画（UNEP）、国連人間居住計画（UN-Habitat）及び横浜市のイニシアチブにより、2017年4月に開催されたモザンビークのマプトでの会合にて、アフリカ24ヶ国の参加を得てACCPが設立されました。

アフリカのきれいな街プラットフォーム事務局（ACCP事務局）
独立行政法人国際協力機構　地球環境部　環境管理グループ内
所在地：〒102-8012 東京都千代田区二番町5-25 二番町センタービル
http://africancleancities.org/
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JICA　UNEP　UN-HABITAT FOR A BETTER URBAN FUTURE　OPEN YOKOHAMA　Ministry of the Environment

AFRICAN CLEAN CITIES PLATFORM

PLATE-FORME AFRICAINE DES VILLES PROPRES

Toward Clean and Healthy Cities in Africa!

アフリカのきれいな街プラットフォーム

ACCPの活動の3つの柱

1 知見の共有とネットワーク化：

セミナーやワークショップを通して、アフリカ諸国間で経験、優良な取組及び教訓の共有を促進します。アフリカ及び他地域の中央・地方政府、研究機関、民間セクター等のネットワーク化を推進します。

日本での研修の実施

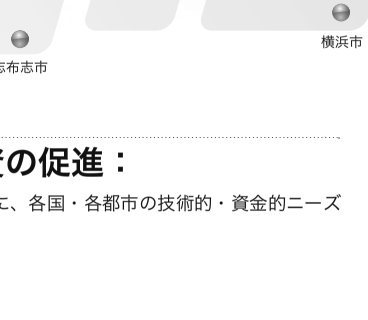
ACCPでは、加盟国・都市を対象として、廃棄物管理に関する複数の研修を実施しています。実務者向けには、廃棄物管理改善のための適切な方法･技術を学ぶ研修プログラムを、政策決定者向けには、廃棄物管理の重要性の理解を深め、政策的優先順位を向上させることを目的とした招聘プログラムを準備しています。

民間事業者（リサイクルセンター）見学

志布志市においてコンポスト施設の視察

民間事業者の取組の
PR とマッチング

横浜市の最終処分場にて実地研修

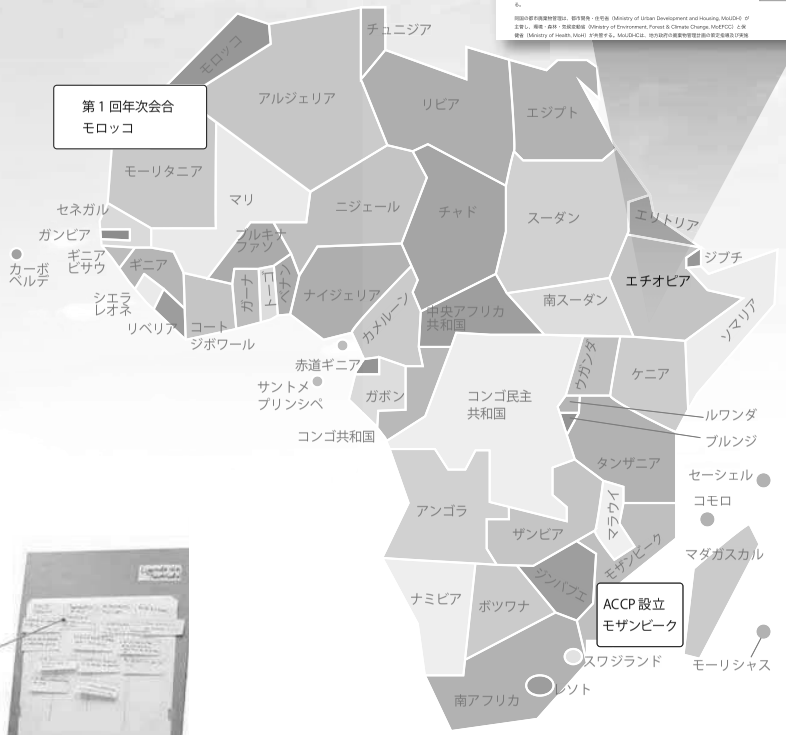


2 廃棄物管理に関する SDGs ターゲットの達成促進：

アフリカ諸国の廃棄物管理に関する SDGs のターゲットに関するデータ収集やモニタリングを促進します。

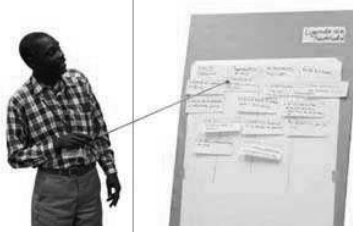
加盟国･都市の廃棄物管理に関するプロファイルを公表しています。

プロファイルは、それぞれのステークホルダーの立場に即した意思決定に役立つよう、国や都市の廃棄物管理の現状と将来に向けた改善ニーズに関する情報を提供しています。



3 廃棄物管理に対する投資の促進：

資金ソースとのマッチングを促進するために、各国・各都市の技術的・資金的ニーズに関する情報を提供します。



Toward Clean and Healthy Cities in Africa!

What the ACCP is

The African Clean Cities Platform (ACCP) is a platform to encourage knowledge sharing, achievement of the Sustainable Development Goals (SDGs) and investment on waste management in Africa with the aim of African countries realizing clean and healthy cities. As of June 2018, 32 countries and 60 cities are members.

Background

During TICAD VI in August 2016 in Nairobi, Kenya, Seminar on Solid Waste Management in Africa was held. About 180 participants from governments and private sectors from African countries confirmed the importance of appropriate waste management in African cities. The seminar was concluded by proclaiming the promotion of further cooperation, such as establishing a platform among African countries and partner organizations for more knowledge sharing and networking.

Based on the proclamation in Nairobi, the ACCP was established in April 2017 in Maputo, Mozambique with the initiatives of the Ministry of the Environment of Japan, the Japan International Cooperation Agency (JICA), the United Nations Environment Program (UNEP), the United Nations Human Settlement Program (UN-Habitat) and City of Yokohama, having 24 African countries participation.

African Clean Cities Platform Secretariat（ACCP Secretariat）

c/o Global Environment Department, Japan International Cooperation Agency (JICA)

Nibancho Center Building, 5-25 Niban-cho, Chiyoda-ku, Tokyo 102-8012, Japan

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JICA UNEP UN-HABITAT FOR A BETTER URBAN FUTURE OPEN YOKOHAMA Ministry of the Environment

AFRICAN CLEAN CITIES PLATFORM

PLATE-FORME AFRICAINE DES VILLES PROPRES

Toward Clean and Healthy Cities in Africa!

Three Pillars of ACCP Activity

AFRICAN CLEAN CITIES PLATFORM
PLATE-FORME AFRICAINE DES VILLES PROPRES

1 *Knowledge sharing and networking:*

Promote sharing of experiences, good practices, and lessons learned among African countries, through seminars and workshops, and promote networking among central and local governments, research institutes, private sectors, etc. in Africa and other regions.

Training program in Japan

ACCP implements several training courses on waste management for member countries and cities. For practitioners, a training program to learn appropriate methods and techniques for improving waste management, and for policy makers, a study tour to deepen understanding of the importance of waste management and to raise policy priorities have been prepared.

Site visit to a private SWM player - Recycling Center

Private sector involvement and business matching

On-site training at a composting plant in Shibushi City

On-site training at final disposal site in Yokohama

Shibushi

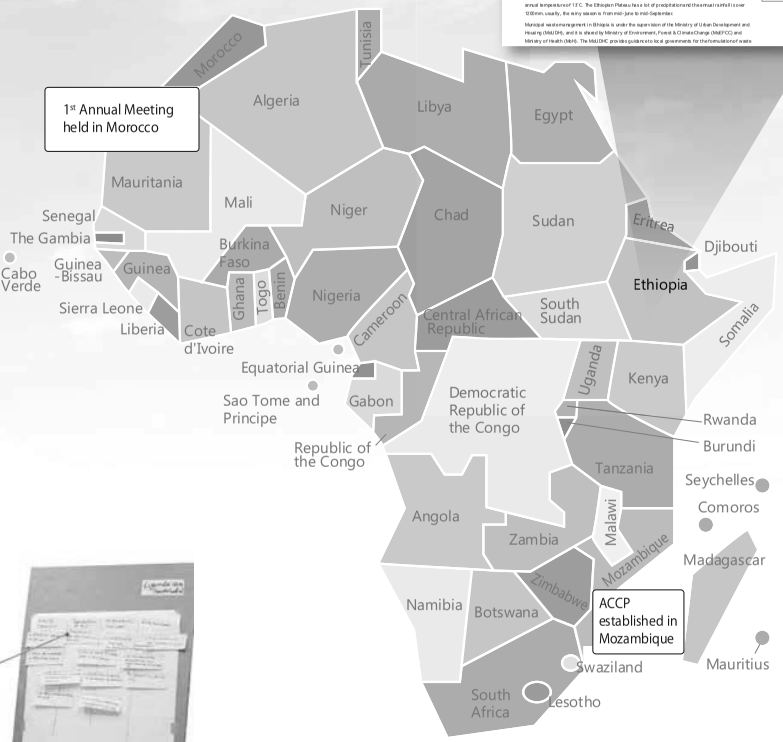
Yokohama

2 *Promotion of SDGs targets on waste management:*

Facilitate data collection and monitoring of SDGs targets in African countries.

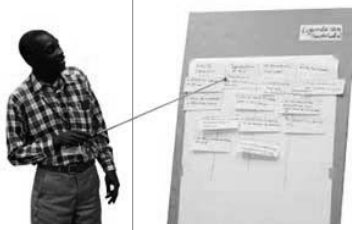
You can find solid waste management profiles of member countries and cities.

The profiles provide information on the current situation of solid waste management in countries and cities, and their improvement needs for the future. These are aiming at being useful for decision-making according to the position of each stakeholder.



3 *Promotion of investment in waste management:*

Provide information on technical and financial needs of the member countries and cities for matching them with sources of finance.



Toward Clean and Healthy Cities in Africa!

En quoi consiste la plate-forme africaine des villes propres (ACCP) ?

La plate-forme africaine des villes propres (ACCP : African Clean Cities Platform) est une plate-forme destinée à encourager le partage des connaissances, la réalisation des objectifs de développement durable (ODD) et l' investissement dans la gestion des déchets en Afrique dans le but de permettre aux pays africains de parvenir à la réalisation de villes propres et saines. Au mois de juin 2018, 32 pays et 60 villes en sont membres.

Contexte

Lors de la TICAD VI en août 2016 à Nairobi au Kenya, un séminaire sur la gestion des déchets solides en Afrique a été organisé. Environ 180 participants des gouvernements et du secteur privé des pays africains ont réaffirmé l' importance d' une gestion appropriée de déchets dans les villes africaines. Le séminaire s' est conclu par la déclaration de la promotion de nouvelles coopérations, telles que la mise en place d' une plate-forme réunissant les pays africains et les organisations partenaires pour procéder à un partage des connaissances et à la constitution d' un réseau.

La plate-forme africaine des villes propres a été établie en avril 2017 à Maputo au Mozambique, conformément à la déclaration de Nairobi, à l' initiative du ministère de l' Environnement du Japon, de l' Agence Japonaise de Coopération Internationale (JICA), du Programme des Nations Unies pour l' Environnement (PNUE), du Programme des Nations Unies pour les Établissements Humains (ONU-Habitat) et de la ville de Yokohama, avec la participation de 24 pays africains.

Secrétariat de la plate-forme africaine des villes propres (secrétariat de l' ACCP)
a/s du Département de l' environnement global, Agence Japonaise de Coopération Internationale (JICA)
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JICA UNEP UN-HABITAT FOR A BETTER URBAN FUTURE OPEN YOKOHAMA Ministry of the Environment

AFRICAN CLEAN CITIES PLATFORM

PLATE-FORME AFRICAINE DES VILLES PROPRES

Vers des villes propres et saines en Afrique!

Les trois piliers d' activité de l' ACCP

AFRICAN CLEAN CITIES PLATFORM
PLATE-FORME AFRICAINE DES VILLES PROPRES

1 *Partage de connaissances et réseautage :*

Promouvoir le partage d' expérience, des bonnes pratiques et des leçons apprises des pays africains par des séminaires et ateliers, et promouvoir un réseautage entre les gouvernements centraux et locaux, les instituts de recherche, le secteur privé et autres, en Afrique et dans d' autres régions.

Programmes de formation au Japon

La plate-forme africaine des villes propres réalise plusieurs cursus de formation sur la gestion des déchets pour les pays et villes membres. Un programme de formation à destination des personnes impliquées dans la gestion des déchets pour apprendre les méthodes et techniques appropriées pour améliorer la gestion des déchets et un voyage d' études à destination des décideurs politiques pour approfondir leur compréhension de l' importance de la gestion des déchets et définir des priorités politiques ont été mis en place.

Visite du site d' un acteur de la gestion des déchets solides du secteur privé – Centre de recyclage

Implication du secteur privé et facilitation des rencontres avec les entreprises

Formation sur place dans une usine de compostage de la ville de Shibushi

Formation sur place dans une décharge finale à Yokohama

Shibushi

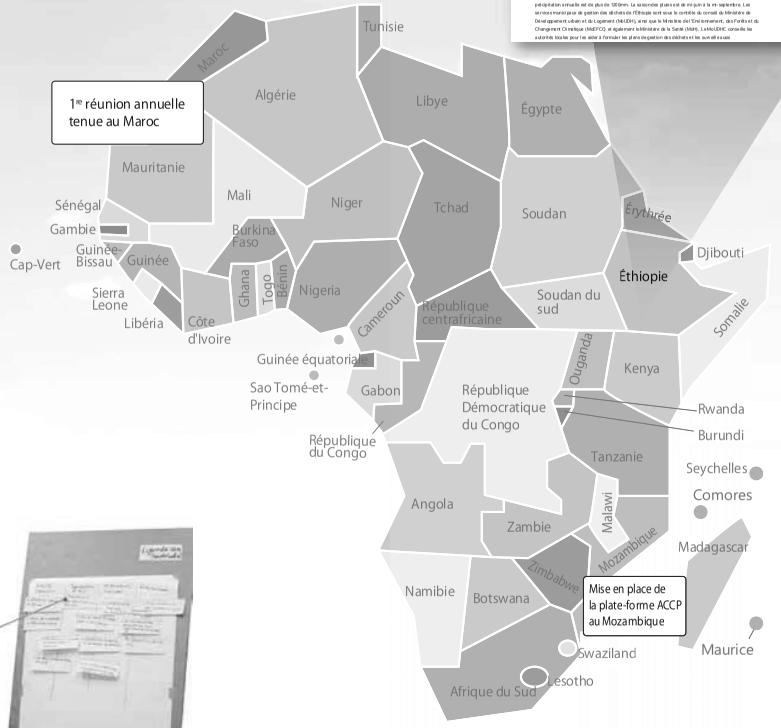
Yokohama

2 *Promotion de la réalisation des cibles des ODD sur la gestion des déchets :*

Faciliter la collecte de données et le suivi de la réalisation des cibles des ODD dans les pays africains.

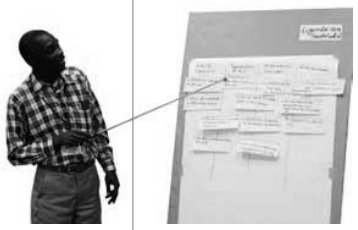
Mise à disposition des profils des pays et villes membres en matière de gestion des déchets solides

Les profils fournissent des informations sur la situation actuelle de la gestion des déchets solides dans les pays et villes membres, ainsi que les améliorations dont ils auraient besoin à l' avenir. Ces profils sont destinés à servir à la prise de décision des différentes parties prenantes en fonction de leur position.



3 *Promotion de l' investissement dans la gestion des déchets :*

Fournir des informations sur les besoins techniques et financiers des pays et villes membres pour leur permettre de trouver des sources de financement.



Vers des villes propres et saines en Afrique!

作成資料１５：参考文献要旨（References' Summary Draft）

References' Summary

(Draft)

Prepared for
Japan International Cooperation Agency (JICA)

Prepared by
EX Research Institute Ltd.
CTI Engineering International Co., Ltd.

December 2018

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Ref.-1: A review of renewable energy development in Africa -A focus in South Africa, Egypt and Nigeria-

Summary

This paper was published in the Renewable and Sustainable Energy Reviews Journal in 2017. The paper reviews renewable energy technological developments in Africa, specifically Egypt, Nigeria and South Africa. The paper focuses on solar, hydro, wind and biomass energy and it outlines the challenges associated with the development of renewable energy in Africa in general.

The authors point out that the development of renewable energy in the three countries and Africa in general is hindered by the following key challenges: (1) Insufficient policy and lack of implementation of existing policy, (2) Insufficient funding of governmental agencies that are responsible for generation, transmission and distribution of electricity. (3) Mismanagement of funds allocated to the energy sector. (4) Lack of awareness of latest renewable energy technologies, (5) Insufficient collaboration with international bodies on promoting renewable energy. (6) Insufficient financial resources and expertise knowledge about the implementation of modern renewable energy that would be efficient and effective. (7) Interests of governments and investors to develop large scale instead of small scale renewable energy production. (8) Lack of enforceable regulation due to lack of law, corruption and poor governance. (9) Poor market for renewable energy products. (10) Institutional and regulatory barriers.

To address these challenges, the authors identified the following solutions: (a) standardization of institutional and regulatory departments and authorities to a single agency that may regulate all the institutional and regulatory bodies. (b) Public awareness about the importance of building renewable energy sources. (c) Deregulation of the energy sector can promote the use of small scale renewable energy production that will increase the availability of electricity and provide favorable environment for private investors. (d) government policies in promoting renewable energy must be consistent. (e) External assistance from countries and financial entities to assist in reducing risk in renewable energy deployment using technological equipment and facilities. (f) Rural electrification programs must integrate renewable energy in their policy, planning and management which can encourage private investors to function in such areas.

Authors: Abubakar Kabir Aliyu, Babangida Modu, Chee Wei Tan.

Ref.-2: Investigating in the Solid Waste Management Problems in Urban Area, Sudan

Summary

This paper was published in the International Journal of Engineering Research & Technology in 2014 and it presents the results of a study that set out to investigate the quantity and sources of solid waste and the impact of solid waste on outbreak of diseases in seven main localities in Khartoum. The data for the study was collected through a random sample of 350 households and through visits to dump sites and relevant institutions.

The results of the study showed the following: (a) the quantity of solid waste tends to increase with income, activity and geographic factors. (b) Changes in food habits and the widespread use of disposable containers and packages resulted in huge amounts of waste. Therefore, changing food habits would lower the quantity of waste and hence the resources needed to collect and dispose solid waste. (c) Different types of waste are mixed (no separation) and that waste collection service is provided in affluent areas but not in low income areas. The results further show that some households in low income areas are willing to pay for waste collection services if adequate waste collection service is provided or if they are asked to pay. The authors note that some households (poor households) would not afford to pay for waste collection services.

In conclusion, the authors indicate that the problem of solid waste in Khartoum will continue unless proper waste management practices are adopted and unless the public cooperates with the Public Health Department in finding and implementing solutions.

NOTE: A key component of the research was to investigate the impact of solid waste on outbreak of diseases. The paper discusses the relationship between solid waste and outbreak of diseases but there is no empirical evidence of an association between solid waste and outbreak of diseases.

Authors: Abubaker B. M. A, Mohammad Alhadi, Aisha Magzoub, Alnail Mohmmed, Gamareldawla Hussein, Nabil M. Elamin, Bashir H. Osman6, Mukhtar Adam

Ref.-3: Globalization, Urbanization and Municipal Solid Waste Management in Africa.

Summary

This paper was presented in 2003 at a conference on globalization (African on a Global Stage). The paper examines the impact of globalization and urbanization on municipal solid waste management in Africa in general, using case studies of Bamenda and Yaoundé City in Cameroon.

In this paper, the author has argued that globalization has led to an increase in the flow of goods and services, changed life styles and consumption patterns, and that these outcomes have resulted into an increased volume and variety of municipal solid waste which city authorities are struggling to manage sustainably. The author identified a range of challenges that make it difficult for city authorities to manage municipal solid waste sustainably:

- Many cities remain poor, weak and badly administered;
- Rapid urban population growth and corruption.
- Municipal solid waste is not being managed sustainably partly because governments are copying ill adapted global strategies/technologies that are not suitable to local realities.
- Governments are not adequately exploring and using local initiatives and strategies to improve solid waste management.

The author concludes by indicating that as population in cities continues to grow; local and adapted techniques involving collaboration with stakeholders and coordinated by the government would be important. The author also indicates that the ability to deal the impact of globalization and urbanization on municipal solid waste management will require effective capacity building for cities and communities toward participatory and good governance.

Authors: Eric Achankeng, University of Adelaide

Ref.-4: Economic growth and environmental pollution in West Africa: Testing the Environmental Kuznets Curve hypothesis.

Summary

This paper was published in the Kasetsart Journal of Social Sciences in 2017 and it presents the results of a study that was set out to examine the relationship between economic growth and environmental pollution in West Africa. The paper was based on the observation that several studies suggest that increased economic activities result in poor environmental quality while other studies argue that increased economic activities do not result in poor environmental quality due to the demand for improved environmental quality because of higher incomes.

The study used panel data set from 1970 to 2013 to:

- Examine the relationship between economic growth and environmental pollution (combustible renewable waste and CO_2 emissions)
- Estimate the turning point at which CO_2 emission and combustible renewable waste begin to decrease,
- Investigate the relationship between combustible renewable waste and CO_2 emission to determine if combustible renewable waste leads to CO_2 emission.

The results showed that economic growth in the short term significantly increases CO_2 emission and combustible waste. However, economic growth in the long-run did not significantly decrease environmental pollution. The results also revealed that combustible waste positively influenced CO_2 emission, although the relationship was not statistically significant. The authors argue that the results imply that environmental pollution does not significantly decrease even at higher income levels. From these results, the authors recommend that West Africa Economies should still pursue efficiency improvement policies to prevent environmental degradation.

Authors: Derick Taylor Adu, Elisha Kwaku Denkyirah

Ref.-5: Recognizing Africa's Informal Sector

Summary

This brief report - published by the African Development Bank in 2013 - discusses the role of the informal sector in economic development, its proliferation and measures that need to be implemented to promote the sector.

The paper points out that the informal sector contributes about 55% of Sub-Saharan Africa's GDP and 80% of the labor force. The paper further points out that the prominence of the informal sector in most African economies lies in the fact that it offers opportunities to the most vulnerable populations such as poorest, women and youth.

The paper identifies the following as key factors preventing informal operators from formalizing their activities: lack of skills, education and training; higher taxes, complicated fiscal processes, limited access to capital and technology and poor infrastructure,

The paper suggests the following as important actions to be taken to promote the sector:

- Policy makers should recognize the important role informal sector companies play in economic development,
- Improve access to finance for the informal sector,
- Improve access to information about the informal sector (characteristics of actors, tax collection, working conditions, productivity).

Ref.-6: African Economic Outlook 2017

Summary

This is a 317 pages report that assesses recent economic and social situation in Africa. The report was produced from a partnership among three international organizations: the African Development Bank, the OECD and the United Nations Development Programme.

The report has three parts: Part I examines Africa's macroeconomic performance, financing, trade policies and regional integration, human development, and governance. Part II explains how improving entrepreneurship contributes to Africa's industrialization and offers policies to do so. Part III summarizes the performance of every African country.

Ref.-7: Role and importance of informal collectors in the municipal waste pre-collection system in Abidjan, Côte d'Ivoire

Summary

This paper was published in the Habitat International Journal in 2016. The paper presents the results of a qualitative study which was carried out in Abidjan, Côte d'Ivoire to examine the motivation, role and importance of informal waste collectors in the management of municipal solid waste. The researchers collected da from 400 residents, 37 private waste pre-collectors and from non-governmental organizations.

The results of the study showed the following:

- There is no legal framework governing the activities of private waste collectors.
- Majority of private waste collectors are informal workers using only very basic equipment.
- Most informal waste collectors joined the business because of lack of employment. Participation of the informal sector in waste collection could help young people to make a decent living and reduce unemployment rate, if better organized, controlled and supported by the government.
- The informal collectors contributed to extending the areas covered by the overall waste management system.
- Most of the waste collectors were sorting the waste but some were not sorting the waste because the prices of the recovered materials were usually too low when compared to the work done.
- Residents preferred informal waste collectors to private companies because informal collectors were collecting waste more regularly compared to private companies. Households would prefer to see informal collectors continue the collection service than going back to the direct involvement of the municipal government - this is due to the failure of the municipal government in collecting waste in the past.

From these results, the authors concluded that informal waste collectors can greatly improve the urban well-being and that sustainable management of municipal waste in developing countries would not succeed if the existing informal workers are not integrated in strategic planning of waste management.

Authors: Harinaivo A. Andrianisa, Yves O.K. Brou, Alphonse Séhi bi

Ref.-8: Solid Waste Management and Risks to Health in Urban Africa

Summary

This paper was published by the African Population and Health Research Center. The paper presents the results of a study which was carried out in Dakar, Senegal to: (1) Identify the existing practices and interests shaping the state of solid waste collection, disposal and recycling. (2) Examine the relative exposure of residents of slum settlements and less deprived city areas to poor SWM and associated health outcomes. (3) Explore knowledge, attitudes and practices of stakeholders in relation to environmental and health risks due to poor SWM at individual, household and community levels. (4) Explore disparities in vulnerability, capacity and loss to health across different age-groups and gender.

The results of the study showed the following:

- Households are aware of the health and environmental risk posed by poor SWM.
- Households do not have appropriate containers for collecting and storing their waste.
- Laws and regulations do not ensure clear delineation of responsibilities between the national government and municipalities.
- Laws and regulations have never been sufficiently enforced to reduce indiscriminate disposal of waste.
- Due to financial constraints, municipalities are not able to allocate adequate financial resources to SWM sector.

To improve SWM in the city, the following solutions were proposed:

- Members of the public should be sensitized about the importance of keeping the environment clean.
- Households should be sensitized about waste recycling and composting.
- There should be legislation mandating government to make substantial resources available to municipalities to tackle solid waste management problems.
- Improve working conditions of SWM personnel.

Ref.-9: Comparison of municipal solid waste management systems in Canada and Ghana: A case study of the cities of London, Ontario, and Kumasi, Ghana

Summary

This paper was published in the Journal of Waste Management in 2009 and it presents the results of a case study which set out to compare solid waste management in Kumasi in Ghana and London, Ontario in Canada. The paper identifies challenges in waste management in Kumasi and discusses factors that lead to better management of solid waste in London, Ontario in Canada.

The paper identifies the following challenges to successful solid waste management in Kumasi:

- Inadequate funding for capital investment for effective delivery of waste management services.
- Inadequate equipment holding culminating in limited coverage of service delivery.
- Inadequate bye-laws and lack of enforcement of available ones.
- Inadequate revenue mobilization to finance Waste Management Service costs.
- Bad attitude of residents such as indiscriminate disposal of household waste and littering due to lack of effective environmental health education and service promotion strategy.
- Poor infrastructure, particularly road networks and waste collection points, mostly in new settlements, which impacts negatively on service delivery.

The authors pointed out that Kumasi could adopt and implement the following lessons - from waste management practices in London, Ontario in Canada:

- Preparing a strategic solid waste management for the city. In developing the plan, important stakeholders should be identified and brought together. The plan should consider financing schemes that will adequately pay for the cost of waste management and adoption of modes of payment that will be most effective.
- Enacting strong and adequate legislation both from the national and city level to guide waste management decisions and strategies.
- Intensive education of the inhabitants of the city is required to ensure they fully understand the health hazards posed by inadequate municipal solid waste management.
- Taking steps to extend the lifespan of the cities landfill through waste diversion, recycling.
- Locally based solutions should be sought for waste management equipment to ensure that they are serviced frequently and are always in good condition.

Authors: Mizpah Asase, Ernest K. Yanful, Moses Mensah, Jay Stanford, Samuel Amponsah

Ref.-10: Recyclable resources from municipal solid waste: Assessment of its energy, economic and environmental benefits in Nigeria.

Summary

This paper was published in the Journal of Resources, Conservation & Recycling in 2018. The paper presents the results of a study that was carried out in six geographical zones in Nigeria to evaluate the potential energy saving, economic and environmental benefits of recycling municipal solid waste. The authors used data from local literature, reports and publications from relevant institutions to carry out the evaluation.

The results of the evaluation revealed the following:

- Plastic waste was the most prominent recyclable waste in all the cities studied.
- However, paper was the most available recyclable material in the waste stream of the cities in the South West of the country.
- A total of 1046.43 GW h of energy could be saved per annum by recycling waste materials rather than producing new products from virgin materials.
- The saving in electricity could provide electric power for about 9.8 million people
- The environmental assessment results indicated that a total of 307.364 kilotons CO_2 eq of GHG emission reduction could be achieved annually.

Authors: Ayodele T.R., Alao M.A., Ogunjuyigbe A.S.O

Ref.-11: World Bank CCS Program activities in South Africa – Results and lessons learned

Summary

This paper was presented at the 13th International Conference on Greenhouse Gas Control Technologies in 2016. The paper presents the results of a study that was carried out as part of World Bank's pilot project on carbon capture and storage (CCS) in South Africa. The study had three objectives: (1) Assess the legal and regulatory framework for carbon capture and storage (CCS) projects in South Africa. (2) Develop a detailed technical and economic analysis for large scale development and deployment of CCS in South Africa. (3) Develop a comprehensive plan for raising public awareness, informing and engaging with various public stakeholders in South Africa, both at the national and local levels, on the CCS technology deployment and respective management of potential risk.

Regarding the first objective, the study recommended the following four options for regulating CCS in South Africa: (a) The National Environmental Management: Waste Act. (b) The national Environmental Management Act (NEMA). (c) The NEMA and the Mineral Petroleum Resources Development Act (MPRDA). (d) The development of stand-alone legislation, specifically for the purposes of regulating CCS.

Regarding the second objective, the study found that large-scale CCS could be deployed in South Africa at a levelized average cost of ZAR 422 per metric ton of CO2 across industrial sectors. The study found that the capital up-front cost of this large-scale deployment were significant but could be mitigated by taking a phased approach to CO2 capture deployment.

Regarding the third objective, the study recommended that stakeholder engagement commence at the national level with government official before proceeding in turn to the provincial, district municipal, and local municipal levels. The key messages identified for the project related to: Project description; Rationale for the project; Details of the CCS roadmap and project program; Job creation; Skills development; Human safety, Water use; potential for groundwater pollution; potential for environmental impacts; Energy costs, Economic; International CCS experience; and Responsibility and liability. The methods of engagement identified included: individual consultation meetings; Technical workshop; Open house meeting; Focus group discussions, Media briefings, questions and answer sheets, factsheets and Social media.

Authors: Brendan Beck, Natalia Kulichenko-Lotz, Tony Surridge

Ref.-12: Solid Waste Management in Africa: A Review

Summary

This paper was published in 2016 in the International Journal of Waste Resources and it reviews solid waste management in Africa. The paper presents a brief history about solid waste; and examines the composition, collection and transportation/disposal of solid waste in Africa.

The paper points out that in Africa, organic waste is predominant and that e waste is increasingly becoming a problem in many cities. The paper further points out that there is insufficient collection of waste in Africa because of a range of factors including: city authorities have limited financial resources, shortage of labor, there is limited capacity to recover and recycle waste, and by-laws are ineffective. The paper also points out that corruption affects solid waste management.

To improve solid waste management in Africa, the paper recommends the following: waste related laws should be reviewed and reinforced accordingly; there is a need to build local capacity in solid waste management, it is important encourage and promote private sector participation in solid waste management; and change people's attitude towards waste.

Authors: Ibrahim Adebayo Bello, Muhamad Norshafiq bin Ismail and Nassereldeen A Kabbashi*

Ref.-13: Municipal Solid Waste Management in the Accra Metropolitan Area, Ghana

Summary

This paper was published in the Environmentalist Journal in 2003 and it reviews solid waste management in Accra, Ghana. It compares solid waste management during the time solid waste was solely under the responsibility of the Waste Management Department of Accra Metropolitan Authority to the time private operators started participating in solid waste management.

The paper notes that low-income areas generate less waste per capita than the middle and high-income areas and that the waste generated has high organic content. The paper further notes that packaging materials and empty cans form a significant part of the waste in high income areas. The paper indicates that recycling of waste materials and composting of organic waste does take place and that these activities create employment for local people and reduce the volume of waste to be collected, transported and disposed. The paper points out that the major problem with composting is the mixed nature of the waste, with plastic, metals and raw faecal matter, especially in low-income areas where sanitation facilities are lacking

The paper explains that the introduction of the private sector in solid waste management did not significantly improve solid waste management in the city because the private sector lacks qualified personnel and adequate equipment. The paper also points out that solid waste is collected mainly in high income, low density settlements and that the private sectors lacks financial resources, qualified personnel and appropriate equipment to sustainably collect and dispose solid waste. The paper further points out that the problem of solid waste management is compounded by rapid urbanization, lack of proper land use planning and lack of access roads for waste collection vehicles.

The paper recommends the following as possible solutions that would improve solid waste management in the city: (1) private sector should be supported through soft loans to allow them to hire qualified personnel and access necessary equipment. (2) informal waste collectors should be integrated into the waste management stream. (3) Communities should be involved in decision making. (4) strengthen institutional capacity in planning. (5) Build local capacity in data collection and analysis on solid waste as data is necessary in the selection of appropriate technologies.

Authors: KWASI OWUSU BOADI MARKKU KUITUNEN

Ref.-14: Privatization of solid waste collection services: Lessons from Gaborone

Summary

This paper was published in the Journal of Waste Management in 2015. The paper compares efficiency and effectiveness between the private and public sector in the use of staff and waste collection vehicles; vehicle purchasing and repairing. The paper also points out challenges Gaborone City Council faced in the process of engaging the private sector in waste collection.

The study, showed the following: (1) The public sector collected more waste per unit of available vehicle capacity than the private sector, possibly indicating that the private sector had limited capacity in vehicle routing optimization, or the areas they were assigned under the service contract generated insufficient waste to fill the available capacity. (2) The private sector employed younger workers than the public and the results showed that the private sector was collecting 5 tons/day/man while the public sector was collecting 0.96 tons/day/man. (3) The process of purchasing vehicles takes longer in the public sector. This makes it difficult for the public sector to replace old vehicles; majority of public sector vehicles suffered persistent breakdowns. (4) Repairing equipment was delayed by bureaucratic procedures that often increase the turnaround time for vehicle maintenance. (5) It was not possible to compare the unit cost of waste collection between the private and the public sector because both the private and the public sector failed to provide adequate data to make such comparison.

Regarding the process of engaging and contracting the private sector to provide waste collection services, the paper made the following observations: (1) the service contracts were unaffordable to the city council, indicating that the scope and budget of the service were ill defined. (2) The council had challenges in defining the scope of the contract which led to a dispute between the council and one service provider. (3) The service contracts did not have set criterion for evaluating performance. (4) The time lapse between initiating the privatization process and actual implementation showed lack of experience by the city council in executing privatization contracts. (5) It is important that the city councils should have adequate capacity in executing service contracts. (6) Contracts should be based on comprehensive waste related data and the criteria for evaluating performance should be set out clearly. (7) Where required skills cannot be developed through training of existing staff, city councils to recruit qualified staff.

Authors: Benjamin Bolaane, Emmanuel Isaac

Ref.-15: Tools and resources for Mitigating Methane and Black carbon from the municipal Solid Waste Sector.

Summary

This is a brief introduction to a central repository (from the Waste Initiative) that offers cities access to a range of tools and resources for mitigating methane and black carbon from municipal solid waste. The repository provides access to the following:

City profiles: Users can get information about waste management practices in several cities. (2) *Documents:* users can search documents related to solid waste management for example guidance materials, strategies, case studies, fact sheets. (3) *Tools:* the repository provides access to a range of tools and models for example solid waste emissions estimation tool, emissions quantification tool, landfill gas projection screening tool. (4) *databases* of waste related statistics. (5) *upcoming events:* the repository provides information about upcoming events related to improving solid waste management.

Ref.-16: Solid Waste Management City Profile

Summary

This report is from the Climate and Clean Air Coalition. It presents the profile of solid waste management in Antananarivo, Madagascar. The profile covers the municipal solid waste generation amount, the collection coverage, the composition of waste and waste management practices. The report also addresses the role of the informal sector in waste management.

The report indicates that the city generates 500 923 tons per year at the rate of 219 kg per capita per year, translating to 0.6kg per capita per day. Nearly 53% of the waste generated is formally collected and disposed. The waste is predominantly organic (45.37%). Paper accounts for 4% of the waste and plastic accounts for 6% of the waste. The waste is disposed without any treatment at an open-air landfill.

The management of waste is under SAMVA (Service Autonome de Maintenance de la Ville *d'*Antananarivo). Waste is collected door to door by association agents. The waste is sent o SAMVA bins located at strategic places within the city. There are 320 bins placed in six boroughs. A total of 35 rented trucks transport the collected waste to the landfill. The informal sector participates in municipal solid waste management through collection and recycling of waste materials. There are approximately 300-400 waste pickers at the landfill site.

Households pay waste collection fee to neighborhood association. The sources of finance for waste collection services include property taxes and SAMVA's own funds. SAMVA charges private companies and industries waste collection fees.

Ref.-17: Solid waste Management Practices at a Private Institution of Higher Learning in Nigeria

Summary

This paper was published in the Procedia Environmental Sciences Journal in 2016 and it was presented at a conference on solid waste management. The paper examines solid waste management practices at a private institution of higher learning in Nigeria. Data collection involved key informant interviews and observations.

The results showed the following: (1) The waste generation rate ranged from 0.3 to 0.4 kg/capita/day and that the waste was predominantly organic. (2) Plastic waste, bottles, metals and electronic waste had higher market values. (3) Non-biodegradable materials are usually collected and segregated by scavengers and sold to at the market.

The paper recommends that waste reduction should be encouraged, and that recycling should be promoted to reduce the amount of waste.

Authors: A.O. Coker, C.G. Achi, M.K.C. Sridhar, C.J. Donnett

Ref.-18: Research, Design and Implementation of Sustainable Technologies for Municipal Solid Waste Management in an East African City: The case of Hargeisa, Somaliland.

Summary

This paper discusses activities that were carried out to improve municipal solid waste management in Hargeisa City, the capital of Somaliland. It addresses the waste generation amount, the collection process and recycling of plastic waste.

The paper estimates that 223 tons/day was generated at a rate of 0.35kg/capita/day. Organic matter accounted for 21.2% of the total waste while plastic waste and paper accounted for 16% and 19.9% respectively. The paper notes that the proportion of organic matter was lower than the proportion observed in developing countries while the proportion of plastic waste was higher than the proportion observed in developing countries. Waste is collected door to door and is then transported to a transfer station and then the final disposal.

An attempt was made to compost the organic waste and recycle the plastic waste. The composting initiative failed because agriculture was not widespread so there was no market for the compost. Women used the plastic waste to make handmade products but the market for the products was limited. There was a plastic factory in the city, but the owners were unwilling to purchase plastic waste as they were using imported plastic pellets.

All waste was transported to two final disposal sites. These sites had two key problems. Access roads to the site were not properly maintained and the use of bulldozer limited.

Authors: Carlo Collivignarelli, Veronica Di Bella, Mentore Vaccari

Ref.-19: Techno-economic evaluation for the improvement of MSW collection in Somaliland and Puntland

Summary

This paper was published in the Waste Management & Research Journal in 2010 and it presents an overview of solid waste management and identifies strategies that can be implemented to improve solid waste management in the main cities in Somaliland and Puntland. The data was collected through workshops, meetings, site visits and observations.

Examination of the characteristics of solid waste in the cities studied showed that organic waste accounted for 21.2% of the total waste while paper accounted for 19.9% and plastic waste accounted for 16% of the total waste. The paper points out that waste is collected from about 65% of the population.

The paper identifies the following as key challenges in solid waste management: (1) increasing coverage will require authorities to substantially increase investment is solid waste management. (2) Compactor trucks used for secondary collection of waste require careful and frequent but expensive maintenance. (3) Existing laws and by-laws regarding environmental protection are very few and often copied from foreign countries. (4) Laws and by-laws are not properly enforced. (5) Willingness and ability to pay tax is generally very low, and taxation specifically for waste collection and disposal is even less acceptable. (6) Corruption and misuse of local resources. (7) No system for monitoring and coordinating solid waste management operations. The paper identifies the following as strategies that would improve solid waste management in Somaliland and Puntland: (1) development of legal framework, specific regulations and by-laws. (2) Strengthen the capacity of staff. (3) Set up acceptable and affordable taxation system to allow cost recovery.

Authors: Carlo Collivignarelli, Menore Vaccari, Veronica Di Bella, Daniela Giardina.

Ref.-20: Delivery and viability of landfill gas CDM projects in Africa – A South African experience

Summary

This paper was published in the Renewable and Sustainable Energy Reviews Journal in 2011. The paper describes the history and process of the eThekwini Municipality (Durban, South Africa) landfill gas to electricity project. The landfill gas project was implemented under the Clean Development Mechanism (CDM). The project was to be financially supported by the World Bank's Prototype Carbon Fund (PCF). The eThekwini had therefore an agreement with the World bank to develop the first landfill gas to electricity project in Africa, which was anticipated to deliver CER (Certified Emissions Reduction (CER)credits for sale to the PCF.

The objective of the paper is to provide details about the CDM landfill gas project, examine its viability, present lessons from the project and comment on the viability of similar CDM landfill gas projects in Africa.

Some of the lessons learnt from the project include:

a) The municipality should assemble a team of experienced landfill gas experts to develop the project, with knowledge transfer to internal staff
b) Gas pumping trials should be carried out first to establish how much gas can be extracted from the landfill.
c) Gas to electricity schemes can be affected by externalities such as fluctuations in the quantity of gas generated with changing disposal rates and waste composition.
d) The project shows that small to medium sized landfills accepting 500-1000 tons per day are not viable with gas utilization unless there is a premium tariff for non-fossil fuel green electricity like renewable Energy Feed-in Tariff (REFIT).
e) Medium sized CDM landfill gas utilization projects should be viable in Africa with just the flaring of gas.
f) For large landfills – accepting up to 5000 tons per day- CDM projects are viable despite the 6-year period required to obtain a meaningful return on capital investment (2 years for design and construction, 3 years operation; and up to 1 year for issuance of CERs).
g) The CDM methodologies are very conservative and undercalculate CERs which may put marginal projects at risk.
h) It takes up to a year for the issuance of CERs after conclusion of a combustion period, i.e. income from the first ERs may not be obtained for over 2 years.

Authors: R. Couth, C. Trois, J. Parkin. L.J. Strachan, A. Gilder, M. Wright

Ref.-21: Waste management activities and carbon emissions in Africa

Summary

This paper was published in the Waste Management Journal in 2011. The paper presents the results of a research which examined waste production and management practices in sub Saharan Africa. The main objective of the research was to provide a clear understanding of emission reductions (ER) than can be gained through viable improvements to waste management. Seven cities participated in this research: Addis Ababa and Arba Minch in Ethiopia; Nakuru, Kenya; Arusha, Tanzania; Windhoek, Namibia; and cape Town and Durban in South Africa. A questionnaire seeking the following information was sent to these seven cities: legislation related to waste management, waste generation data, composition of waste, landfill details and whether the city was implementing a Clean Development Mechanism (CDM) project.

About legislation related to waste, the results show the following: (a) Ethiopia has a draft Environmental Protection Proclamation. (b) Tanzania has a national Environmental Action Plan (NEAP) and the Tanzania national Conservation Strategy for Sustainable Development. The national Environmental Policy was drafted in 1997 and enacted through the Environmental Management Act of 2004. (c) Namibia's Environmental Management Act 2007 promotes sustainable management of the environment. (d) South Africa has a comprehensive environmental legislation controlling waste management.

Regarding waste generation and composition, the results show the following: Waste in these cities is predominantly organic and the mean waste generation rate was 230 kg/person/yr. In relation to carbon emission, the percentage of biogenic carbon ranged from 42.5% for Durban to 65% for Arusha, with a mean for the five cities of 52.8%.

Regarding landfill sites, the data showed that landfill sites in Tanzania and Ethiopia are open dumpsites while landfill facilities in South Africa and Namibia complied with minimum design standards, primarily associated with the protection of the environment from leachate and biogas. Only the landfill in Durban had active landfill gas extraction and combustion systems. None of the cities had a CDM project except Durban.

The respondents to the questionnaires reported there is poor waste management in Sub-Saharan Africa because of lack of funding for municipal solid waste management.

Authors: R. Couth, C. Trois

Ref.-22: Cost effective waste management through composting in Africa

Summary

This paper was published in the Waste Management Journal in 2012. The paper compares the economic advantages of three composting options against landfill gas recovery. This paper was part of a larger research project by the University of KwaZulu-Natal on Zero Waste and Waste Management Strategies towards the effective reduction of carbon emissions in the atmosphere.

The economic benefits of the following options were considered: composting municipal solid waste in static DAT windrows, (b) shredded municipal waste composting in turned windrows, (c) dry recyclable material recovery and shredded municipal waste composting in turned windrows, (d) landfilling with gas flaring; and (e) landfilling with gas combustion to generate electricity. The cost comparison assumed a population of 1,000,000 generating 230,000 tons per year based on 230kg/head/year.

After the economic analysis, the options were ranked as follows: (1) mechanically sorted and shredded municipal waste in turned windrows. (2) composting municipal waste in static DAT windrows. (3) Shredded municipal waste in turned windrows. (4) landfilling with gas flaring. (5) Landfilling with gas to electricity.

The three composting options were considerably more favorable than landfill disposal and gas collection options as the waste is converted into a useable product and not left as a burden for future generations. In addition, up to 100% of the biogenic carbon is captured in a relatively short time (4 months) while landfill gas schemes capture gas more slowly over a longer period (typically 10 years). Mechanically sorted and shredded municipal solid waste in turned windrows is the most favorable option from the cost benefit analysis due to the income derived from dry recyclables and compost. Landfill gas to electricity CDM projects are only viable on the largest landfills in Africa; they are not viable in Africa for waste from urban population of 1,000, 000

The paper concludes that waste composting is beneficial over controlled landfilling, although uncontrolled dumping of waste as practiced across sub-Saharan Africa is cheaper in the short term. Of the composting options, it is attractive to have an upstream materials recovery facility to remove dry recyclables from the waste, which will significantly improve the quality of the compost and will also provide local employment.

Authors: R. Couth, C. Trois

Ref.-23: Modelling of greenhouse gas emissions from municipal solid waste disposal in Africa

Summary

This paper was published in the International Journal of Greenhouse Gas Control in 2011 and it presents the results of an FOD (First order decay) model which calculates GHG (greenhouse gas) emissions from municipal solid waste disposal sites for the urban population in Africa and evaluates how these may change over time (next 10 years). The objective of the paper is to describe the FOD model, together with the results and sensitivity of the results.

The FOD model used in this study calculated that GHG emissions from urban municipal solid waste will increase from 55Mt CO_2e in 2010 to 132 Mt CO_2e in 2019 – an increase of 140%.

The authors indicated that there is an urgent need for an African waste management body to initiate new measures to manage waste in Africa territories. The authors further explained that the identified measures should be focused on the prevention of waste production, followed by waste recycling and composting, with only the remaining fossil carbon waste disposed. The authors noted that composting municipal solid waste is only feasible where the waste is sorted to remove dry recyclables to allow a compost to be produced, which can be applied to land.

Authors: R. Couth, C, Trois, S. Vaughan-Jones

Ref.-24: Scavenging for solid waste in Kinshasa: A livelihood strategy for the urban poor in the Democratic Republic of Congo

Summary

This paper was published in the Habitat International Journal in 2015. The paper presents the results of a study that was carried out in Kinshasa, in the Democratic Republic of Congo to examine the role that solid waste scavenging contributes to household livelihoods. The data used in the study was collected from 100 respondents (scavengers).

The research revealed that most of the solid waste scavengers are poor and marginalized groups of people, predominantly male, who however have some form of education. The main driver for scavenging waste is poverty. The study further revealed that itinerant buyers make slightly more money per month (65 US Dollars) than the people (children and vulnerable people) that actually go around collecting and sorting recyclable materials from solid waste (45 US Dollars per month). The authors suggest that a more effective way would be facilitating the formation of a scavenger cooperative as a means of promoting grassroots development. The authors also suggest that an effective solid waste management scheme can be achieved if scavengers are recognized, empowered and incorporated into the formal waste management plans.

Authors: Danny Simatele, Clement Longondjo Etambakonga

Ref.-25: Modelling Municipal Solid Waste Management in Africa: Case Study of Matadi, the Democratic republic of Congo

Summary

This paper was published in the Journal of Environmental Protection in 2013 and it presents the results of a solid waste management case study which was conducted in Matadi City in the Democratic Republic of Congo. The purpose of the paper is to present key elements for best performance and profitability of a municipal solid waste management in a low-income city.

The key questions in the study were: what are the needed organizational, technical and financial resources for an effective and profitable municipal solid waste management? Is municipal solid waste management a profitable enterprise?

The paper notes that the following elements were needed for an effective and profitable municipal solid waste management: (a) The service area needed to be expanded from 25 kilometers to 50 kilometers, (b) waste collection and disposal fees from needed to be high enough, (c) the expenses associated with waste collection and disposal needed to be low, specifically, low salaries and low taxes,(d) Carbon Emission Reduction (CER) grants were essential for the profitability of solid waste treatment plants, (e) topographic factors affected solid waste collection efficiency - from this observation, the authors recommend that future municipal solid waste projects should consider improving roads for better accessibility of solid waste collection vehicles and handcarts. (f) It was observed that solid a waste sorting facility was necessary, and that hand sorting was ideal to address unemployment in the city. The authors also pointed out that payback period and internal rate of return (IRR) evaluated without CER grants were less attractive for possible investment.

Authors: Gregory Yom Din[1], Emil Cohen[3]

Ref.-26: Opportunities for managing solid waste flows in the peri-urban interface of Bamako and Ouagadougou

Summary

This paper was published in the Journal of Environment & urbanization in 2003 and it examines the link between peri-urban agriculture and solid waste management. The paper presents challenges of privatizing solid waste management and disregarding the important role that communities play in municipal solid waste management. Specifically, the paper presents elements of a master plan for solid waste management, under the World Bank funding in Ouagadougou, and presents challenges that the master plan presented in relation to peri-urban agriculture.

The solid waste master plan as presented by the authors had the following elements: Creation of a new solid waste treatment center and the complete privatization of waste collection and delivery to this center which would operate as a private concession; no community involvement in recycling and composting of organic matter. The municipality would withdraw from direct participation in waste management and occupy itself with regulation and enforcement of standards.

The authors point out the following challenges/risks associated with the plan: (1) under the plan, households were expected to pay about 1.50 Euros per month. This was considered optimistic in comparison to the amounts households were currently paying. (2) the scheme was unlikely to provide compost to urban farmers at a price the farmers could afford; leaving the farmers with incentive to make their own illicit arrangement for acquiring waste material and making compost.

The authors also point out that the organic fraction of municipal solid waste can be recycled in agriculture and that recycling organic waste in agriculture provides benefits for farmers and reduces the costs of waste management by decreasing the disposal or burial costs.

Authors: Derek Eaton and Thea Hilhorst

Ref.-27: Solid Waste Management in Urban Areas: The Case of Khartoum State, Sudan.

Summary

This paper was published in Pinnacle Journal Publication in 2015 and it presents the results of a waste management study that was conducted in Khartoum in Sudan. The aim of the study was to examine waste management system in the city and the results of the study were expected to be used as a basis for designing an effective waste management system.

Data was collected through qualitative research methods, which included household interviews, field visits and visual inspection of households' waste management practices. The study targeted 83 respondents. The results of the study revealed the following:

- 73.6% of the households collected their waste in plastic bags, others collected their waste in sacks and drums.
- Waste was generated at 0.2 to 0.4 kilograms per capita per day
- Most households kept waste within the yard before being transported for disposal
- Nearly 55% of the households received two collections per week
- The authors noted that the system of collecting waste was not efficient.

The paper made the following recommendations:

- The waste materials collection systems as well as their programs and tools should be revised from time to time in order to test and upgrade their efficiency.
- To raise environmental awareness of population about waste materials through social organizations, educational institutes and information media.
- To introduce modern systems that help to lighten food leftovers.
- Government should introduce and apply legislation's and laws for management of solid waste materials.

Authors: Nagat Osman Mansour Elbaroudi, S.E. M. Ahmed & E. E.A. Adam

Ref.-28: Municipal solid waste generation and disposal in Robe town, Ethiopia

Summary

This paper was published in the Journal of Air and Waste Management Association in 2018 and it presents the results of a waste management study which was carried out in Robe Town, Ethiopia. The aim of the study was to quantify the volume of solid waste generated and investigate factors affecting the generation and disposal of waste in the study area.

The data used in the study was collected through mixed research methods. A total of 372 households were sampled from a population of 13471 households. The results of the study revealed the following:

- Households were generating waste at the rate of 0.26 kilograms per capita per day.
- Solid waste generation was affected by sex, income, family size, house ownership, and recycling of household waste.
- Solid waste disposal was affected by education level, awareness of household, municipal supervision and participation of households in cleanup campaign.
- Waste collection coverage was 57.5%
- The waste collection coverage was low because of limited budget, weak municipal management effort, limited access to training, limited community participation and low coordination of stakeholders.

From these results, the authors recommend the following:

- Promotion of waste reuse, recycling and composting,
- Provision of training on how to separate waste.

Authors: Duguma Erasu, Tesfaye faye, Amaha Kiros & Abel Balew

Ref.-29: Analysis of barriers and success factors affecting the adoption of sustainable management of municipal solid waste in Abuja, Nigeria.

Summary

This paper was published in the Journal of Solid Waste Technology and Management in 2010 and it presents the results of a waste composition study which was carried out in Abuja, Nigeria. The purpose of the study was to examine the impact of seasonal changes on waste composition. The results of the study helped develop strategies designed to improve waste management practices.

The researchers collected samples of waste from ten randomly selected households in each of the selected 8 zones during the dry and wet season. The results showed the following:

- Approximately 60% of municipal solid waste samples from the city were found to be good quality biodegradable materials ideal for compost production.
- There were approximately 11% recyclable materials in the municipal solid waste stream.
- Informal sector recycling takes up approximately 3% of recyclable components and provide gainful employment to many residents.
- The composition of waste samples differed from one neighborhood to the other – depending on socio-demographic characteristics. It was however discovered that the essential character of waste samples from the same neighborhood did not significantly vary with changes in climatic conditions during the year.

From these results, the authors recommend the following:
To achieve significant reductions in waste growth in the city, it will be necessary to provide some level of incentives for businesses, institutions and residents of Abuja to reduce and recover maximum value from waste. This may be possible either by way of direct financial incentives or as materials based incentive, where essential waste disposal items such as plastic receptacles and black bin bags are supplied to residents at subsidized rate.

Authors: Paul S. Phillips, Amos Odunfa

Ref.-30: Quantification of greenhouse gas emissions from waste management processes for municipalities – A comparative review focusing on Africa.

Summary

This paper was published in the journal of Waste Management in 2011 and it presents the results of a study which summarized and compared the existing literature on the quantification of greenhouses gases from waste at municipal level in developed and developing countries, with a focus on Africa. The study also aimed at identifying gaps and problematic areas for quantifying GHG emissions in developing countries. hence, the study investigated individual processes in the waste management cycle, starting with the generation and composition of waste, followed by collection and transport, disposal processes and recovery and recycling.

The paper points out the following:

- The highest savings in GHG are achieved through recycling followed by composting and incineration with energy recovery.
- The disposal of waste in landfills has some of the highest GHG emissions. In developing countries these emissions are dominating due to the methane from dumpsites and landfills.
- The emissions are predicted to increase significantly unless more of the methane is captured and either flared or used for energy generation
- The clean development mechanism (CDM) projects implemented in the developing countries have made some in-roads with regard to the waste to energy projects, however, Africa is lagging behind.
- The GHG emissions from transport and collection of waste are lower in developing countries due to inadequate provision of these services, in particular in African cities which have some of the lowest collection rates.

The authors point out that the investigation of GHG emissions from individual waste management processes, which make up a waste management system, show that the GHG emissions for landfilling or transportation calculated for developing countries are within the range reported for developed countries. However, one has to be critical of these results, because there are no calculations done for the elements/processes found only in developing countries (e.g. non-motorized transport of waste). The authors further point out that a direct comparison of GHG emissions from waste management in different municipalities should be undertaken only at process level. At systems level such comparisons should be undertaken with care because the determining waste management factors (e.g. waste composition, collection rates, waste management process, etc.) are different and so could be the accounting methodology used. In conclusion, the paper indicates that there is a need to develop a common approach applicable for developed and developing countries for the accounting of greenhouse gases from waste management at municipal level and individual processes should be the foundation blocks.

Authors: Elena Friedrich, Cristina Trois

Ref.-31: SOLID WASTE MANAGEMENT IN KENYA: A CASE STUDY OF PUBLIC TECHNICAL TRAINING INSTITUTIONS.

Summary

This paper was published in 2012 in the ICASTOR Journal of Engineering and it represents the results of a study which was conducted in Kenya to examine the generation, collection and disposal of solid waste in public technical institutions. The study further examined people's attitude (students and waste managers) towards waste.

The study targeted 29 institutions out of 42 institutions and the key results are as follows:

- The 29 institutions generated 23 tons of waste per week.
- 82% of the waste was food waste, paper accounted for 4 %, metal 4% and glass 1%
- Per capita waste generation ranged from 0.28/week/student to 0.7 kilograms per week per student per week.
- The waste generation rate was dependent on type of institution. Institutions with boarding students generated more waste than institutions without boarding facilities. The courses offered also influenced waste generation rates. Institutions with technical courses like wood work and metal work produce more waste than institutions with business courses.
- 215 of the institutions recycle their waste while 79% do no recycle.
- Recycling of waste was mainly done in the workshops where metal and wood were used in demonstrations.
- The cost of managing waste ranged from Ksh 0.13 to 0.59 per week per students

The authors made the following recommendations:

- Waste management should be incorporated into institutional planning.
- Adequate resources for waste management.

Authors: N.K Gakungu, A.N. Gitau, BNK Njoroge, M.W. Kimani

Ref.-32: Facilitating the improved management of Waste in South Africa through a national waste information system

Summary

This paper was published in the Journal of Waste Management in 2007 and it presents the results of a study which evaluated the waste information needs and the following hypothesis within the context of South Africa: The identified needs of government will provide a platform from which to design a national waste information system (WIS). The second hypothesis was that where a need for waste information is highlighted, it reflects a greater, unfulfilled need in the sustainable management of waste. The waste information needs of the government were assessed through participatory workshops and through a questionnaire. Key individuals responsible for waste management within the national and selected provincial government departments participated in the workshops a postal questionnaire was sent to 284 local government departments.

The key results of the study were as follows:

The priority needs for waste information by national and provincial government showed that the information was needed for planning (37.6%), for compliance and enforcement (15.6%), support public access to information (10.6%), decision making (7.8%), policy development (6.4%). Other needs were monitoring, budgeting, capacity building, strategy development, business development, reporting, job creation and research. With regard to the specific areas of waste management, the emphasis of the needs for waste information were found to be on waste disposal, followed by minimization, reuse and recycling, waste generation and waste transportation.

With regard to information needs at municipality level, the results showed that 68.9% of the municipalities were collecting data. However, 62% of the municipalities collecting data believed that the data they were collecting was unreliable. Municipalities needed data mainly for planning, budgeting and financial management, reporting, landfill site management, human resources and operations management, monitoring, compliance and enforcement etc.

The paper shows that the desired needs for waste information reflect some of the major issues that reflect the more strategic roles of national and provincial government and the operation/service delivery role of local government. The authors point out that highlighting the needs of government with respect to waste information also provided an understanding of the required framework for a national WIS, the requirements of role-players and data requirements.

Author: Linda Godfrey

Ref.-33: THE ROLE OF WASTE DATA IN BUILDING KNOWLEDGE: THE SOUTH AFRICAN WASTE INFORMATION SYSTEM

Ref.-34: Modeling Municipal Solid Waste Management in Africa: Case Study of Matadi, the Democratic republic of Congo

Summary

Already summarized – Ref 25

Ref.-35: Solid waste as renewable source of energy: Current and Future possibility in Libya.

Summary

This paper was published in 2014 and it is an overview of solid waste and its potential as a source of bioenergy in Libya. The paper presents the amount of solid waste generated, its composition and the status of solid waste recycling and composting in Libya.

The key results are as follows;

- Libya generates nearly 6,301 tons of municipal solid waste per day or an average rate of 1.12 kg/capita/day. Organic waste represents 59% of the waste collected, 12% is paper-cardboard, 8% is plastic, 4% is glass, 2% metal and 8% is wood.

- Approximately, 90% of waste end up in open dumps. More than 2,300 open dumps have been identified in Libya, covering an area of approximately 3,500 ha. Most of the dumps are nearly saturated.

- Composting represents only 2% of all the waste in Libya.

- Preliminary estimates from Libyan Cities indicate that 25% of the waste generated can be recycled. Materials that can be recycled include: paper, textile materials, metals, plastics and glass. However, only 2% of these materials are recycled.

- From these results, the authors discuss various energy conversion technologies (thermochemical extraction, biochemical extraction and mechanical extraction) that can be used to produce useful products (electricity, heat, and fuel). The authors explain that utilizing solid waste to generate energy will reduce Libya's dependence on fossil fuels and significantly reduce both pollution and greenhouse gas emissions.

Authors: Tarek A. Hamad, Abdulhakim A. Agll, Yousif M. Hamad, John W. Sheffield

Ref.-36: Migration, Unemployment and development: A Two -Sector Analysis

Summary

This paper by John R. Harris and Michael P. Todaro was published in the American Economic Review and it discusses a two-sector model of rural-urban migration, which among other things, recognizes the existence of a politically determined minimum wage at levels substantially higher than agricultural earnings. The authors then consider the effect of this parametric urban wage on the rural individual's economic behavior. The distinctive feature of the model is that migration proceeds in response to urban-rural differences in expected earning with the urban employment rate acting as an equilibrating force on such migration. The crucial assumption made in the model is that rural-urban migration will continue so long as the expected urban real income at the margin exceeds real agricultural product – i.e. prospective rural migrants behave as maximisers of expected utility.

The basis of this two-sector model is that Conventional economic models with their singular dependence on the achievement of a full employment equilibrium through appropriate wage and price adjustments fail to provide rational behavioral explanations for the sizable and growing levels of urban unemployment.

The authors use the two-sector model for the following purposes:

- To demonstrate that given the politically determined high minimum wage, the continued existence of rural-urban migration despite substantial overt urban unemployment represents an economically rational choice on the part of the individual migrant.
- To show that economists' standard policy prescription of generating urban employment opportunities using shadow prices implemented by means of wage subsidies or direct government hiring will not necessarily lead to a welfare improvement and may in fact exacerbate the problem of urban unemployment.
- To argue that in the absence of wage flexibility, an optimal policy is, in a combination of partial wage subsidies (or direct government employment) and measures to restrict free migration.

Ref.-37: Municipal solid waste management challenges in developing countries – Kenyan case study

Summary

This paper was published in the journal of Waste Management in 2005 and it presents a case study on the challenges of waste management in Kenya. The study was conducted in five local authorities and it was carried out in three phases, which included a desk study, interviews with department heads, a site visit to a dumpsite and interviews with scavengers.

Key observations from the study are as follows:

- The capacity to provide disposal services weakened by the inability of local authorities to keep all solid waste collection trucks at full operational capacity. Requests for funds for the purchase of spare parts take long to be processed and released.
- Uncollected solid waste at the upper and middle-income zones tend to increase in the rainy season when road conditions are bad due to rainfall. In addition, most of the dumpsites are not served by all-weather roads, which make their access during rainy seasons difficult if not impossible.
- Unplanned settlements have high population density and are inaccessible by solid waste collection vehicles. Local authorities concentrate their limited services mainly in central business districts and the more affluent areas, which have better access.
- Environmental impacts were not considered when selecting sites for dumpsites; convenience took priority in the siting of dumpsites.
- None of the dumpsites in the five local authorities meet the basic requirement for protecting ground water pollution by leachate as they have no liners.
- Local authorities lack capacity to implement legislation.
- Rapid population growth has overstretched the capacity of local authorities.
- Most local authorities maintain an inflated number of workers which exhausts most of the revenue in the form of wages. This leaves little for other services. In addition, local authorities are overstaffed with poorly trained workers.
- Laws governing solid waste, revenue collection and project management are not enforced.

From these observations, the authors recommend that developing countries should develop area-specific solutions to their problems in the management of solid waste. For example, there is no need to import compactor trucks which are suitable to less dense solid waste; dense solid waste needs no compaction. The authors indicate that community involvement can provide the needed solution in mobilizing community-based efforts. The authors further recommend promotion of reuse, recycling and reduction of solid waste.

Authors: Rotich K. Henry, Zhao Yongsheng, Dong Jun

Ref.-38:

Summary

Paper 38 does not exist

Ref.-39: Urbanization and Development of infrastructure in the East Asian Region

Summary

This paper was published in 2005 and its purpose is to review the status of urbanization in East Asian region and examine the results and problems emerging because of the urbanization. In addition, the paper discusses issues of urban development and possible effective measures.

The paper points out the following issues:

- The absolute scale of the urban population in the region is overwhelmingly large and expected to account for 30% of the global urban population by 2030.
- There is a significant positive correlation between urbanization and economic growth.
- Excess urbanization beyond the appropriate speed for economy and society to adjust causes various problems.
- If there is significant differential in income or social services provided between urban and rural areas, further migration from rural to urban areas will be provoked, which may aggravate the issue of overconcentration of population in the capital area.
- Accordingly, in response to rapid urbanization in the East Asian region, a key issue is how to maintain balanced development of large cities, regional cities and rural areas by taking proper steps toward urbanization promoted through service orientation in the urban economy.
- Under the present situation, the public service infrastructure in small and medium-sized local cities and rural areas is relatively weak compared with that in large cities. To prevent excessive population concentration in urban areas, public investment in such areas continues to be necessary. Promoting rural areas will also be important in terms of food security for urban areas.

Author: Atsushi Iimi

Ref.-40: Solid waste management in Abuja, Nigeria

Summary

This paper was published in the Journal of Waste Management in 2008 and it presents the results of a study that examined problems associated with solid waste management in Abuja, Nigeria. The paper discusses problems associated with waste management systems and facilities; the legal, administrative and institutional framework and the role of the informal recycling/scavenging. In addition, the paper proposes ways of achieving more efficient and effective solid waste management.

Key results and observations were as follows:

- Households were generating waste at the rate of 0.55- 0.58 kg/capita/day
- Waste composition data from six districts of Abuja showed that 50-65% of the waste was organic. The waste was collected without sorting.
- Compaction vehicles offered little advantage in terms of increasing waste density.
- There was shortage of waste collection vehicles due to lack of funding and inadequate maintenance. Only 30% of the vehicles were operational
- Greater than 40% of the waste in Abuja is recyclable. Limited recycling is carried out by the informal sector.

The authors made the following recommendations:

- The waste management master plan for the city should be reviewed
- Centrally located waste collection points should be established
- Vehicles for the collection of waste must be appropriate to local conditions
- Strengthen the capacity of the private sector through capacity building
- Promote sorting of waste at the source to enhance recycling and reduce amount of waste to be collected
- Increase involvement and integration of the informal sector so the collectors can collect recyclables
- access to microcredit for the informal sector
- Solid waste regulations and legislation must be enforced

Authors: A. Imam, B. Mohammed, D.C. Wilson, C.R. Cheeseman,

Ref.-41: Optimizing solid waste management in Brazzaville (Republic of Congo)

Summary

This is a one-page brief description of a project that was planned to optimize solid waste management in Brazzaville, Republic of Congo, in 2008. In this project, the plan was to set up a recycling center on a 40,000 square meter property. The plan was to implement thermal and biological treatment procedures. Organizations involved in the project included ISO International Development & Consulting GmbH (Berlin), PRO Brazza S.A (Brazzaville and INTECTUS GmbH. The brief paper does not provide any information about what was actually achieved.

Ref.-42: SOLID WASTE: guidelines for successful planning

Summary

This is a 54-page manual that provides guidelines for successful planning of solid waste management. The manual is useful tool for everyone who wants to prepare, manage, implement, monitor and reviews waste management plans. The manual was published (date not provided) by ISWA and ABRELPE. ABRELPE is a nonprofit association founded in 1976. The association organizes conferences and training courses, studies and surveys regarding the waste sector. ISWA stands for International Solid Waste Association - an independent and non-profit making association.

Ref.-43: Challenges and emerging solutions to the land-based plastic waste issue in Africa.

Summary

This paper was published in the Marine Policy Journal in 2017 and it presents challenges and emerging issues to the land-based plastic waste issue in Africa. The paper focuses on identifying sources of plastic waste entering oceans and seeking solutions to waste mismanagement.

The authors indicate that there is an increase in the amount of plastic waste entering oceans expansion of coastal populations and an increase in the number of people living short distances from river systems. The authors point out that lack of adequate waste management infrastructure in these areas means that these rivers are likely to transport a large quantity plastic waste as they make their way to the ocean.

In discussing possible solutions to the plastic waste problem, the authors explain that initiatives aimed at mitigating the flow of plastic waste into the ocean can occur at various intervention points along the plastic value chain. These possible interventions include activities that reduce plastic production, provide innovative materials and product design, reduce waste generation, improve waste management, improve litter capture and reduce input concentrations to the ocean. The authors point out that there is a growing global consensus emerging on the urgent need to shift towards a circular economy approach, where plastic items are designed to be reused or recycled.

The authors point out that the need to measure the extent, distribution and impacts of debris on land, along rivers, estuaries, on islands and along coastlines is a key knowledge gap. This is considered and important need because by identifying the sources, sinks, flows, and types of waste across Africa, a baseline upon which to build management and remedial strategies can be developed. This knowledge would also enable priority setting and effective deployment of land-based, coastal, and marine waste monitoring and management strategies.

Authors: Jenna Jambecka, Britta Denise Hardestyb,, Amy L. Brooksa, Tessa Friendc, Kristian Telekic, Joan Fabresd, Yannick Beaudoind, Abou Bambae, Julius Francisf, Anthony J. Ribbinkg, Tatjana Baletag, Hindrik Bouwmanh, Jonathan Knoxi, Chris Wilcoxb

Ref.-44: Supporting capacity development for Solid Waste Management in Developing Countries.

Summary

This is a 231page report published by JICA in 2005 and it is about the future direction for cooperation to developing countries in solid waste sector. The report is based on the discussion and findings of the study group on "Future Direction for Cooperation to Developing Countries in Solid Waste Sector."

The report covers the following issues: characteristics of solid waste in developing countries, issues of assistance in the solid waste sector, lessons learnt from donor experience in solving solid waste problems, direction for capacity development support in solid waste management.

The report notes that the traditional approach in supporting solid waste management initiatives in developing countries was based i=on the idea that because developing countries lack sufficient skills and ability, this luck could be overcome through the input of expertise and equipment from external donors; there was insufficient attention paid to ownership by the aid recipients, i.e. the development of the capacity of local government institutions and residents who are the direct stakeholders in solid waste management.

The report recommends that the primary objective of aid in the solid waste management sector must be to support recipients in enhancing their solid waste management capacity and in building sustainable solid waste management systems, The report concludes that it is important to arrange aid inputs so as to enhance he overall capacity of the recipients based on a comprehensive assessment of capacities at three levels: individuals, organizations, and institutions/societies, while ensuring ownership by the recipients. The second principle is based on the observation that the efficiency and performance of service delivery is significantly reduced unless communities play an active part in solid waste management.

Ref.-45:

Summary

Paper 45 does not exist

Ref.-46: Institutional sustainability: 'community' and waste management in Zimbabwe.

Summary

This paper was published in the Futures Journal in 2000 and it addresses the issue of institutional sustainability. The authors point out that development interventions are often ineffective or fail because there is an absence of institutional sustainability. They further point out that social divisions, prevailing interests and power relations can be obstacles both to building a perspective on sustainable development which meets the life needs of many groups of people now and in future, as well as to the task of constructing joint action. The key question the authors are asking in this paper is whether and how it is possible for norms, values and practices to be constructed across social divides and enable multiple actors to build a working relationship and achieve a range of desired outputs and outcomes over time.

In this paper, the authors hypothesize that inclusive practices require structured representation of different interest groups, a conscious process of negotiation, and mechanisms which enable social learning. The authors point out that it is the structured process of social learning across social divides that can lead to institutional sustainability. The paper suggests a learning-oriented framework which can be used to investigate the social dynamics of development interventions and enable participants to begin a process of building institutional sustainability. The framework was developed to: (1) explore and make explicit the assumptions held by stakeholders; (2) develop an awareness of the nature and practices of accountability; (3) build an understanding of cause and effect in relation to action. The paper suggests that structured participation in these processes can help to build inter-organizational and inter-associational learning which can provide the basis for new norms and behaviors stretching beyond the formal life of any intervention (institutional sustainability).

Authors: Hazel Johnson, Gordon Wilson

Ref.-47: Some happy, other sad: exploring environmental justice in solid waste management in Kinshasa, the Democratic Republic of Congo.

Summary

This paper was published in the Local Environment Journal in 2016 and it presents the results of a study that set out to explore the concept of environmental justice in solid waste management and examine relevant theoretical frameworks and mechanisms that would facilitate the attainment of environmental justice in Kinshasa City, Democratic Republic of Congo. The data for the study was collected through literature review, in-depth interviews and two case studies.

The results showed that solid waste management in the city is highly driven by issue relating to political power, economic and social status of the residents in the respective locations. The data showed that affluent neighborhoods enjoy well formulated system of waste collection and disposal than high density areas where most of the city population reside. The authors argue that this is a result of inequalities that exist between the more powerful and the poor people of the urban society in the city.

Information from the case studies showed that collaboration and partnerships among civil society and stakeholders involved in waste generation, collection and disposal can assist to resolve solid waste challenges and may produce innovation in solid waste management.

Authors: Nzalalemba serge Kubanza, Dillip Kumar Das, Danny Simatele

Ref.-48: URBAN ENVIRONMENTAL PROBLEMS: SOCIAL AND ENVIRONMENTAL INJUSTICE IN SOLID WASTE MANAGEMENT IN KINSHASA, THE DEMOCRATIC REPUBLIC OF CONGO.

Summary

This is a PhD thesis on solid waste management. The thesis was submitted/published in 2016 and it presents the results of a study that examined social and environmental injustices in solid waste management in Kinshasa City, Democratic republic of Congo. The thesis explores relevant frameworks and mechanisms that would facilitate the attainment of social and environmental justice in the city. The aim of the study was to find a suitable solution that would lead to sustainable solid waste management in the city.

The author used qualitative and quantitative research methods together with system thinking and system dynamics modelling principles as integral frameworks in understanding the complexity in solid waste management. The author also used cultural theory paradigms and conceptual system dynamics modelling principles to establish how stakeholders in the form of four social solidarities (fatalist, hierachist, individualist and egalitarian) influence solid waste management in the city and how they interact with each other. Based on the inter-linkage, interaction and causal feedback relations, a politico-cultural mechanism was evolved to enable changes to social and environmental injustices in solid waste management.

The results of the study showed that rich neighborhoods enjoy well-formulated systems of service delivery in contrast to high-density areas where almost 80% of the population in the Kinshasa City reside. The results also showed that due to narrow revenue base, increased civil conflict, and limited technical capacities; the municipal authorities have been unable to effectively deliver an appropriate solid waste management system.

The author has argued that a cultural theory inspired participative and collaborative mechanism could result in the incorporation of a majority of stakeholders in the decision making and implementation of solid waste management activities, adoption of technologies and innovative ways of managing solid waste. This could ultimately prompt social and environmental justice in solid waste management in Kinshasa.

Author: Nzalalemba Serge Kubanza

Ref.-49:

Summary

There is no paper 49

Ref.-50: A multiple criteria analysis for household solid waste management in the urban community of Dakar.

Summary

This paper was published in the Waste Management Journal in 2007 and it presents the results of a study that set out to rank 9 settlements in Dakar Senegal to find settlements/areas that had worst nuisance from household solid waste. The authors used data collected through literature review and community observations to rank the nine settlements. A method knows as PROMETHEE and a software known a ARGOS were used to carrying out a pairwise ranking of the 9 settlements in the city. The settlements were compared using the following factors:

- Average quantity of waste produced by households,
- Number of households in an area.
- Average duration between two successive solid waste collections,
- Use of adequate means for collecting solid waste
- Frequency of solid waste collections in one week,
- Mean walking distance to a solid waste collector, expressed in meters,
- Degree of severity of nuisance depending on the chosen cultural means for solid waste elimination (burning, burying, throwing garbage in the street)
- Subjective evaluation by the respondents of the existence of solid waste nuisance.

From the results of the ranking, the authors recommended the following strategies:

- Promotion of source reduction, reuse and recycling of municipal solid waste.
- Promotion of private sector and informal sector participation in solid waste management.
- Encourage and promote sorting at household level and supporting households to sort and separate waste by providing them with waste collection facilities and products
- Supporting the informal waste collectors by providing them with push carts.

Authors: Ka-Mbayu Kapepula, Gerard Colson, Karim Sabri, Philippe Thonart

Ref.-51: Household Solid Waste Generation and Composition in Njoro Division, Nakuru County, Kenya.

Summary

This paper was published in the Journal of Scientific Research & Reports in 2016 and it presents the results of a cross sectional survey which set out to measure waste generation volume and its composition in Nakuru County, Kenya. The study was carried out at a university and a total of 103 respondents participated in the survey.

The results were as follows:

Waste generation was generally low for all respondents, it was 105.87 ±15 grams per capita per day. Daily per capita waste generated was highest for tenants (115.85±22.59) living around the university, followed by farmers around the university (108.53±37.45g) and the least by students (77.85±18.52 grams). regarding the composition of the waste, the results indicated that 55% of the waste was food waste, 11% was plastic waste, 8% was paper, 22% was dust and soil particles (fines) and 5% other items. From the results, the authors recommended composting and recycling.

Authors: J.M. Kariuki, D.N. Kinyanjui

Ref.-52: Appraisal of solid waste collection following private sector involvement in Dar es Salaam City, Tanzania

Summary

This paper was published in the Habitat International Journal in 2003 and it presents the results of a study that examined whether there was an improvement in solid waste collection services following the decision by the city council to contract out the waste collection and disposal service to private waste collectors.

The researchers followed and monitored 12 private operators and used observations and a household survey to evaluate the waste collection and disposal services. The results of the study showed the following:

- The average waste generation rate was 0.4kg/capita/day.
- There were 49 registered private waste collectors but 12 of them - community based organizations - were not operating because of financial constraints.
- The private waste collectors that were operating at the time of the study were collecting an equivalent of 24.4% of the total waste generated in the city. In contrast, the municipalities were collecting 10% of the generated waste.
- Most collection vehicles used by the contractors were second hand and were poorly maintained.
- The waste collection crewmembers were employed on a daily basis and were poorly paid.
- There was lack of enforcement of existing legislation and by-laws.
- Non-payment of refuse collection charge was one of the most serious problems facing all private waste collectors.
- Solid waste collection by the municipalities was 10% of the generated waste while the private operators were collecting 24.4% of the waste.

The authors made the following recommendations:

Construction of secondary collection centers in inaccessible areas can enhance handling of solid waste before it is collected. Recycling and composting activities should be encouraged. The capacity of private waste collectors and community based (CBO) organizations - to provide the waste collection services - should be taken into account when contracting them.

Authors: Mengiseny E. Kaseva, Stephen E. Mbuligwe

Ref.-53: Formalization of informal Waste Pickers Cooperatives in Blantyre, Malawi: A feasibility Assessment.

Summary

This paper was published in the Sustainability Journal in 2018 and it presents the results of a research which examined the economic challenges and opportunities of informal waste pickers (IWPs) in Blantyre City, Malawi. The goal of the research was to assess the feasibility of waste pickers' cooperative. The basis for the study was that a cooperative could help IWPs to address some of the challenges they experience when recovering and selling recyclables.

The key results of the research were as follows:

- Twenty one percent of the interviewed IWPs were recovering only metals, 53% were recovering only plastics while 26% were recovering both plastics and metal.
- On average, one IWP were recovering up to 9 kg of plastic per day. Those recovering metal were recovering up to 10kg of metal per day.
- The mean price for plastic recyclables was MK184 per kilogram, the mode and median were both MK150. The majority of IWPs were selling their plastic materials at a price less than the mean price.
- All IWPs who were recovering scrap metal were recovering and selling aluminum, 88% of them were recovering copper, 56% wee recovering lead, 50% were recovering brass and 31% were recovering steel.
- Negative perceptions by society make IWPs to recover materials in settlements that are far from their residences.
- On average, IWPs in the plastic industry were making a profit of MK392 per day, which is way below the minimum wage in Malawi - MK962 per day.
- Lack of capital, a lack of affordable transportation, negative public perceptions, a lack of PPE and a lack of waste separation at the source were common problems.
- When asked about joining a cooperative, 48% of the IWPs responded that they would join a group right away, 30% responded that they would not join a group and 21% responded that they would wait to see the progress of the group before joining.

The authors observed that buyers of recovered materials take advantage of IWPs low social status and the informal nature of their business by imposing exploitative prices that fluctuate at any time of the day. The authors noted that a cooperative could support the IWPs address some of these challenges, but there was limited interest among the IWPs and City Council in joining or starting a cooperative. The authors proposed that an NGO could implement a pilot cooperative with the IWPs that showed interest in joining a cooperative.

Authors: Cidrick Kasinja, Elizabeth Tilly

Ref.-54: Optimization of waste collection and disposal in Kampala City

Summary

This paper was published in the Habitat International Journal in 2015 and it presents the results of a study in which GIS software was used to optimize the collection and transportation of waste to the landfill in Kampala, Uganda, and to identify the optimum location for a new landfill. The basis of the study was that GIS software plays a potential role for solving various types of engineering and management problems in siting of waste disposal sites.

The researchers used Arc GIS software and its tool of network analysis to find the shortest distance from the source/start point via the temporary waste collection point and finally to the landfill. The authors report that the use of GIS tools led to the reduction in the total number of trips and travel distances, which decreased fuel consumption and vehicle emissions.

To further improve vehicle operation, the authors recommended that vehicle capacity should be increased in volume to increase the volume of waste collected at temporary waste collection points and to reduce travel distances and time.

Authors: J.R. Kinobe, T. Bosona, G. Gebresenbet, C.B. Niwagaba, E. Vinneras

Ref.-55: Challenges and prospects of private sector participation in solid waste management in Dar es Salaam City, Tanzania

Summary

This paper was published in the Habitat International Journal in 2015 and it presents the results of a study which was carried out to evaluate the effectiveness of the private sector participation in solid waste collection and transportation in Dar es Salaam, Tanzania.

The researchers collected data from 5 private companies, 15 community-based organizations (CBOs), city council officials, local wards and streets. The study results showed the following:

- The private sector employed 350 people and collected and disposed 9% of the waste generated, so they contributed in cleaning the city. However, the performance of the private sector was undermined by the following factors:
    - They use inferior waste collection and transportation equipment
    - Absence of waste recycling systems
    - They use inefficient system of collecting fees from customers
    - Inaccessible roads
    - Inappropriate contract durations – short contracts
    - Low awareness of the communities in solid waste management

From these observations, the authors made the following recommendations:

- Municipality must raise awareness about solid waste management, illegal dumping. and improve people's willingness to pay waste collection fees.
- Municipal by-laws must be enforced.
- The municipality must provide adequate waste transfer stations.

Author: Aminatha Kirama, Aloyce W. Mayo

Ref.-56: Assessing biogas potential of slaughter waste: Can biogas production solve a serious waste problem at abattoirs?

This paper was published in the Energy Procedia Journal in 2014 and it presents the results of an experiment which investigated the biogas potential of slaughter waste at a small abattoir in Namibia. The researchers carried out five experiments with different mixes of blood, stomach content and manure from sheep. The basis of this research was that abattoirs generally produce relatively large quantities of organic waste and the management of this waste can be a challenge. Hence, biogas production using waste from the abattoir was investigated as a solution.

The paper presents only preliminary results – the methane content of the gas is not presented in this paper. The preliminary findings suggest that the most optimum mixture of slaughter waste was relatively large amounts of stomach and intestine content. The results suggest that it is possible to produce viable amounts of biogas using only the waste produced at the abattoir, without adding other green substrate (One of the key challenges in the area where the study was carried out is that there is lack of green substrate). The researchers recommend that blood proportion should be kept relatively low, since the high nitrogen content in the blood may inhibit the production of biogas.

Authors: Patrik Klintenberg, Max Jamieson, Viviane Kinyaga, Monica Odlare

Ref.-57: Does infrastructure really explain economic growth in Sub-Saharan Africa?

This paper was published in the review of development Finance Journal in 2016 and it presents the results of a study that examined whether investment in public infrastructure plays an important role in fostering economic growth in the Sub-Saharan Africa region. The research was based on the understanding that public infrastructure (roads, airports, telecommunication facilities, water supply, electricity etc.) promotes human development and improves quality of life through improved productivity and sustainable economic growth.

Specifically, the research examined: (a) Th effects of infrastructure access and quality on economic growth and development, respectively. (b) The effects of increments in infrastructure access and quality on economic growth. (c) The intermediating effects of these infrastructure measures on most infrastructure pertinent drivers of economic growth. The researchers used panel data that covered the period 2000 – 2011 from 45 African countries.

Results from the analysis the showed the following: That rather than the sheer stock/access to or quality of infrastructure being relevant for economic growth in an environment characterized by low basic infrastructure endowments, such as Sub-Saharan Africa, it is the spending on infrastructure and increments in the access to infrastructure that unsurprisingly influence growth in the region. Human capital and institutions featured consistently and mostly significantly positively in most model estimations. Infrastructure access relates significantly to economic growth indirectly via trade competitiveness and infrastructure quality also indirectly influences economic growth via cross-border capital flows and export diversification.

Authors: Odongo Kodongo, Kalu Ojah

Ref.-58: Life cycle assessment of biodegradable waste treatment systems for sub-Saharan African cities.

This paper was published in the Journal of Resources, Conservation and Recycling in 2015 and it presents he results of a study that used a life cycle approach (LCA) to compare eutrophication potential and environmental impacts ((energy use, global warming potential) of different technologies of treating biodegradable waste to produce organic fertilizer. The study also sought to identify processes contributing to most of the environmental impacts associated with a waste treatment technology, so that possible improvements in the life cycle of the different technologies could be suggested. The research compared the following systems: Anaerobic digestion, composting, vermicomposting, fly larvae compost treatment

The research was based on the observation that urban waste in Sub-Saharan Africa is predominantly organic, usually landfilled, and that landfilling organic waste presents several challenges (methane and CO_2 emissions, shortage of land for landfills), so it is necessary to look for alternative sustainable waste treatment approaches.

The study showed that anaerobic digestion system performed best in terms of energy use and global warming potential and eutrophication. The composting system performed poorly regarding global warming potential, mainly because of direct emission from the composting process. The authors noted that composting is easiest system to implement, and in terms of global warming potential, it is far better than landfilling of biodegradable waste. The authors also noted that improving the management of composting process could reduce its emissions and improve its performance regarding global warming.

A.J. Komakech, C. Sundberg, H. Johnsson, B. Vinneras

Ref.-59: Environmental impact from vermicomposting of organic waste in Kampala, Uganda.

This paper was published in the Journal of Environmental Management in 2016 and it presents the results of a study which used a life cycle approach to evaluate the environmental impact (global warming and eutrophication potential) of vermicompost method of treating animal manure. In this research, the researchers compared the environmental impact of vermicomposting to the environmental impact of the current practice of dumping animal manure. To understand why people simply dump animal manure, the researchers calculated and compared the cost of transporting and using animal manure and mineral fertilizer on a crop field.

The results showed that the emission factors found for the vermicompost unit were 10.8, 62.3, and 12.8 g Mg^{-1} bio-waste for methane, nitrous oxide and ammonia respectively. The results of the study indicated that the baseline/current system of dumping animal waste was worst performing because of the huge quantities of nutrients the system delivers to water bodies.

The authors noted that people simply dump animal manure because of the high cost associated with the process of using animal manure on a crop field. The authors recommend that

Ref.-60: Challenges of domestic solid waste management: a case study of Lobatse Botswana.

This paper was published in the African Geographical Review in 2016 and presents a case study of Lobatse, Botswana which examined the challenges of solid waste management.

Lack of enforcement of waste management laws
Limited participation of households in planning and decision making
Break down of vehicles, poor accessibility to some collection points
Richer households more willing to pay for waste collection services than poor households
No comprehensive waste reuse and recycling programs

Recommendations/improvements
Involve all stakeholders in planning for domestic solid waste management.
Public education and awareness campaigns to encourage sustainable waste management behaviors and to influence change in habits and traditions
Ensure community involvement in the planning, implementation and monitoring stages
Encourage private sector involvement in waste collection, both short term and long term contracts.
Use affordable equipment that is appropriate to the physical nature of the area, for example the introduction of wheel bins to serve household with narrow roads.

Ref.-61: The generation of stakeholder's knowledge for solid waste management planning through action: A case study from Busia, Uganda

This paper was published in the Habitat International Journal in 2015 and it presents a case study about the use of action research in solid waste management. In this paper, the authors point out that the involvement of multiple stakeholders in planning solid waste management interventions is important to successfully improve solid waste management in low-income countries. The authors note that stakeholders need access to sufficient knowledge to fully and effectively participate in planning solid waste management interventions.

To address information deficits that may exist among relevant stakeholders, the authors suggest that action research presents stakeholders an opportunity to acquire knowledge they need to participate in planning solid waste management interventions. They define action research as an approach that involves stakeholders in (1) the formulation of research problems and questions, (2) the collection of data and information, (3) the interpretation and discussion of results, and (4) the drawing of conclusions and reformulation of the problem based on the conclusion.

Authors:
Jakob Lederer, Amosiah Ongatai, Dyllis Odeda, Hamis Rashid, Simon Otim, Medrine Nabaasa,

Ref.-62: Financial sustainability in municipal solid waste management – costs and revenues in Bahir Dar, Ethiopia.

This paper was published in 2014 in the Journal of Waste Management. The paper presents the results of a study that analyzed the cost and revenue of a private waste management company in Bahir Dar, Ethiopia. The key question in the study was whether a private company can generate sufficient revenue from waste management activities to offset costs and generate some profit. From this study, the authors point out options on how financial sustainability can be improved in solid waste management. Key results and observations from the study are:

- Outsourcing the collection services to a private company led to a substantial improvement regarding cleanliness of the city.
- The solid waste management system was not financially sustainable.
- Operating costs increased continuously while revenue streams did not match the gap.
- The revenue stream relied entirely on waste collection tariffs paid by households, commercial enterprise and institutions.
- The financial situation of the company was not evident from the outset as the company was successful in obtaining new grants which were able to cover some of the running costs although they were not earmarked for this purpose.
- The main lesson is that whether services are public or private, a detailed regular cost revenue analysis is critical as a financial monitoring tool to avoid unpleasant sudden surprises of a private public partnership failing due to a financial deficit.

From the key results and observations, the authors made the following recommendations and observations:

- Adopting a polluter – pays – principal where those who generate more waste pay more
- Options to increase revenue streams through tariffs are highly political and thus need strong political will and acceptance of the political constituency.
- Increase revenue by selling recycled products.
- Improve the road infrastructure to reduce on-route time and fuel consumption, as well as maintenance costs.

Authors:
Christian Riuji Lohri, Ephraim Joseph Camenzind, Christian Zurbrügg

Ref.-63: Torrefaction of waste biomass for application in energy production in South Africa.

This paper was published in the South African Journal of Chemical Engineering in 2018 and it presents the results of an experiment which used torrefaction to convert biomass from blue gum wood and marula seeds into coal-like material. Key results and observations from the experiment were as follows:

- It was observed that marula seeds required a temperature of 275 0C under inert conditions at a heating rate of 10 ^{0}C/min and a residence time of 20 min achieve the best torrefied biomass that has properties comparable to those of coal.
- For blue gum wood, a temperature of 300C, under inert conditions at a heating rate of 10 ^{0}C/min and a residence time of 40 min gave optimum torrefied biomass that could be co-fired with coal.
- Marula seeds had an HHV of 27.9Mj/kg which is higher than that of bituminous coal that averages between 23 and 26MJ/kg.
- Non-oxidative conditions with low heating rates and shorter residence time resulted in the best torrefied biomass.
- The increase in HHV coupled with increase in energy density for torrefied marula seeds during experimentation meant that it is possible to co-fire with coal making it a promising biomass source.
- Marula seeds gave promising properties than blue gum wood.

T.A. Mamvura, G. Pahla, E. Muzenda

Ref.-64: Waste management in Cameroon: A new policy perspective?

This paper was published in the Journal of Resources Conservation & Recycling in 2007 and it presents a critical analysis of the state of solid waste management regulations in Cameroon, using a case study from Limbe Municipal Council. The paper discusses key solid waste management challenges and offers suggestions for improving solid waste management.

Key results and observations from the analysis are:

- Regulations do not adequately address waste handling and disposal.
- Many inspectors cited lack of manpower, finances, expertise, testing facilities and equipment as impediments to their enforcement of regulations.
- There are inefficiencies in the implementation of waste management policy due to the devolved responsibilities between several governmental agencies and the local councils.
- Inadequate financial resources.
- Low levels of enforcement of regulations.
- Inefficient collection of solid waste.
- Poor recovery and disposal practices.

The authors suggested that the following would improve waste management in the council:

- Formulation of a comprehensive framework of legislation for waste management, integrating materials conservation, disposal, public participation and data gathering which reflects the realities of Cameroon.
- Increase public participation in effective waste management through genuine decentralization of council control and the empowerment of the electorate.
- Public education and awareness related to neighborhood services.
- Strengthen private-public partnerships in waste management. Such partnerships can be forged in the areas of materials recovery, and community composting.

Authors:
Veronica Ebot Manga, Osric Tening Forton, Adam D. Read

Ref.-65: Assessment of Municipal Solid Waste Management Practices in Juba City, South Sudan, Challenges and Practical Considerations: A review

This paper was published in the Journal of Environmental Science, Toxicology and Food Technology in 2017. The paper presents the results of a study that examined challenges associated with solid waste management in Juba City, South Sudan. From the identified challenges, the authors proposed a range of solutions.

The authors observed the following key challenges:

- Challenges associated with awareness and education:
  Lack of awareness about recycling.
  Lack of skilled solid waste management personnel.
  Lack of health and environmental education in the community.
- Challenges associated with technical issues:
- Lack of recycling equipment, Lack of infrastructure and power to operate recycling equipment. High operational costs and expensive recycling equipment. Frequent collection vehicle breakdowns and expensive spare parts.
- Lack of coordination among stakeholders.
- Lack of government funding and financial resources in solid waste management sector
- Lack of private sector interest in recycling business.
- No clear or adequate policies on solid waste management.
- Lack of clear regulations.
- National, state and local authorities unable to enforce policies and regulations.
- No demand for recyclables in South Sudan and low earnings from recyclables.

Proposed solutions

- Create awareness about waste reduction, reuse and recycling.
- Promote use of appropriate technologies, technologies suitable for Sudan.
- Solid waste services revenues should not flow into the general municipal account so that it is not absorbed in the total expenditure.
- Promote a democratic process of solid waste management policy formulation.

Authors:
Charles Mahmoud Sebit Manya, SeyoumLeta, Mohammed Mazharuddin Khan

Ref.-66: Management of medical waste in Tanzania hospitals.

This paper was published in Tanzania Health Research Bulletin in 2006 and it presents the results of a research which was carried out to examine medical waste management systems in Tanzanian hospitals. The data for the study was collected through a questionnaire.

The results of the research showed the following:

- Increase in population, poor medical waste management and the use of disposables were the main reasons for an increase in medical waste in hospitals.
- The main disposal methods comprised of open pit burning and burying of the waste.
- A large proportion of the hospitals used dust bins for transporting waste from generation points to incineration without plastic bag.
- Most hospitals had low incineration capacity, with few of them having fire brick incineration.
- Some hospitals were using untrained casual laborers in medical waste management and general cleanliness.

The authors conclude that hospital waste management in the country is poor and that there is a need for proper training regarding awareness and practices of medical waste management to cover all health workers in the country.

Authors:
S.V. MANYELE and H. ANICETUS

Ref.-67: Experimental and feasibility assessment of biogas production by anaerobic digestion of fruit and vegetable waste from Joburg Market.

This paper was published in the Journal of Waste Management in 2018 and it presents the results of a study that examined the feasibility of biogas production by anaerobic digestion of fruit and vegetable waste.

Authors
S.O. Masebinu, E.T. Akinlabi, E. Muzenda, A.O. Aboyade C. Mbohwa

Ref.-68: Informal waste harvesting in Victoria Falls town, Zimbabwe; Socio-economic benefits.

This paper was published in the Habitat International Journal in 2006 and it analyses the socio-economic benefits of informal waste harvester in Vitoria Falls. The author collected the data that was used in this paper through a questionnaire and site visits to dump sites.

The results show that informal waste recovery and reuse of building materials in the study area existed due to several factors including poverty, lack of safety net for the poor, high unemployment and demand for recyclables which are cheaper than he products from hardware shops. Analysis of the income and expenditure data of waste pickers showed that by engaging in informal waste harvesting, some of the urban poor were able to eke out a living in an urban environment where economic opportunities were very limited.

Author:
Mhosisi Masocha

Ref.-69: Towards Zero Waste in emerging countries – A South African experience

This paper was published in the Journal of Waste Management in 2008 and its aim is to describe the necessary steps towards the optimization of waste minimization/zero waste strategies into already established integrated waste management system and the development of a Zero Waste model for a post-consumer waste in urban communities in South Africa.

The results of the study showed that through a Zero Waste scheme, the volume of waste disposed at a landfill will be reduced, hence landfill space would be saved. The results also showed that a Zero Waste scheme would also have economic benefits because of revenue from the sale of recyclable materials and also because operating costs would be reduced.

The authors point out that waste minimization at point of purchase and reuse of waste within the household constitutes the first step in the application of Zero Waste model. Recycling using at-source separation or a wet/dry model constitutes the second step in the model. The authors argue that Zero Waste schemes can be applied within existing waste management systems and that the success of such schemes will depend on the participation rate of households. The authors point out that the drive towards Zero Waste should include efforts to instill positive attitude towards waste minimization and recycling among residents.

Authors:
Ntlibi Matete, Cristina Trois

Ref.-70: Urban solid waste characteristics and household appetite for separation at source in Eastern and Southern Africa.

This paper was published in the Habitat International Journal in 2014 and it presents the results of study that examined the willingness of households to participate in source waste separation in Bulawayo, Lusaka, and Mombasa. Data for the study was obtained through key informant interviews, focus group discussions, household interviews, field and observations.

Key results and observations from the study are:

- Due to poor collection services in all the cities, households already separate some of the uncollected waste for alternative disposal such as burning of plastics, burying of organic waste in backyard gardens or various ways of illegal dumping. The authors suggest that if this source separation and recycling is supported by formal city policies and interventions like anaerobic digestion, at least as much as 40% of waste currently going to landfills could be diverted.
- Waste is predominantly organic but composting of organic waste is limited. The waste composition is becoming more complex as the region adopts globalized consumption patterns witnessed by large quantities of imported goods.
- Recycling at dumpsites is the most commonly reported phenomenon in these cities.
- In all the three cities and for all income groups, respondents reported an overwhelming willingness to participate in at source separation of waste.
- Residents suggested that they would welcome separation and recycling of waste if they were provided with incentives to do so; for example, free plastic bags for storage of waste, provision of guidelines on recycling and clear financial benefits of doing so.
- The authors note that the uptake of source separation would be more acceptable to residents if this did not come with extra costs.

Author:
Beacon Mbiba

Ref.-71: Municipal solid waste characterization and quantification as a measure towards effective waste management in Ghana.

This paper was published in the Journal of Waste Management in 2015 and it presents the results of a study which piloted household waste separation and examined waste generation rate and its composition in Ghana. The basis of the study was that reliable data on waste generation and its composition - needed for planning waste management interventions - was absent.

The results of the study showed the following:

- The rate of waste generation in Ghana was 0.47kg/person/day
- The composition of the waste was as follows:
  - ✓ 61% organics,
  - ✓ 14% plastic,
  - ✓ 6% inert,
  - ✓ 5% miscellaneous,
  - ✓ 5% paper,
  - ✓ 3% metals,
  - ✓ 3% glass,
  - ✓ 1% leather and rubber,
  - ✓ 1% textile
- Organic composition of the waste varied among various socioeconomic areas, but the differences were not significant.
- 92.4% were willing to separate their waste while 4.8% were unwilling to do so.
- The motivation of those willing to separate waste was cleaner environment.
- The pilot study showed that most households were able to separate their waste.

Author:
Kodwo Miezah, Kwasi Obiri-Danso, Zsófia Kádár, Bernard Fei-Baffoe, Moses Y. Mensah

Ref.-72: Waste Pickers Perceptions among Households in Cosmo City, South Africa

This paper was published in the Journal of Advances in Applied Science Research in 2017 and it presents the results of a study that examined the relationship between household's willingness to separate waste from source and household's perceptions about waste pickers. Data for the study was obtained through literature review, a survey and field observations.

Key results from the study were as follows:

- 82% of the households were willing to incorporate waste pickers into the waste management system.
- Only 20% of the households were willing to separate waste at source.
- 36 % of the households agreed to providing basic salary for waste pickers.
- 80% of the households agreed to some form of regulation for waste pickers.

The authors point out that the design of municipal recycling programs and policies should take the local context into consideration, including perceptions of all stakeholders, informal waste pickers and households.

Authors
Mphaka DL and Moja SJ

Ref.-73: Towards the Efficiency of Municipal Solid Waste Management in the Democratic Republic of Congo (DRC): Case Study of Lubumbashi.

This paper was published in the American Journal of Environmental Sciences in 2016 and it presents the results of a study that examined the status of solid waste management in Lubumbashi. The paper presents waste generation rate and the composition of the waste. In addition, the paper presents a conceptual framework for effective management of solid waste,

The results of the study showed the following: the city was producing 95040 tons of waste per year. About 20% of the waste was recyclable, 29.2% was biodegradable solid waste and 12% was inert. Households incinerated or buried their waste. City waste collection was done by the Lubumbashi Municipality, which had access to 10 trucks with a volume of 8 tons and 3 trucks with a volume of 20 tons. There were 100 waste collection bins but only 33 were operational.

For effective municipal solid waste management, the paper highlights the importance of an enabling environment and stakeholder participation in all the aspects of solid waste management (waste generation, collection, transportation, disposal recycling and reuse).

Authors
Martin T. Mpinda, Olusegun K. Abass, Mujinya B. Bazirake, Eric M.M. Nsokimieno,
Ngoy S. Mylor, Kayembe W.M. Kayembe, Sissou Zakari and Rodrigue Khonde

Ref.-74: Drivers to Sustainable Plastic Solid Waste Recycling: A Review

This paper was presented at a conference on sustainable manufacturing and was published in the Procedia Manufacturing Journal in 2017. Through literature review, the paper identified community and household level drivers influencing the development of sustainable systems for managing and recycling plastic solid waste or municipal solid waste.

Regarding community level drivers, the paper identified government policies, public health, environmental protection, resource value of waste and institutional responsibility as key factors influencing the development of sustainable systems for managing and recycling municipal waste. At the household/individual level, the paper identified education and awareness, economic incentives to households participating in recycling, income, gender and age as key factors influencing individuals to participate in recycling of waste. The authors point out that the behavior and attitude of individuals in recycling program has a significant influence in determining whether the program will be successful or not.

The authors pointed out that there was no research that focused on analysis factors influencing the recycling plastic waste. The authors therefore recommended more research on factors influencing the recycling of plastic waste,

Authors
Bupe G Mwanzaa, Charles Mbohwa

Ref.-75: The Influence of Waste Collection Systems on Resource Recovery: A Review

This paper was presented at a conference on sustainable manufacturing and was published in the Procedia Manufacturing Journal in 2018. The paper reviews waste collection systems and how each system influences the recovery of recyclable materials. The paper focused on Kerbside collection, drop off collection, buy-back system and deposit refund system.

The paper points out the following: The kerbside system is the most convenient system and that it increases recycling rates than the drop off systems. Regarding the drop off system, the paper points out that it reduces environmental impacts and reduces waste collection costs. However, the drop off system has lower recovery rates compared to the kerbside collection. Regarding the buy-back collection system, the paper points out that it provides a link between waste generators and recoveries. The paper further points out that this system relies on waste brought by waste generators, so the location of buy-back centers should be carefully considered. The paper points out that the deposit refund system has high administration costs, but it results in high collection rates and that the collected recyclables have less contamination compared to the kerbside system. The paper also points out that the deposit refund system is suitable for products that are environmentally harmful and difficult to monitor and dispose.

The paper explains that each of these systems influence households' participation in recycling differently and that the selection of a waste collection system should consider whether the selected system is economically, environmentally and socially sustainable.

Authors:
Bupe Getrude Mwanza, Charles Mbohwa, Arnesh Telukdarie

Ref.-76: Strategies for the Recovery and Recycling of Plastic Solid Waste (PSW): A Focus on Plastic Manufacturing Companies.

Summary

This paper was presented at a conference on sustainable manufacturing and was published in the Procedia Manufacturing Journal in 2018. The paper presents results of a study that examined strategies that would positively influence plastic manufacturing and recycling companies to recover and recycle plastic solid waste. The authors collected data from 15 companies involved in manufacturing and recovering plastic waste. The data showed the following as the most critical factors in the recovery and recycling of plastic waste: the cost of alternative forms of disposal compared to recycling; creating closer engagement of recyclers with one another along the supply chain; efficiency of the municipality, private and informal waste collectors in waste collection; enforcement of producer responsibility regulations to encourage plastic waste collection.

Authors

Bupe Getrude Mwanza, Charles Mbohwa, Amesh Telukdarie

Ref.-77: Pricing landfill externalities: Emissions and disamenity costs in cape Town, South Africa

This paper was published in the Journal of Waste Management in 2011 and it presents the results of a study that estimated the external costs associated with emissions and disamenities from landfills in the City of Cape Town. The study compared three landfilling scenarios: scenario 1 meant landfilling waste at existing landfills with no energy recovery, scenario 2 meant landfilling waste at existing landfills with energy recovery, and scenario 3 meant landfilling waste at a new regional landfill with energy recovery. The basis of this study was that external cost of landfilling (emissions to air, soil and water; and disamenities such as odors and pests) are not generally reflected in waste disposal charges

The results showed that the net cost of emissions per ton of waste was 28.91 Rands for scenario-1, 0.66 Rands for scenario-2 and 0.07 Rands for scenario-3. The net cost of disamenities per ton of waste was 57.46 Rands for scenario-1, it was 40.22 Rands for scenario-2 and 0.00 Rands for scenario-3. The net transport cost per ton of waste was 24.22 Rands for scenario-1 and scenario-2 and 31.42 Rands for scenario-3.

The authors concluded that scenario 3 - a new regional landfill with energy recovery was a preferable scenario to landfilling waste at existing landfills, although the transport cost would be slightly higher with this scenario.

Authors

Anton Nahman

Ref.-78: Economic instruments for solid waste management in South Africa: Opportunities and constraints.

This paper was published in the Journal of Resources, Conservation and Recycling in 2010 and it presents the results of a study that identified opportunities and constraints associated with the implementation of economic instruments (e.g. environmental taxes, subsidies, deposit refund) for solid waste management. The study targeted representatives from municipalities and private waste management companies.

The paper points out that economic instruments could lead to reduction of waste generation and increased diversion of waste from landfill to recycling, but the implementation of economic instruments for solid waste management is a complex issue that must take local conditions into account. The paper identifies a range of issues that must be addressed before economic instruments can be implemented, including: promulgation of the waste management bill which will create an enabling environment for enforcement and provide legal framework within which economic instruments can be implemented; there must be political will; there is a need for education and awareness; capacity at all levels of government must be developed, for administration, monitoring and enforcement of instruments.

The paper points out that simpler instruments that are more easily enforced and don't create incentives for illegal dumping should be preferred. The paper further points out that revenue providing and revenue neutral instruments, such as subsidies or deposit refund schemes have an advantage because of concern regarding the negative impacts that economic instruments such as taxes and charges might have on the poor and businesses.

Author:
A.Nahman and L.Godfrey

Ref.-79:

There is no paper # 7

作成資料１６：ACCP スタディツアー関連業務実施報告資料（2019 年 1 月 8 日）

ACCP スタディツアー関連業務実施報告

１.１　　概　要

エチオピア・アジスアベバ市にて、2018 年 12 月 5 日～16 日の行程で業務を実施したのでここに報告する。

【出張者】

- 副総括/廃棄物管理計画/住民啓発：長安　美恵 （現地滞在：12 月 6 日～16 日）
- 収集・運搬体制分析：前田　剛和 （現地滞在：12 月 9 日～15 日）

【行程】

No.	Date	Day	Time	Activity (Nagayasu/Maeda)
1	12/5	Wed	20:50	Leaving Narita (ET0673, Nagayasu)
2	12/6	Thu	07:35 10:00 13:30	Arriving in Addis Ababa (ET0673, Nagayasu) Meeting with JICA HQ @ Capital Hotel & Spa Meeting with AA City SWM Agency @ SWMA Office
3	12/7	Fri	All day	Logistic arrangement with Capital Hotel & Spa
4	12/8	Sat	09:30 14:00 18:35	Visit to Koshe Landfill Site, Meeting with UNH & SWAN Lunch arrangement with restaurant Sami Leaving Narita - Bangkok (ET1411, Maeda)
5	12/9	Sun	06:00 12:30 15:00	Arriving in Addis Ababa (ET0629, Maeda) Lunch arrangement with restaurant Hillbottom Logistic arrangement with Capital Hotel & Spa
6	12/10	Mon	All day	ACCP study tour on landfill management in Addis Ababa @ Capital Hotel & Spa
7	12/11	Tue	All day	ACCP study tour on landfill management in Addis Ababa @ Capital Hotel & Spa
8	12/12	Wed	All day	Site Visit: Koshe Landfill Site & Rappie Waste to Energy Plant
9	12/13	Thu	All day	Site Visit: Sandafa Landfill Site & Bole Recycling Center Interview with participant from Madagascar
10	12/14	Fri	All day	ACCP study tour on landfill management in Addis Ababa @ Capital Hotel & Spa
11	12/15	Sat	09:00 10:30 22:50	Interview with participant from Kenya, Nairobi Interview with participant from Djibouti Leaving Addis Ababa (ET672,Maeda)
12	12/16	Sun	00:05 15:20 19:45	Leaving Addis Ababa (ET684, Nagayasu) Arriving in Shanghai (ET684, Nagayasu) Arriving in Narita (ET672, Maeda)

１.２　　今後の案件形成にかかるインタビュー調査

スタディツアー参加者のうちマダガスカル（アンタナナリボ市）、ケニア（ナイロビ市）、ジブチ国からの参加者に対し、今後の案件形成を見据え、国・都市別プロファイルデータおよびジョブレポートをもとにインタビュー調査を 2019 年 12 月 13 日および 15 日に実施した。概要は以下のとおりであり、詳細は添付資料に示す。

（１）マダガスカル

【廃棄物管理の現状と課題】

① 収集は料金を徴収し実施しているが、徴収率が低く不法投棄が多い。
② 収集車が不足している可能性がある。
③ 実施機関である SAMVA の管轄が大統領選挙（2019 年 12 月 19 日）の結果次第で変わる可能性がある。

【今後の現地調査で主として確認すべき事項】

① SAMVA の管轄・役割と権限
② 収集の実態把握と課題の抽出

（２）ケニア

【廃棄物管理の現状と課題】

① 新規最終処分場候補地のルアイは、焼却灰を持ち込めば建設可というところまで話は進展しているが、焼却炉建設のフィージビリティは検証されていない。
② フランチャイズ制による収集は訴訟により停滞しており、出口が見えない。
③ 先のマスタープラン策定より 10 年が経過しようとしており、状況も変化していることから改訂が必要である。
④ UN-Habitat がコミュニティベースでの収集に支援を行う可能性がある。

【今後の現地調査で主として確認すべき事項】

① 新規最終処分場候補地のルアイの状況（郡政府、航空局、国家環境管理公社）
② フランチャイズ制による収集の状況（ゾーン 7&9、廃棄物組合、民間収集業者ほか）
③ UN-Habitat 支援の内容・協調の可能性

（３）ジブチ

【廃棄物管理の現状と課題】

① 市民の意識が低く不法投棄が見られる。
② 分別やリサイクルの導入を行うためのスタッフの能力向上が必要である。
③ 処分場の残余年数が 2 年であるため、延命化や新規処分場の建設を検討する必要がある。

【今後の現地調査で主として確認すべき事項】

① 収集の実態把握（収集車の状態、維持管理・料金徴収の実態）
② 最終処分場の実態把握
③ 分別やリサイクルシステム（施設）の導入可能性

１.３　ACCP Study Tour on Landfill Management in Addis Ababa の開催

１．３．１　実施概要

（１）目的

本スタディツアー実施の目的は以下のとおり。

- エチオピア・アジスアベバ市にて、環境保全型ごみ埋め立て技術である準好気性埋立構造（福岡方式）最終処分場管理スタディツアーを開催し、アフリカ地域に適当な福岡方式処分場の協力の有り方について情報収集・分析を行う。
- スタディツアーの実施により、アジスアベバ市の都市レベルの廃棄物管理システムの実態や課題・教訓を学ぶ機会を提供する。

（２）開催期間と場所

- 期間：2018 年 12 月 10 日（月）～14 日（金）
- 場所：Capital Hotel and Spa, 1F Conference Hall

（３）参加対象者

スタディツアー参加国は、JICA が選定したケニア、ナイジェリア、モザンビーク、スーダン、ジブチ、マダガスカルとし、計 12 名（下表）であったが、別途、横浜市と UN-Habitat の招待研修生も合流した。ただし、以下の研修生は、都合により不参加となった。

- Oladipo Jacob Olajide：VISA が間に合わず、事務所に連絡ないまま渡航せず。
- Suleiman Elemam Adam：家庭事情により無断欠席。
- RAVALOERA Antsatiana：家庭事情により欠席。事前連絡あり。

No	Country	Organization	Position/title	Name of Participant
African countries invited by JICA				
1	Kenya	County Government of Kiambu	Ag Asssistant Director,Environment	Alice Njoki Muchiri
2	Kenya	Nairobi City County	Director of Environment	Issac Muraya Kimani
3	Nigeria	Abuja Environmental Protection Board	Deputy Director, HOD Solid Waste Management	Odunfa Amos Tunji
4	Nigeria	Federal Ministry of Environment	Deputy Director	Oladipo Jacob Olajide
5	Mozambique	Ministry of Land, Environmnent and Rural Development	Head of Division of the Waste Management and Green Spaces	João Augusto Cipriano
6	Mozambique	Directorate of SWM and Salubrity, Maputo Municipal Council	Director	Joao Agostinho Mucavele
7	Sudan	National Councill for Environment	Environmental Inspector	Salma Hassan Abdelrahim Mohamedkheir
8	Sudan	Cleaning project / North Khordfan	Operation Manager	Suleiman Elemam Adam
9	Djibouti	Office de la Voirie de Djibouti	Environment Engineer/ Coordinator	Oubah Mahamoud Hassan
10	Madagascar	Urban Commune of Antananarivo	Coordinator of Risks, Disater and Draining	Jaona Andrianaivo
11	Madagascar	Ministere de l'Eau de l'Assainissement et de l'Hygiène	Directeur de l'Assainissement / Point Focal	RAVALOERA Antsatiana
12	Mozambique	JICA	Program Officer (Environment Sector)	Benedito Armando da Silva

（４）プログラム

本スタディツアーのプログラムは以下のとおり。ただし 13 日午前に予定していた Sandafa 処

分場への視察が周辺住民への配慮のため急遽中止となり、プラスチックのリサイクルセンターに変更となった。また Sandafa 処分場への視察ができなかった代わりに、AA City SWM Agency、Landfill Directorate Director の Mr. Atiku Legesse が、最終日に Sandafa 処分場の構造や基礎工事の状況に関するプレゼンを行うことで対応してくれた。

ACCP Study Tour on Landfill Management in Addis Ababa

Date		Time			Program	Presenter/Contact Person for Site Visit	
						Name	Position/Organization
Dec. 9	Sun.				Arrival at Addis Ababa		
Dec. 10	Mon.	8:45	~	9:00	Registration		
		9:00	~	9:40	Opening Remarks	Dr. Eshetu Lemma Mr. Akira Uchida Mr. Takeshi Matsuyama	General Manager, AA City SWM Agency Deputy Chief of Mission, Embassy of Japan Senior Representative, JICA Ethiopia Office
		9:40	~	9:50	Group Photo		
		9:50	~	10:10	Coffee Break		
		10:10	~	10:30	Program Orientation	Mr. Masakazu Maeda Ms. Mie Nagayasu	JICA Expert Team (JET)
		10:30	~	12:00	Lecture on Waste Collection to Dumping Practices in Addis Ababa City, Q & A	Mr. Kassahun Tsegaye	Solid Waste Re-Use and Re-Cycle Center Directorate Director, AA City SWM Agency
		12:00	~	13:30	Lunch		
		13:30	~	15:00	Lecture on Various SWM Projects in Addis Ababa City, Q & A	Mr. Takele Dessisa	Technology and Project Development Directorate Director, AA City SWM Agency
		15:00	~	15:20	Coffee Break		
		15:20	~	16:20	SDG	Ms. Nao Takeuchi	Waste Management Expert, Urban Basic Services Branch, UN-Habitat
Dec. 11	Tue.	9:00	~	10:10	Lecture on the Project for Emergency Technical Support to SWM in Addis Ababa, Ethiopia:	Mr. Akilu Fikresilassie	Director, UN-Habitat Ethiopia Office
		10:10	~	10:30	Coffee Break		
		10:30	~	12:00	Lecture on Sanitary Landfill Technology of Semi-aerobic System, Fukuoka Method	Ms. Sachiyo Hoshino	Special Adviser to the Director, UN-Habitat Regional Office for Asia and the Pacific
		12:00	~	13:30	Lunch		
		13:30	~	15:00	Cont.	Mr. Yasushi Matsufuji	Professor of Fukuoka University
		15:00	~	15:20	Coffee Break		
		15:20	~	16:20	Cont.		
Dec. 12	Wed.	9:00	~	12:00	Site Visit to Koshe Dump Site	Mr. Yasushi Matsufuji Mr. Atiku Legesse	SWAN AASWMA
		12:00	~	13:30	Lunch		
		13:30	~	15:00	Site Visit to Reppie Waste to Energy Project	Mr. Masakazu Maeda TBD	JET EEP
Dec. 13	Thur.	9:00	~	12:00	Site Visit to Sandafa Sanitary Landfill Supported by AFD	Mr. Masakazu Maeda Mr. Atiku Legesse	JET AASWMA
		12:00	~	13:30	Lunch		
		13:30	~	15:00	Site Visit to Bole Recycling Center	Mr. Masakazu Maeda Mr. Biniyam	JET AASWMA
			~		Interview with Madagascar	Mr. Masakazu Maeda Ms. Mie Nagayasu	JET
Dec. 14	Fri.	9:00	~	10:30	Lecture on Fukuoka Method - Review and Considerations of Design and O&M	Mr. Masakazu Maeda	JET
		10:30	~	10:50	Coffee Break		
		10:50	~	12:00	Discussion for the Better Landfill Management & Preparation of Discussion Results by Participants		JICA/JET/Participants
		12:00	~	13:30	Lunch		
		13:30	~	14:30	Short Presentatoin by Group Leader		Participants
		14:30	~	15:00	Lecture on Landfill Management in Yokohama city, Japan	Mr. Takayuki Nakajima	Manager,Operational Management Section, Management of Reclaimed Land for Disposal Division, Resources and Waste Recycling Bureau, City of Yokohama
		15:00	~	15:20	Coffee Break		
		15:20	~	15:30	Evaluation (Questionnaire)	Ms. Mie Nagayasu	JET
		15:30	~	15:40	Distribution of Certificate	Mr. Tsuyoshi Yamamoto	Deputy Director, JICA Grobal Environment Department
		15:40	~	16:00	Closing Remarks	Mr. Akilu Fikresilassie Mr. Sadayuki Kanazawa	Director, UN-Habitat Ethiopia Office Deputy Director General, Resources and Waste Recycling Bureau, City of Yokohama
		16:00	~	16:10	Group Photo		
Dec. 15	Sat.				Departure from Addis Ababa		AM : Interview with Dibouti & Kenya, Nairobi

（５）スタディツアー実施に対する所見

スタディツアー実施後の評価シートによるアンケート調査結果を踏まえ、所見と今後改善すべき点などについて、以下のとおりまとめる。

a. 講義

講義の内容は、大きく分けて、アジスアベバ市の都市レベルの廃棄物管理システムの現状、準好気性埋立構造（福岡方式）による最終処分場の管理方法、SDG 11.6.1 のメソドロジーとその適用法、横浜市の処分場管理の実態に関してであった。各機関の講師の方々より包括的、かつ的を射た説明をして頂き、研修生はアジスアベバ市をケーススタディとし都市レベルの廃棄物管理の概況や課題、福岡方式の導入方法などについて効率よく理解することができたと判断する。

研修生のアンケートによると、特に福岡方式にかかる講義が有意義であったとほぼ全員が評価した。また横浜市などの処分場の管理方法や周辺住民との関係など先進事例も役に立ったというコメントもあった。講義に追加すべき内容としては、市民の環境意識の向上、廃棄物管理における予算上の制約への対処方法、アフリカの都市のデータベースの改善、処分場管理の経費管理、処分場プロジェクトの資金調達方法、などが挙げられた。

b. 視察

視察に関しては、前半 12 月 10、11 日にアジスアベバ市の廃棄物管理と福岡方式に関して座学でしっかり学んだ後に実際のオペレーションの現場を見学することで、より研修生の理解が促進されたと評価できる。視察現場の概要と研修生の主な質問は以下のとおり。

- Koshe Dump Site（2019 年 12 月 12 日）

UN-Habitat の星野補佐官、福岡大学の松藤名誉教授により、処分場改善工事について説明があった。工事は重機調達の遅れがあり、工程が遅れているようであった。研修生からは浸出水の処理・コントロール、斜面の抑えにしている蛇篭の諸元について等、技術的な質問があり、実際に自分たちの国における福岡方式の実践に役立てようという意識が見られた。

- Reppie Waste to Energy Project（2019 年 12 月 12 日）

2 グループに分かれて場内の施設を案内され詳しい説明を受けた。本施設は日量 1,000m^3 のごみを受入れ、それを焼却処理することで 50MW の発電を行うものである。2017 年 11 月に竣工し 1 ヶ月間あまり稼働したが、いくつかの技術的欠陥が見つかりそれ以来稼働していない。中国の援助によって建設され、運営維持管理に関してはデンマークの世界的コンサルタントである Ramboll 社の技術サポートを受けている。研修生からは排出ガスの成分やその処理について等、技術的な質問があった。

- Recycling Center（2019 年 12 月 13 日）

Coba Impact Manufacturing Plc. という会社が運営するリサイクルセンター（2 ヶ所）を訪問した。最初のセンターはホテルより車で 40 分くらいのところにあり、敷地面積は約 3,500m^2 でこれは借地とのことである。2011 年から稼働しており、1 日およそ 350～400t のペットボトルを処理している。トラックで搬入されてくるペットボトルを手選別により、白（透明）、青、緑の 3 種類に分類し、各々を圧縮機で一辺が 60～70cm 程度のベイル（圧縮物）にしている。こ

のベイルはヨーロッパ各国（イタリア、スペイン、ポルトガル、トルコ等）の再生工場へ出荷されている。以前は中国にも輸出していたが、現在は中止されている。処理量としては、新しい機械を導入予定でそれにより、600～800t/日を目指している。選別はほとんど女性が行っており、男性は荷下ろし等の力仕事を担当しているとのことであった。全部で 120 名の従業員がおり、2 グループに分かれ、シフト制で働いている。

もう 1 ヶ所のセンターは、2015 年 4 月から稼働の新しい建物で、敷地面積は約 4,000m^2 でそのうち 3,000m^2 が工場棟でその他事務所、食堂、更衣室・シャワー室等の管理棟から成る。先のセンターからのベイルをコンベアーシステムにより、洗浄、分別、破砕し、輸出用およびセメント工場の燃料用の細かいプラスチック材にしている。ここで発生する汚水は全て処理し、循環させ再利用を行っている。両センターとも、研修生からはペットボトルの回収からリサイクルまでの一連の処理についてや従業員の待遇について等の質問がよせられた。

- Bole Arabsa Transfer Station（2019 年 12 月 13 日）

アジスアベバ市廃棄物管理公社が建設を計画している中継基地を視察した。敷地面積は 3ha で北から南に若干傾斜のついた土地である。この面積の半分を使用し、事務所・ガレージ・維持管理用ワークショップ・トラックスケール等の施設を整備し、市内で収集されたごみをここで大型のトラックに移し替え、処分場まで運搬するシステムを構築する計画である。また、将来的に同敷地内にコンポストやバイオガス施設を建設する計画で、これらは現在入札を実施しているところである。土地は政府の土地で、これら施設の整備費用は 5,000 万 ETB（1 ETB = 約 4 円）を見込んでいる。研修生からは中継基地に至るまでのアクセス道路が劣悪でこの改良の必要性を指摘する声が多かったが、これは道路部局による改良工事が計画されているとのことであった。その他、分別の手法、基地内で発生する汚水の処理や立地条件について等、技術的な質問があった。

c. グループディスカッション・発表

研修生を 6 つのグループ（グループ分けの結果、3 名のグループができたため、他グループと合同とし、最終的に 5 グループ）に分け、各グループで処分場管理における根源的課題は何か、についてまずブレーンストーミングを行ってもらった。研修生個人の意見はポストイットに書いてもらい、それらを壁に貼り同じ課題を集めることで課題を分類した。分類後それら課題に対する解決策をグループで議論してもらい、整理し、発表してもらった。グループ毎の課題及びその解決策は以下のとおりである。技術的な課題の解決方法としては、福岡方式の採用を上げるグループが多く、本研修で重点的に学んでもらった成果が出たものと評価できる。また、能力開発の必要性や資金援助といった途上国で必ず課題となる事項が挙げられている。

表　グループディスカッションによる処分場管理における課題とその解決策

ｸﾞﾙｰﾌﾟ	課題	解決策
G1	環境汚染	福岡方式による埋立 • 浸出水集排水 • 浸出水処理 • ガス抜き • 即日覆土
	機材調達のための資金調達	• 中央政府からの資金 • 政治的判断

ｸﾞﾙｰﾌﾟ	課題	解決策
		• パートナーシップ
	社会的配慮	• 社会の認知 • 教育と支援運動 • 環境影響評価の実施 • 政治的判断
	能力向上	• 人的資源管理への投資 • 運営維持管理における政治的判断
	設計	• 承認済の設計 • コンサルタントの雇用 • プロジェクトマネジャーの採用
G2	温室効果ガスの排出	福岡方式の採用によるメタンから二酸化炭素ガスへの変換
	浸出水の浸透	福岡方式の採用により環境汚染防止のための浸出水集排水管と浸出水貯留池の設置
	オープンダンピング	福岡方式の採用により環境への負荷を最小とするための覆土とコンパクションの実施。これにより悪臭や害虫の発生を抑える
	予算上の制約	福岡方式の採用により、経済的で管理のし易い処分場となる。
G3	⇒人数の関係でグループ 6 に合流	
G4	機材の不足	• 外注に委託 • ドナーによる支援 • ごみ料金の徴収 • 政治家のコミットメント
	人的資源の不足	JICA 等の資金援助による NGO 等が実施する訓練指導への支援
	設計・施工における問題	• 適切な埋立地設計の活用 • 各国の状況を勘案した設計 • 各国の状況に合致した福岡方式の採用
G5	資源に関する問題 • 資金不足 • 専門家不足 • 資機材不足	パートナーによる資金調達 • 政府からの援助 • 啓蒙活動 • 住民参加
	技術に関する問題 • トラックスケールの不足 • 浸出水及びガスの処理	福岡方式の採用 • 中間処理の実施 • ガスの有効利用
	社会に関する問題 • 違法なウェイストピッカー • コミュニティの反対 • 健康	• 住民啓発活動 • コミュニティの参加 • 社会問題解決のためのアクションプランの実施 • 衛生施設の整備

ｸﾞﾙｰﾌﾟ	課題	解決策
G6	技術的な管理能力の欠如 • 斜面が 45 度以上 • メタンガスの発生 • 浸出水処理の不備	福岡方式の採用 • 斜面はテラスや階段の設置により 30 度以下にする • ガス抜き管の設置 • 浸出水集排水管の設置
	能力開発	• 資格のある人材の採用 • 福岡方式に関する研修・ワークショップの開催 • 知識と経験の共有化
	資金ソース	• 資金調達 • 優先順位の定義づけ
	政治的な意欲と態度の改善	• 透明性の確保 • コミュニティの関与と参加 • 住民啓発活動の実施

d. 研修テキスト・資料・機材/施設

福岡方式のテキストや事前に入手できた講義資料は、集約印刷し初日にフォルダにまとめて研修員に配布し、研修員の理解を促す努力を行った。ただし、UN-Habitat からのプレゼン資料は、当日ギリギリに持ち込まれたため、研修生には USB でデータを渡すこととなった。研修生のアンケートでは、福岡方式のテキストが大変わかりやすいと評判が高く、講義資料に対しても高い満足度が示された。

機材・施設については、実施中研修員からは特に不満の声もなく、アンケートでも高い評価が得られたため、研修実施に際して支障はなかったと考えられる。

e. 全体

ロジ面では無断で不参加の研修生がいたり、視察用のバスが故障したり、研修生が視察に大幅に遅れてきたり、視察先が急遽変更になったりとハプニングが多発したが、JICA エチオピア事務所やアジスアベバ市 SWM Agency の手厚いサポートのお陰で、なんとかうまく乗り切ることができた。総じて研修生の満足度の高さは、アンケート結果からもうかがえるところであるが、スタディツアー全般に対する研修生からのコメントを以下に列挙する。

- 情報共有のため、このような機会をもっと持つべき（3 名）
- 有意義なトレーニングプログラムであった（2 名）
- Koshe 処分場の現場視察が大変有意義だった
- 参加者同士の経験の共有ができた
- 本ツアーは、アフリカの都市における廃棄物管理において非常に重要な内容である
- 本研修で学んだことを活用することで、関係機関において廃棄物管理が改善することが期待できる。フォローアップ活動を希望する

f. ワークショップ参加への意欲・受講態度

講義や視察に際して、研修生は疑問やコメントが生じた場合には、その都度非常に積極的に質問を行っており、研修で得られた知識をさらに補完する努力も見られた。講師陣からも研修生の知識欲と熱心な態度に対して好評を得た。よって研修員の参加意欲は高く、受講態度も良

好であったと評する。

（６）研修成果の今後の活用

a. 研修で得られた成果

本スタディツアーの目的は、環境保全型ごみ埋め立て技術である準好気性埋立構造（福岡方式）による最終処分場管理の方法、およびアジスアベバ市の都市レベルの廃棄物管理システムの実態や課題・教訓を学ぶことであった。前述の通り、参加隊員は何れの講義、グループディスカッションにおいても積極的かつ的確な質問を行い、プログラムの集大成であったディスカッション結果の発表のための議論や準備も全員が意欲的に行っていた。このことから、スタディツアーの目的は、十分に達成されたものと考えられる。

また、研修員からは今後、廃棄物のリサイクル施設の導入や処分場の改善といったハードの充実とともに、市民啓発のための教育や広報といったソフトの充実も図るべきであるという点、またこれらのハード整備には多大な初期コストと維持費がかかるという点、廃棄物管理システム全体をうまく機能させるためには、財源の確保（収集費の徴収効率の改善）が大切であるという点などが指摘されたことから、知識や技術の習得だけではなく、考え方にも何等かの変化が生じたものと察せられる。

b. 成果の活用方法

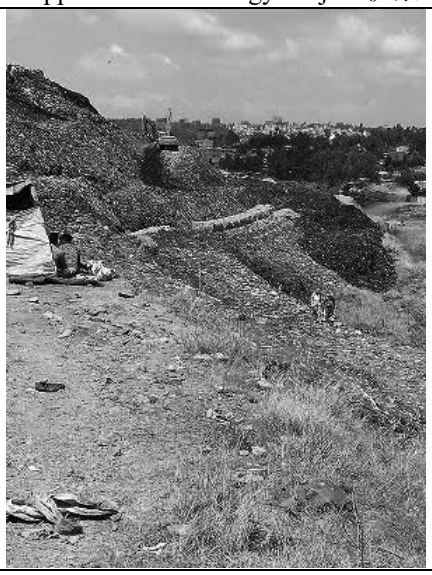
アンケート結果（質問８）によると、研修生からは以下のような成果の活用方法が列挙された。

- 現オープンダンプサイトに福岡方式を取り入れる。
- 従来の嫌気性埋立方式から、低コストな準好気性の福岡方式への移転を検討する。
- スタディツアーで学んだ技術や知識を、帰国後同僚やステークホルダーと共有する。
- 関係者と福岡方式を使った既存の処分場の安全閉鎖と新規処分場の建設を検討する。
- リサイクルプログラムにより注力する。

今回の研修員は、ほぼ全員が国レベルの廃棄物管理所管部署や自治体の実務者のトップであったため、それぞれの帰国後の活動がうまくいけば、アフリカ諸国における福岡方式の普及による処分場の改善も大いに期待される。

（７） 関連写真

次頁以降に関連写真を示す。

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>アジスアベバ市による講義</td><td>UN-Habitat による講義</td></tr>
<tr><td>  </td><td> 
</td></tr>
<tr><td>松藤先生による福岡方式の講義</td><td>Rappie Waste to Energy Project 視察</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>ガス抜き管@Koshes 処分場</td><td>Koshe 処分場のリハビリ工事</td></tr>
</table>

	
プラスチックリサイクル施設	プラスチックリサイクル施設
	
研修終了証の授与	全体写真

（８）添付資料

１）インタビュー議事録（3 か国）
２）アンケート結果全体集計（招聘先ごと）
３）アンケート結果（No.８の記述）
４）アンケート回答 PDF 版（全研修生）

作成資料１７：ニジェール国調査実施報告（2019 年 1 月 11 日～1 月 20 日）

ニジェール現地調査実施報告

１.１　　概要

ニジェール・ニアメ市にて、2019 年 1 月 11 日～20 日の行程で業務を実施したのでここに報告する。

（１）業務の目的

- ニジェール支所が主体的に企画・実施する「ニアメ市清掃キャンペーン」を資機材及び調査支援する。主に、①学校の環境教育実践者及び中央・地方自治体担当者を対象とした住民啓発セミナー開催、②前回開催したサイトでの事後評価と改善点の提案などを行う。
- ACCP の活動の一環として作成中の「アフリカ廃棄物管理環境教育ガイドブック」について、ニジェール関係機関から意見を聴取し、ガイドブックに反映させる。
- 住民啓発の取組事例として、ニアメ市「清掃キャンペーン」を「アフリカ廃棄物管理環境教育ガイドブック」及び ACCP FB で紹介する。

（２）出張者

- 副総括/廃棄物管理計画/住民啓発：長安　美恵 （現地滞在：1 月 12 日～19 日）

（３）行程

Date	Day	Time	Activity
1/11	Fri	20:40	Lev. Narita - Addis Ababa (ET0673)
1/12	Sat	14:10	Arr. Niamey (ET0937)
1/13	Sun	10:00 PM	事務所打合せ（軍手手交） 資料整理
1/14	Mon	9:00 10:00 10:30 15:00	通訳との打合せ 環境省衛生局長への表敬 環境省ニアメ州局長へのインタビュー 環境省次官への表敬
1/15	Tue	9:00 14:00 15:00	フランスアミティエ中・高一貫校校長、他関係者への聞き取り・事後評価 ニアメ市衛生局衛生課長への表敬 ニアメ州知事への表敬 市内のごみ処理施設の視察
1/16	Wed	08:15 AM- 13:00 PM	住民啓発セミナー開催 （清掃キャンペーン普及セミナー）
1/17	Thu	08:15 AM- 13:00 PM	ノルディレ中学校での清掃キャンペーン実施
1/18	Fri	10:00 15:00	環境教育ガイドブックにかかる住民啓発担当者への聞き取り調査 事務所報告
1/19	Sat	9:00	Lev. Niamey -Cotonou - Addis Ababa (ET1030)
1/20	Sun	19:20	Arr. Narita (ET0672)

１.２　　第一回清掃キャンペーンの事後評価

前回清掃キャンペーンを開催したサイトでの事後評価を行ったので、以下にその結果と改善点の提案などを行う。

（１）インタビュー対象者

- France-Amitie 中・高一貫校校長 Hama Amadou、他生徒数名

（２）実施期間と場所

- 日時：1 月 15 日 9：00～
- 場所：ニアメ市第 1 コミュン、France-Amitie 中・高一貫校校

（３）評価結果

第一回清掃キャンペーンを実施してからのポジティブなインパクトとしては、以下が挙げられた。

学校内での変化

- 以前は、生徒はごみを教室の床に捨てていたが、JICA からごみ箱の供与があったため、生徒がごみをごみ箱に捨てるようになった。市役所からも追加でごみ箱の供与があり、今は各クラスルームに 1 個のごみ箱が割り当てられている。
- 供与されたごみ箱がいっぱいになると、男子生後が自発的にごみ箱を担いで学校の一角にあるピットにすてるようになった。
- ごみが地面に落ちているのを見つけると、生徒は先生に注意されなくても自発的にひろってごみ箱に捨てるようになった。
- 以前から毎朝全校生徒が登校直後、校庭を一斉清掃をする時間を設けているが、今は校庭に落ちているごみ量自体が少ないので、大幅に清掃時間が短縮されている。
- 掃除当番制度（5~6 名がチームに分かれて、当番制でクラスルームを掃除する）は以前から存在していたが、生徒がより積極的に参加するようになった。クラスには、1 名 Supervisor が割り当てられており、清掃後にきれいになったかチェックしている。学校としても毎月末に一番きれいにしていた教室にプライズをあげるというインセンティブを与えている。またきれいにしなかった日の当番の生徒には、罰として成績評価にも影響するようにしている。
- 生徒の中から清掃大使（Embassador of Cleaning）が任命されており、毎月末に啓発活動（生徒のメンタリティチェンジのための啓発、コミュニティへの衛生活動の普及）を実施している。
- 以前から学校全体での定期的な大規模清掃を School Year の開始時（雨季が終了する時期）に行っていたが、キャンペーン実施前より生徒の参加率が上がった。

学校外での変化

- キャンペーン以前から学校にスナックなどを売りに来るベンダーに対しては、店を出す前と後にごみを片付けるということを義務づけていたが、彼らもより自発的にごみを拾うようになり、習慣化されている。
- その他の学校から、Amitie のきれいな状況を聞きつけて、視察しにくる学校関係者も増えた。
- Sopamine（Minig Company）などの企業からも、Amitie の校内がきれいに管理できているという状況が審査で認められ、机や椅子、コピー機などの物資供与（12-13 Million CFA 相当）が受けられるようになった。また彼らの支援で、校内に花壇をつ

くったりと環境づくりも進んだ。

前回のキャンペーン実施にかかる改善点については、以下のような意見が出された。

- 機材に関して、ごみ箱や手押し車などはすべて良いコンディションで機能しているが、熊手などは 100 本近く供与されたが 10 か月たった今はほぼすべてが壊れている。供与前に柄の部分に補強を入れれば、長持ちするのではないか。

現在学校の抱える衛生上の問題点としては、以下が挙げられた。

- 学校のフェンスが壊れていたり、穴が開いていたりするためそこから外部者が侵入してごみを散らかしていく傾向がある。フェンスを整備して防ぎたい。
- 校内のごみ捨て場となっているピットについては、市役所の所有するごみのコンテナを学校内に設置してもらうよう申請したが、却下されたため、ピットを定期的に生徒がいない夜などに、焼却してボリュームを減らしている。いっぱいになったら、市役所がごみを引き取りにくるというシステムである。
- トイレの汚物をくみ取る穴にかぶせる鉄の蓋が外部者によって売却目的で盗まれ、そこから土がつもって詰まってしまう。

（4）提言

キャンペーン実施後には、生徒や周辺住民の行動に多くのポジティブなインパクトが確認された。以下に評価結果と視察に基づいて、教訓および所感を述べる。

- もともと France-Amitie 校は、平成 24 年度コミ開無償（ニジェール中学校教室建設計画）の一つのサイトあったこと、さらに親日的な学校長がいたことなどがキャンペーン自体の成功と、正のインパクトの発現に大きく寄与したと思われる。学校でこの種の活動を行うにはには校長の理解がなければうまくいかない。今後他コミューンにも普及させるのであれば、まずはトップである校長の環境衛生に対するコミットの度合いやる気を確認する必要がある。
- また当時の校長は、ニアメ州の中等教育局長補佐に昇格しており、彼が中心となってこの種の活動や美化運動の取組みが他地域にも普及されるようなシステムを構築できるのではないかと思われる。
- Amitie 校内のピットでごみの野焼きが実施されているが、野焼きにより発生する煙にはホルムアルデヒド、アセトアルデヒド、PM2.5 等有害物質が含まれている可能性もあり、これは呼吸困難・頭痛・目まい・手足のけいれん・パニック障害等を起こすという報告もある。これらの被害について理解してもらい、仕方のない場合に限って、有機物（選定ごみや食べかすなど）のみ焼却し、プラスチックごみなどは市に引き取ってもらうか燃やさず埋めるなどの処置を施すべき。
- 水の入ったプラスチック袋などは溶解して、鋳型に入れ固めて道路舗装用のブロックにするというリサイクル会社がニジェール国内に存在すると聞いている。また PET などの硬質プラスチックはペレットにしてガーナに輸出されていると聞く。市のごみ全体量のうち７％はプラスチックごみであり、プラスチックバックを食べた牛や羊・ヤギなどが消化不良を起こし死ぬ原因にもなっていると聞く。プラスチックバックの問題はニアメ市にとって最も深刻な問題であるという意識は高く、プラスチックの使用禁止にかかる法律も制定されているが、法の執行に問題があるとのことである。スーパーでのプラスチックバックを有料化にするとか、エコバックを持参したものにはポイントを付与するなど経済的インセンティブを与える施策の導入なども考えられる。ケニアのようにプラスチックが全面禁止され、輸入や利用が

発覚すると罰金と 4 年間の禁固刑が科せられるとまではいかなくとも、何等かの対応が望まれる。

- この種の活動は、今回 JICA がイニシアティブをとって実施され、イベント実施という観点ではうまくいったと評価できるが、持続可能性や発展性という観点から、本来直接裨益する住民居住区の自治体レベルで行うのが適切である。せめて、市の環境衛生局が収集車や収集人、ガソリンの手配などにかかる費用負担は行い、学校は生徒、コミュニティの動員を担い、清掃器具は自治体所有のものを借り上げるなど将来的には独り立ちできるような体制の構築が望まれる。市は清掃事業の一環としてこのような予算措置をとるべきである。
- 清掃キャンペーンを実施する団体は世界中に存在するが、大きなものとしては World Cleanup Day（毎年 9 月中旬、2019 年は 9 月 22 日一斉開始）がある。セミナーでも当方から紹介したが、186 か国が参加するボランティアとしては世界最大規模のイベントである。ニジェール国内にも WCD のフォーカルパーソンがおり、数か所で参加グループがいたようである。また 6 月 5 日の世界環境デー、4 月 22 日の Earth Day などのグローバルなイニシアティブもある。Niger もこのような機会を利用して、現地主導で清掃キャンペーンを定期的に実施されるよう期待したい。

１.３　住民啓発セミナーの開催

１．３．１　実施概要

（１）　目的

本セミナー実施の目的は以下のとおり。

- 清掃キャンペーンの実施に先立って、他国の清掃活動や廃棄物管理の事例紹介を行い、すべての関係者がごみの排出者として当事者意識を醸成する。
- ニアメ市の都市レベルの廃棄物管理システムの実態や課題・教訓を学ぶ機会を提供する。

（２）開催期間と場所

- 期間：2019 年 1 月 16 日（水）8：15～13：30
- 開催場所：イスタンブールレストランのケベレット会議場

（３）参加対象者

- 清掃・衛生当局者、環境 NGO、中学校校長や教員の代表、生徒代表、地域住民代表、行政官、COGES（学校運営委員会）、UNDP 等他ドナーなど約 100 名

（４）プログラム

住民啓発セミナーのプログラム内容を以下に示す。

Horaires/時間	Activités/活動内容	Responsables/担当
8h15-8h30	参加者の受付	運営側
8h30-8h40	開会の辞	ニアメ市中等教育局長

8h40-8h50	JICA 挨拶	JICA ニジェール支所長
8h50-9h00	環境省挨拶(衛生・環境政策において)	環境省ニアメ州局長 DRE/SU/DD
9h00-9h50	各国の清掃事業及び廃物管理の取り組み事例について	JICA　調査団
9h50-10h10	ニアメ市の清掃・管理状況について	ニアメ市衛生局衛生課長
10h10-10h30	上記2セッションの質疑応答	参加者
10h30-11h00	Pause -café	Organisateurs
11h00-11h20	映像で見るニアメ市の衛生環境(ビデオ上映)	司会;環境省ニアメ州局長
11h20-12h00	上映した映像から見た、課題・対策・を検討し、望ましい戦略を提言	・NGO 代表、・生徒代表 ・住民代表、・校長代表 ・清掃局代表、及び参加者など
12h00-12h20	2018 年3月の清掃キャンペーンの経験から	France Amitié Niger 中・高一貫校校長
12h20-12h30	誓いの言葉 2019 年清掃キャンペーン/きれいな街つくりに向けて	ノルディレ中学校 生徒代表
12h30-12h40	まとめ/閉会の辞	環境省ニアメ州局長

（５）所感

報道関係者の到着が大幅に遅れ、セミナーは 1 時間弱ほど遅れて開始した。当方より「各国の清掃事業及び廃棄物管理の取組み事例」という議題で講義を行ったところ、参加者から多くの質問が投げかけられた。アフリカ国内でもまだまだ最貧国のひとつであるニジェールでは、日本のような先進国が、すでに 3R から 2R（発生抑制と再利用）へと生活様式を変容しつつあるということに対し、半信半疑の意見が多く聞かされ、こうした流れに対し、生産者からは反対は出ないのか？といった素朴な質問が出された。日本人のメンタリティが環境教育や住民啓発を通じて、すでにある程度物質主義から環境配慮主義へと移行しており、そのような意識が生産者のモノづくりにも影響を及ぼすといった説明は、彼らにとって理解しがたいようであった。

このような反応に対しては、私自身も人口の急速に増え続けるアフリカにおいては、廃棄物

の問題は技術だけではなく、法制度整備、関連機関の能力や市民意識の向上など、社会そのものの変化が必要で、それにはある程度の時間が掛かかるのだということを改めて実感した。

全体としては、市の廃棄物管理の現状の説明やビデオ上映があったり、生徒代表から誓いの宣言があったり、死んだ牛の胃袋を解体して取り出されたプラスチックバックの実物の披露があったり、限られた時間に盛り沢山の内容が参加者と共有され、セミナーによるインパクトは大きかったように思う。

１.４　清掃キャンペーンの実施

１.４.１ 実施概要

（１）目的

本キャンペーン実施の目的は以下のとおり。

- ニアメ市 5 区のノルディレ中学校の学生が、清掃キャンペーンに参加することにより、ごみに対する意識改善が促される。
- 学校を拠点として、清掃活動を地域コミュニティーにアピールすることで、地域の美化意識の向上を促す。

（２）開催期間と場所

- 期間：2019 年 1 月 17 日（木）8：10～13：00
- 場所：ニアメ市 5 区のノルディレ中学校校庭及び周辺コミュニティ

（３）参加対象者

- ニアメ市 5 区のノルディレ中学校（生徒数約 700 名）の教員と生徒、及びその周辺の地域住民

（４）プログラム

清掃キャンペーンのプログラム内容を以下に示す。

時　間	内 容	担　　当
8h10-8h30	受付開始及び開会準備	執行委員会
8h30-8h40	歓迎の言葉	ニアメ市第 5 区教育長
8h40-8h50	挨拶	ノルディレ中学校校長
8h50-9h00	挨拶	JICA ニジェール支所長

9h00-9h15	スケッチ（寸劇）	ノルディレ中学校生徒
9h15-9h30	清掃キャンペーン開始の挨拶	ニアメ州知事
9h30-9h45	清掃活動開始宣言	区役所関係者
9h45-10h15	周辺の行進・清掃（学校内外）	教員・生徒・父兄・地域住民
10h15-13h00	清掃活動	参加者全員

（５）所感

前日のセミナーと同じく、報道関係者の到着が一時間ほど遅れ、州知事など VIP を長時間待たせたままであったため、改善の余地があると思われる。

オープニングでは、生徒による「ごみのポイ捨て禁止！」などの啓発用寸劇も披露され、会場を沸かせた場面もあり、ニジェールならではの和やかな雰囲気で進められた。清掃作業実施前には、鉄製のごみ箱 30 個、一輪車、ほうき、ごみばさみ、熊手、背負いごみ箱などを学校に贈呈し、その中には本邦より調達した軍手 480 組も含まれていたが、全員には渡らなかったため取り合いになる場面も見うけられ、苦労して持ち込んだ甲斐があった。

ノルディレ中学校は、生徒数 700 名のうち女生徒の占める割合の高い学校であったが、清掃態度は前回のキャンペーン実施校と比べると熱心ではなかったとのことである。これはおそらく校長や教員たちの主導力がそれほど高くなかったからではないかと思われる。その一方で、先のセミナーでも大活躍した環境省ニアメ州局長 Coullbaly Adamou 氏は、大変熱心で廃棄物管理にかかる知識も豊富であり、清掃キャンペーンでも主導力を発揮していた。今後廃棄物管理分野におけるキーパーソンになると思われるため、積極的に訪日研修や ACCP 関連の研修などへの参加を促すことが期待される。

現地で開発されたごみばさみについては、長さがかなりあるため先端の噛み合わせが悪いこと、鉄製であるため重いこともあって、体の小さな低学年の学生には少し使い勝手が悪いようであった。

また清掃実施時に特に気になった点は、子供たちがごみと一緒にかなりの量の砂や石なども集めていた点である。これは環境省からの聞取り調査結果からも全ごみ量中砂の占める割合が 50%（OXFAM によるごみ量ごみ質調査、2013 年）という結果からもうかがえるとおり、住民が砂などもごみととらえているという事実の現れであるといえる。砂漠面積も広く、未舗装道路も多いため、一般の街路清掃などをする場合も砂の割合が高くなるというのは否めないが、これは市のごみ収集サービスにもかなりの負担をきたしていると予想される。砂はごみではないので集めなくてもよいというような住民教育も必要ではないかと思われる。

１.５　「アフリカ廃棄物管理環境教育ガイドブック」にかかる意見聴取

「清掃キャンペーン」に関わった関係機関のうち、ニアメ市において積極的に住民啓発を実践しているNGOであるAssociation Nigérienne des Scouts de l'Environnement - ANSENに対し、聞き取り調査を実施したので、以下にその概要について述べる。

１）ANSENの実績、活動内容について

1993年に設立されたNGOで、ボランティアベースの主要メンバーは20名程度であるが、全国に会員を擁する。資金源は、主に会員費であるが、BAD（African Development Bank）や大統領のファンドなどからイベント毎に補助金をもらっている。主な活動のひとつは、学校での環境教育で、現在市内の３校（Gawaye、Vineta、Mariama 校）で定期的に環境教育の授業を行っている。そのうちのMariama校では、2008年から環境教育（あるいは理数科教師？）の環境教育隊員が派遣されていたようで、彼女もANSENの活動に深くかかわっていたとのこと。

学校では“Women and Environment”という名前のクラスの中で、リサイクル工作、プラスチックバックを使った裁縫やキーホルダーづくりなどを教えている。授業は、理論と実践に分かれており、理論では、環境とは何か、住環境をどうやって保護するかなどについて教えている。理論を学んだ後、実践で、清掃活動、学校菜園、リサイクル工作などを教える。学校ではプラスチックバック、缶、紙の3つがメインのごみであるため、特にこれらを使ってReuseを推進している。プラスチックバックは苗床入れとして使用し、校内で有機肥料を使って育苗している。子供たちが学校で学んだことは家庭でも実践し、普及するよう促している。フィールドトリップも過去に数回実施した。子供たちを国立公園に連れて行ったり、プラスチックバックのリサイクル工場を視察したりもした。

学校でのクリーンアップキャンペーンも実施したことがあり、その場合の資金は学校が準備し、集めたごみを運ぶ収集車や人は市役所が負担した（たまに燃料代を請求されることもある）。またその他の参加者の動員は、主にフェイスブックを活用している。

各クラスには Environmental Club があり、掃除のリーダーも任命されている。このリーダーはEnvironmental Clubのメンバーの一員でもあり、学校の清掃の評価も担う。

２）学校以外での住民啓発活動について

女性グループに対し、プラスチックごみを回収して、それらから新たな製品（植木鉢、装飾品、小物入れ、キーホルダー等）をつくる支援をしている。また彼女たちをグループに分け、清掃ユニットをつくり、定期的な清掃活動もおこなっている。今現在３つのユニットしかないが、今後拡大普及させていきたいと考えている。

３）他機関との連携状況について

上の女性グループとの活動は、女性支援の NGO と協力して実施している。ニアメ市環境衛生局からは、学校の授業に対しても技術的支援をもらっている。特に環境省ニアメ州局長のCoullbaly Adamou 氏には積極的に講義をしてもらったり、清掃キャンペーンに参加してもらったりしている。

４）既存の環境教育教材について

手本となるような環境教育教材がないため、カリキュラムはほぼ手作りで、理論を教える際もプロジェクターがあるわけではないため、口頭での説明がメインである（環境教育ボランティア活動ハンドブックの仏語版を紹介したところ、是非参考にしたいということで電子ファイ

ルを提供した)。ACCP ガイドブックが出来上がったら、是非共有してもらいたいとのこと。

５）活動を実施するにあたってあればよいと思う教材について

環境保全全般について説明する教科書やごみの危険性、管理の仕方、リサイクルなどを説明する Visual Aids やポスターがあればよい。Visual Aids はインパクトも強く、記憶に残りやすいため活用したいが、現在活動している３校のうち１校にしかプロジェクターがないという問題もある。

６）分別の推進について

試験的に３校のうちの１校で、プラスチックと缶の分別用のごみ箱を設置している（学校の予算で設置）が、なかなかうまくいかない。ただ分別してもリサイクルする受け入れ先がない。これに対して当方からは、プラスチックバックのリサイクル会社などは市内に存在するので、ある程度量がたまったら学校に引き取りに来てもらい、売った売却益（キロ当たり 500CFA）は学校の修繕費や文房具購入などに充てるというようなシステムの構築などを考えてみてはと提案した。

７）その他の課題

とにかく学校で環境教育を教える教材がない。またせめて、学校では各クラスに 1 個のごみ箱の設置が必要である。市役所の収集車がごみを運搬する際に一杯で溢れそうになったまま街中を移動するため、ごみをちらかしているのも問題である。

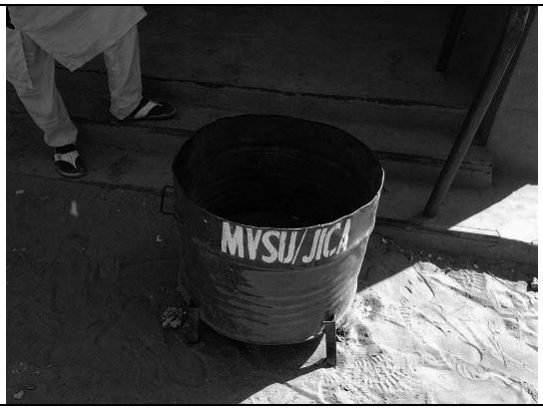
１.６　事例紹介の原稿作成

「アフリカ廃棄物管理環境教育ガイドブック」のコラム作成については、支所に内容詳細確認のうえ、後日提出。

１.７　関連写真

以下に本調査にかかる関連写真を示す。

Amitie 校のきれいな校庭



JICA で供与されたごみ箱＠Amitie

各クラスにある掃除当番表@Amitie

Amitie 校にあるごみのピット

校庭には以前はなかった花壇が設置@Amitie

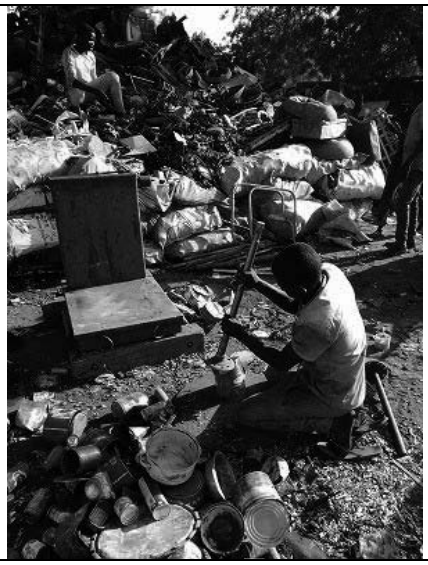
熊手はほぼ全て壊れ使用できない@Amitie

ニアメ市内のスキップポイント

市内の不法投棄場所

市内のジャンクショップ

アルミ缶は地面に敷いて通る人の足で圧縮



ジャンクショップでの危険な圧縮作業も手作業

スロープのある市内の中継地点（使い勝手が悪い）

排水路につまるごみ

市内の不法投棄場所（タイヤが黒炎を挙げて燃え、牛や羊がごみを漁っている）

市役所が収集したごみを捨てるが、市によって管理されていないダンプサイト

住民啓発セミナーの様子

死亡した牛の胃袋から抜取られたプラスチックバックを披露@セミナー

ごみアートの披露@セミナー

山形所長の清掃キャンペーン開会スピーチ

ニアメ州知事による挨拶

清掃器具の供与

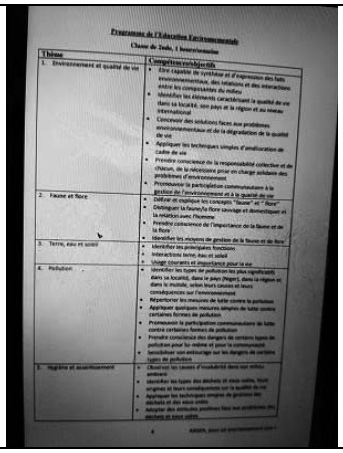
ノルディレ校生徒によるポイ捨て禁止宣言

キャンペーンでのごみ拾いの様子

市の清掃車による拾ったごみの運搬

環境 NGO ANSEN のオフィス

ANSEN の推進するリサイクル工作

	
ANSEN の推進するリサイクル工作	手作りの環境教育カリキュラム

添付資料

1）ニジェール国廃棄物管理プロファイル（聞き取り調査により情報補足）

2）ニアメ市廃棄物管理プロファイル（聞き取り調査により情報補足）