

Waste Sector CDM – Potential Opportunities for Pacific Island Countries

The Pacific Islands

The PIC's are spread over 30 million square kilometres of ocean with their exclusive economic zones encompassing over 310 million square kilometres of water, but their combined land area is around 530,000 square kilometres. Even though the Pacific region is spatially large, most of it comprising the gigantic Pacific Ocean, it is extremely small in terms of actual land area and total population. With an aggregate population of approximately 10 million, this region is the smallest in terms of people. Behind this broad picture lies considerable diversity of size, resources, culture, economy, polity and social development.

Pacific Waste Management Issues

Some characteristics of the Pacific Island countries are that the dependence on imports is high, they are remotely located, and the population is concentrated in urban areas. In each of the countries, a number of problems have been emerging along with changes in the socio-economic conditions in recent years, including an increase in the amount of waste (in the amount generated as well as changes in the nature of the waste); illegal dumping (in back yards, mangroves and lagoons); inadequate management of landfills and difficulty in acquiring more land for landfills; increases in the imports and disposal (abandonment) of used cars; lack of adequate handling of medical (contagious) and hazardous waste (persistent organic pollutants); poor economic viability of recycling (small market, difficulty of transport); and contamination of groundwater and seawater from waste and domestic effluent.

Pacific Waste Types

The waste types in the Pacific Island Countries typically include:

- Municipal Waste (including solid waste and wastewater)
- Industrial waste (including manufacturing)
- Hazardous wastes
- Construction and Demolition Waste
- Mining Waste
- Waste from Electronic and Electric equipment
- Packaging Waste

- End of Life Vehicles (ELV's) and Tires
- Agricultural wastes

Municipal Waste

Source- generated by house hold, commercial activities and other sources whose activities are similar to those of households and commercial enterprises. It does not include other waste arising from mining, industrial or construction and demolition processes.

Content- mainly made up of residual waste, bulky waste. Secondary materials from separate collection (e.g. paper and glass), household hazardous waste, street sweepings and litter collections. Mainly paper, cardboard, metals, textiles, organics (food and garden waste) and wood. –

Quantity - between 1998 2001 the Pacific in general was producing 0.66kg of waste per person per day. Over 60% of this amount was biodegradable and most of it was ending up in waste disposal facilities.

Industrial Waste Waste

Source and Contents - Manufacturing industry waste comprises of many different waste streams arising from a wide range of industrial processes including production of basic metals, food, beverage and tobacco products, wood and wood products and paper and paper products.

Hazardous Waste

Source arises from wide ranging sources including households, commercial activities and industry. Content represents ~1% of all wastes generated in Pacific. Wastes are classified as hazardous depending on whether they exhibit particular characteristics. –

Management Routes Main disposal for hazardous wastes is currently landfill, incineration and physical or chemical treatment. A small but significant portion of hazardous wastes is recycled or burned as a fuel. ESM treatment mechanisms are expensive. Environmental Relevance represents a potential risk to both human health and environment. Legislation usually requires special management arrangement to ensure it is kept separate and treated differently to non-hazardous waste.

Construction & Demolition Waste

Made up of two components

- Construction waste
- Demolition waste

Arises from activities such as construction of buildings and civil infrastructure, total or partial demolition of buildings and civil infrastructure, road planning and maintenance. In some countries land levelling are regarded as construction and demolition waste.

No accurate data currently exist for the Pacific but Construction and Demolition Waste makes up about 25% of all waste generated in the EU. A major proportion arising from the demolition and renovation of old buildings and consists of concrete, bricks, wood, glass, metals, plastic, solvents, asbestos and excavated soil many of which can be recycled.

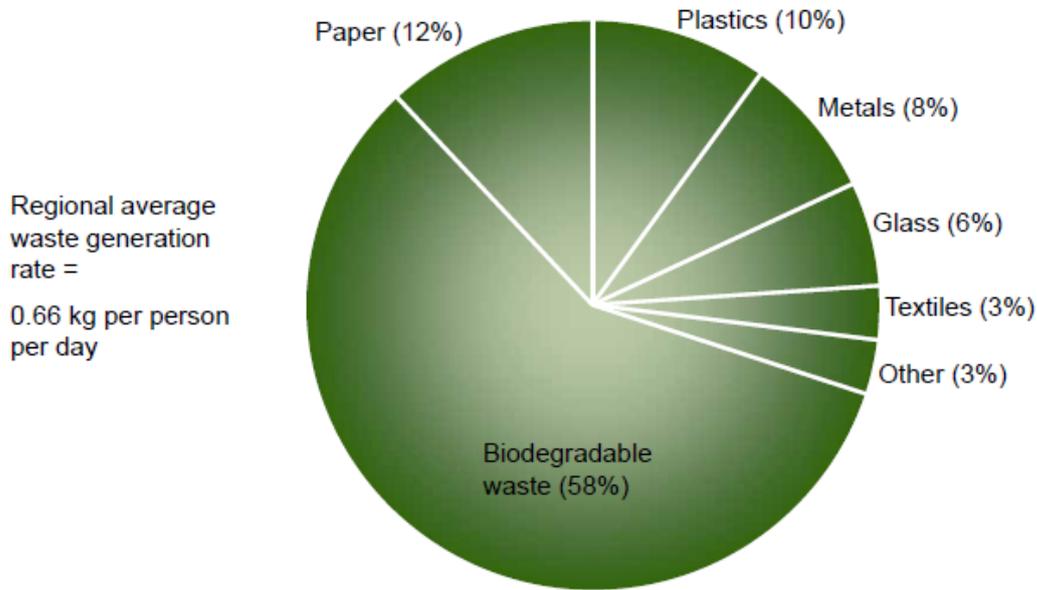
Mining Waste

A few exist in the Pacific region especially in the Melanesian region (Fiji, New Caledonia, PNG, Solomon Islands and Vanuatu). Source arises from prospecting, extraction, treatment and storage of minerals. Quantity and Content Mining and quarrying activities gives rise to the single biggest waste stream (29%) of waste generated in developed countries approximately 50% of extracted material becomes waste. Mainly made up of top soil, waste rock, tailings which may include water, chemicals and portions of the material.

Agricultural Waste

This type of waste is composed of organic waste (animal excreta in the form of slurries and farmyard manures, spent [mushroom] compost, soiled water and silage effluent) as well as waste such as plastic, scrap machinery, fencing, pesticides, waste oils and veterinary medicines. Quantity No estimates are available at present. Management Routes Spreading waste on land, anaerobic digestion and composting. The other solid waste is usually landfilled.

Typical Solid Waste Composition in Pacific



Source: S.C. Raj (2000), *Solid waste education and awareness in Pacific Island Countries*, Pacific Regional Waste Awareness and Education Programme, SPREP, Apia.

CDM Opportunities in Waste Sector

The waste sector is not a major contributor to climate change: waste management activities generate ~ 3% of worldwide GHG emissions. But there are a number of possible actions to reduce these emissions.

Several opportunities exist for development of CDM projects under waste sector which includes but not limited to:

- Rationalising the collection operations
- Adopting alternative transportation for collection
- Using alternative fuel for waste collection vehicles
- Waste heat recovery from waste treatment process
- Recovery of by-products such as ash & slag
- Capture and utilisation of landfill gas
- Development of new recycling techniques and opportunities
- Composting of waste through aerobic process and manure production
- Capture and utilisation of methane from anaerobic digestion of sludge from wastewater treatment

Solid Waste Management in Pacific

Solid waste has been recognised as a problem for the Pacific Islands for many decades but it is only in the last ~10 years that significant progress has been made in addressing the issue. One of the main driving forces for this progress has been the development of the Regional Solid Waste Strategy.

Priority concerns for the region include sustainable financing, integrated waste management, legislation, education and awareness, and capacity building. Two other aspects that is proposed to be targeted, particularly from an international perspective are technology transfer and private sector engagement and support.

Solid Waste Management & CDM

Waste management is one of the potential sectors under the Clean Development Mechanism. Suitable technologies which are potential as both CDM activities and waste management options are composting, incineration, LFG capture/ avoidance, methane capture & utilisation from sewerage etc.

Under CDM, waste management projects lead to both environmental protection, healthier community and income generation through the selling of carbon credits. Capture and utilisation of biogas from landfill will also benefit in terms of renewable source of energy and associated economic benefits.

Landfill Projects under CDM

In order to qualify, it should be well planned and constructed. The amount of waste dumped should be known. If possible, sorting of waste should be done to ensure that the dumped waste is largely composed of organic matter.

Landfills are an efficient, proven and cost effective method of disposing organic wastes without releasing greenhouse gases. In a well-managed landfill, Biogas is likely to be produced over a period of 20 or 25 years.

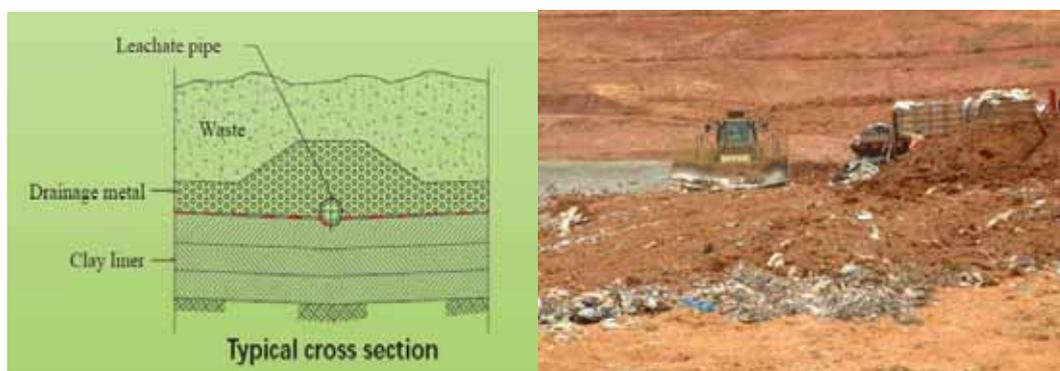
Potential CDM Project Example - Naboro Landfill, Fiji

The Naboro Landfill is a project of the Fiji Government, funded by the European Union and the Government of Republic of The Fiji Islands. The site was officially opened by The Prime Minister of Fiji, Hon. Laisenia Qarase and His Excellency Dr. Roberto Ridolfi from the Delegation for the European Union for the South Pacific on the 2nd of August, 2005. The site is operated by HG Leach (Fiji) Limited, as wholly owned subsidiary of H.G. Leach & Co. Ltd, Waste managers, Quarrymen and Contractors of New Zealand.



The Naboro Landfill is located on an ideal site, well away from central Suva and properly screened behind a natural barrier and not clearly visible from Queens Road. The location of this new landfill is a vast improvement from the old Lami dump site located at the entrance to Suva, within the mangroves on the foreshore. The old site was an eyesore and posed a high risk to the surrounding community. By comparison, the Naboro Landfill is engineered to a high standard to contain leachate which is the liquid residue produced by decomposing organic waste. The compacted clay liner and leachate collection system prevents leachate permeating down into the underlying ground water or nearby rivers or the sea as was the case at Lami. A high standard day to day operation ensures proper placement and compaction of the waste, along with daily cover and intermediate capping layers which minimise the fire risk and helps minimise odour issues, windblown refuse, vermin along with uncontrolled discharge of landfill gas.

The landfill site infrastructure comprises: gate office, a certified weighbridge providing accurate measure and charging of all waste coming to the site, an administration block, workshop and main access roads along with the first stage protective clay liner, associated leachate drainage and treatment, stormwater control systems and soon a bin washing facility will be added for washing down bins used to carry special and odorous waste.



CDM Potential for methane capture & utilisation:

- Average quantity of MSW dumped per year since 2005 : 50,400 tonnes
- Data is not available for the composition of waste
- Sampling & analysis of MSW dumped need to be carried out using appropriate techniques to determine the average waste composition
- Waste composition (based on IPCC 2006 guidelines default values for Pacific countries):
 - Food: 60%, Paper/Card board: 6%, Wood: 2.5%, Textile: 1.5%, Inorganic/other: 30%.

CDM Assessment:

- CDM sectoral scope
 - Waste handling and disposal - 13
- Scale of project
 - Small Scale
- Source of emission reductions
 - Methane recovery and flaring/electricity generation from landfill gas capture
- Baseline scenario
 - venting the methane generated in landfill into atmosphere.
- Approved baseline methodology
 - Type III.G – Landfill Methane recovery (III.G./Version 6) and AMS ID – Grid connected renewable electricity generation (Version 17)
- Preliminary estimate of emission reductions
 - 14,000 – 17,000 tCO₂e

Domestic Wastewater Treatment in Pacific

Sewage is the most significant source of marine pollution in the Pacific region. Overflowing latrines, water seal toilets, septic systems, sewage treatment plants (if any) as well as the complete lack of sanitation facilities in some places. In many PIC's human waste is normally collected in septic tanks at household level and transported to a dump site. The grey water (kitchen/bathing) generally gets mixed with storm water and reaches the sea. Improper sanitation including wastewater treatment is resulting in algae blooms and eutrophication in lagoons, dying reefs, contaminated drinking water wells and outbreaks of gastro-intestinal disease and cholera.

Kinoya Sewerage Treatment Plant GHG Emission Reduction Project

The CDM project details are available in the PDD submitted to UNFCCC for registration at:

<http://cdm.unfccc.int/Projects/DB/TUEV-SUED1299488431.41/view>

Recommendations

- Significant opportunities exist for developing SSC projects under waste sector in Pacific Island nations
- Potential projects include:
 - Methane recovery and utilization from landfills & wastewater treatment – anaerobic decomposition - Electricity & Gas
 - Methane avoidance – aerobic treatment – composting/aeration of landfills – Soil Fertilizer
 - Naboro landfill if developed as CDM project will be ‘first of its kind’ in Pacific and can be a role of model project.