Solid Waste Management in the Pacific
Papua New Guinea Country Snapshot

BACKGROUND

Papua New Guinea (PNG) covers a land area of over 450,000 square kilometers (km^2). Approximately 12.5% of its 7.16 million people live in urban areas. In 2012, the per capita gross domestic product of PNG was estimated at 4,500 Kina ($1,629).[1] Port Moresby, PNG's capital city, which is the focus of this study, is located on the southeastern coast on the Gulf of Papua. It has a geographic area of about 90 km^2, and a population of around 400,000.[2]

TECHNICAL ASPECTS

Waste Generation and Composition

Reliable data is not available on the amount and composition of municipal solid waste (MSW) in PNG. However, going by the average for all Pacific island countries, it may be inferred that PNG's per capita household MSW generation rate could be about 0.45 kilograms (kg) per person per day. It varies in different parts of the country based on GDP, urbanization rate, and other factors. In Port Moresby, Lae, and other cities, MSW generation rates are likely higher, and probably considerably lower in rural areas.

Assuming this average MSW generation rate and the current population, the national household generation is over 3,000 tons per day, or over one million tons per year. From 2012 until 2030, assuming nominal per capita generation and population growth, PNG is expected to generate in excess of 20 million tons of household MSW. On the composition of PNG's MSW, although national data is not available, information from other Pacific island countries indicates that it is likely to contain significant proportions of organic material (possibly up to 60%). Port Moresby likely generates about 135 tons per day of household MSW, equivalent to over 50,000 tons per year.

Waste Collection and Transfer

A total of 36 private contractors operate the MSW collection system of Port Moresby, under arrangements with the Waste Management Division of the National Capital District Commission (NCDC). The contractors include 11 for household waste; 11 for public markets; 8 for settlements; 3 for schools; and one each for commercial waste, for sanitary waste, and for MSW of medical institutions. MSW is collected twice a week on average, with contractors providing their own equipment and labor. Most contractors use small, open-topped vehicles for the collection of wastes. Some contractors also collect commercial MSW, although many commercial generators either contract alternative private haulers or haul their MSW to the disposal facility themselves. The geographic area served by the system is large, but there are no transfer stations. Records of collection coverage and collection efficiencies are currently unavailable.

Regulations require household and commercial generators to provide suitable storage containers for their MSW. In reality, however, many containers are unsuitable. Many households place their MSW for collection on raised metal stands to isolate wastes from scavenging animals; but many of these stands are untidy, with waste scattered on the ground. Other common containers include oil drums that are frequently used in public areas. However, the containers are often left uncovered, exposing the wastes to vermin and the elements, and causing the bases of the drums to rust. Wheelie bins have been provided to selected communities in the city, but are not widely used. There are legal provisions that prohibit illegal dumping, including the imposition of fines. Despite this, illegal dumping and burning of waste are common due to the lack of public awareness and education, adequate waste collection services in certain areas including the city's large informal settlement areas, and insufficient funding for adequate enforcement; and the relatively low level of fines imposed.

1 ADB. 2013. *Key Indicators for Asia and the Pacific 2013.* Manila.
2 Global Cities Research Institute. http://global-cities.info/placemarks/port-moresby-papua-new-guinea

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Waste Disposal

Although uncontrolled dumpsites and dumping grounds are reported to exist within the city limits, the only official municipal disposal facility for the disposal of the city's waste is the Baruni dumpsite. Commencing operations several decades ago, the dumpsite comprises open dumping of piles of wastes within a confined, relatively narrow valley on the city's outskirts. The facility is unfenced, although government workers are employed to maintain security and order. The dumpsite lacks engineered environmental protection systems, such as for basal lining or leachate and landfill gas collection. The wastes are completely uncovered, and exposed to the elements. Scavengers scour the waste mounds to recover recyclable materials, and set fire to the wastes to extract metals from waste components—both extremely dangerous practices. The internal haul roads are poorly maintained, and the waste placement methodology is disorganized.

The dumpsite represents a significant risk to the environment and to human health. Increasing criminal activity e.g., carjacking, also takes place at the site. It is most likely polluting the adjacent environment through leachate and landfill gas emissions. It also presents a public health threat to humans through direct waste contact, and potentially through the ingestion of polluted groundwater from the facility. The government fully recognizes these deficiencies and has now embarked on a rehabilitation program to improve the conditions. The program, a partnership between the NCDC, national government, and Japan International Cooperation Agency, includes upgrading of the facility, conduct of landfill operator training, and formulation of a solid waste management (SWM) strategy for the National Capital District.

Waste Reduction and Recycling

The government does not implement formal waste reduction or recycling programs. In Port Moresby, there are two commercial recycling operators that collect, process, store, and containerize and ship nonferrous metals to foreign ports. Recyclable nonferrous metals and used batteries are exported to Australia, the Republic of Korea, and Singapore. Informal, household, and community recycling is also practiced, including the use of food waste as animal feed; and reuse of materials of perceived value, such as plastics. Scavengers work in dangerous and unhealthy conditions at the city's Baruni municipal dumpsite and other dumping grounds by sifting through piles of garbage to segregate and recover recyclables from the wastes.

Medical Waste Management

The Department of Health (DOH) is responsible for medical waste management. There are 19 public hospitals in PNG that operate a color-coded bag system for the collection, storage, and transfer of medical wastes: green (general waste), pink (radioactive waste), and red (hazardous chemical waste). Containers are also provided for the safe disposal of sharps. The incinerators installed at the public hospitals are old and many have ceased to function; their replacement and proper operation are being hampered by lack of funding. The incinerator at the general hospital in Port Moresby has not functioned for several years, resulting in all medical wastes being buried in pits without treatment—an extremely dangerous practice. Two replacement incinerator units are to be commissioned, to be located at the existing Baruni facility subject to local acceptance.

INSTITUTIONAL ASPECTS

The SWM sector relies on legislative and regulatory documents that contain general waste provisions. The Environment Act (2000) is the primary legislation for environmental protection, implemented nationwide by the Department of Environment and Conservation (DEC). It also empowers the provincial and local governments to develop provincial environmental policies and bylaws on environmental issues, including SWM. A key mandate of the act is the formulation of policies, including a national SWM strategy and associated regulations. The DOH implements the Public Health Act (1973) and Public Health (Sanitation and General) Regulation. The regulation includes provisions related to health, sanitation, cleaning, scavenging, and waste disposal; and fines for illegal dumping practices. The Organic Law on Provincial and Local Level Governments (1995) empowers provincial and local governments to formulate SWM policies, legislations, and bylaws. The National Capital District Commission Act (2001) provides for public welfare protection.

The existing regulatory framework, however, lacks a single legislative document to provide for effective planning, management, and operation of the SWM sector. The NCDC lacks adequate policies and guidelines to provide for effective operation of the sector in cities. Recently, a waste management policy has been drafted to provide guidance in the sector and delineate stakeholder responsibilities, but the policy is yet to be implemented. PNG was one of several Pacific island countries to adopt the Solid Waste Management Strategy for the Pacific, which was published in 2006 and endorsed by member countries in 2009.

Three institutions are involved in SWM. The DEC is the lead agency for planning, coordination, and formulation of national legal and policy frameworks for environmental protection. It is vested with powers to protect water, air, soil, and biodiversity; and assure the sustainability of natural resources. It is obligated to control waste disposal, evaluate environmental plans, and monitor the enforcement and

compliance of environmental legislation. It is also the lead agency in the development of an SWM legal and policy frameworks. The NCDC legislates and manages the SWM sector in the National Capital District. The Waste Management Division of the NCDC implements these functions, which include the management, collection, and disposal of MSW. However, the division lacks the capacity to implement many of its functions, including SWM strategic planning, waste characterization assessments, and overall recording and reporting of detailed SWM operational data. The DOH is responsible for medical waste management, including the formulation of laws and policies; and the collection, treatment, and disposal of medical wastes.

Historically, the NCDC has been directly providing municipal collection, transfer, and disposal services for the city using its own equipment; but only supplemented periodically with outsourced services. Recently, however, the NCDC outsourced the entire SWM system to the private sector to improve service quality and reduce overall costs. Initially, they operated under contracts that clearly defined their scope, specifications, and performance standards; and were engaged in accordance with accepted procurement procedures. Formal contracts have now ceased to be issued, resulting in the contractors operating and being paid without proper contracts, and in the absence of conventional procurement procedures.

FINANCIAL ASPECTS

As a part of its annual budget, the NCDC funds the city's municipal SWM services through internal revenue sources, such as land tax, licensing fees, and SWM tariffs; the national government does not provide any funding for the city's SWM sector. The annual SWM budget allocation for 2012 was 10.4 million kina (K), equivalent to about $4.05 million. In addition to this, SWM tariffs are also established for residential areas, currently at a rate of K33.00 ($12) per month for an 80-liter waste storage bin, paid quarterly. Tariff collection efficiencies are low; in 2009, a total of K10.149 million was billed, although only K5.320 million was actually collected. Only residents of titled properties pay SWM tariffs in conjunction with their annual land rates. A significant population of the city lives in unplanned settlements, and many of these residents do not use the municipal service or pay the tariff. A tipping fee is charged at the Baruni dumpsite, currently set at K52.00 (around $19) per truck, but the collection efficiency of the fees is once again low. As funding for the SWM system is provided through the NCDC, the viability of its operation is sustained as a government responsibility. Due to the low collection rates for MSW tariffs and tipping fees, the NCDC appears not optimizing its system revenue potential, which may be possible once the system is improved. On expenditures, the lack of written, formalized contracts with private sector waste collectors requires immediate rectification.

Baruni disposal site

Photo by N. Allen

PUBLIC AWARENESS

There is a general lack of awareness and education about environmental and SWM issues. Interviews with the public confirm this. Consumers still burn their wastes or dump it; household segregation is virtually absent except for food waste, nonferrous metals, and other ad hoc items of perceived value. Many consumers are not even served by the municipal services; and where they are, the satisfaction level is often marginal. Although the DEC and NCDC implement rudimentary public awareness programs, more funding and resources are required to improve and expand these programs, and for better coordination among them. A public awareness program is being implemented by one of PNG's commercial banks as a corporate social responsibility initiative. Aptly named the "Go Green" program, it educates people to be responsible for their own waste and to dispose of waste appropriately. Its activities include cleanup drives, funding support to community and institutional groups for waste collection programs, and raising awareness in schools and communities.

CONCLUSIONS AND RECOMMENDATIONS

The SWM system in Port Moresby is incapable of serving the needs of this rapidly expanding international capital city. Its residents have little awareness of, and engagement in, environmental protection and SWM opportunities and challenges; or in practices, such as sustainable waste segregation. Recycling is a virtually unknown concept; and waste collection is sporadic and inefficient. Although a regulatory framework exists, it is insufficient to properly guide and regulate the SWM sector. Institutions lack funding, and there is a crucial need to modify and regulate the practices of waste collection contractors active in the sector.

National and provincial governments now fully recognize the needs, challenges, and opportunities facing the SWM sector. The national government has affirmed its intention to develop and implement sector reforms, and to progressively invest in the sector to improve performance. In this context, and based on discussions and analysis of the sector, several key actions are suggested nationwide, and for Port Moresby in particular.

The formulation of a national SWM strategy is an essential initial step in guiding sector developments. Such a strategy would define the sector's goals and objectives, guiding principles and strategic options, and phasing of physical investments and sector support programs. Strategy formulation should follow consultations with a wide range of stakeholders, and provide for inclusive and equitable development throughout the country. Emphasis should be placed on rationalizing private sector involvement, and promoting informal community-based SWM programs.

The next step recommended after strategy formulation is that legislative reforms be put in place, which should include the formulation of a national law on waste and implementing regulations, with the rationalization of existing laws. In parallel, it is necessary to dramatically strengthen the technical capacities of, and increase the funding for, the DEC, DOH, NCDC, and other national and provincial institutions involved in SWM provision, to enable them to better implement and regulate the sector.

On the Port Moresby SWM system, many stakeholders agree that dramatic and immediate reforms are necessary in virtually all parts of the physical system. The reforms include the financing, management, and regulation of operations in the entire sector. The crucial needs in Port Moresby are to:

(i) formulate a city SWM plan to guide sector investments and support initiatives;
(ii) improve public awareness to educate consumers on basic SWM responsibilities to reduce illegal waste dumping and gradually introduce the concepts of waste minimization and recycling;
(iii) initiate a sustainable recycling subsector, including the promotion of, and support for, household segregation and informal sector recycling, which have been successful in other parts of Asia;
(iv) improve and rationalize privately operated waste collection system, with appropriate procurement, contracting, and operational monitoring and regulation procedures in place toward efficient, transparent, and reliable municipal waste collection services with full city coverage;
(v) continue the remediation program at the Baruni dumpsite as a short-term response to this serious issue, while in the longer term, develop a replacement sanitary landfill facility for Port Moresby, designed to international standards, and with capacity to accommodate the city's MSW; and then close the Baruni facility and analyze alternative waste processing technologies, including waste-to-energy systems that may be of relevance to the city;
(vi) rationalize SWM financing and cost recovery modalities, including the proper enforcement of tariffs and consideration of alternative financing mechanisms, such as import tariffs and recycled material redemption schemes; and
(vii) provide support to the Waste Management Division of NCDC to successfully plan and implement the required transformation of the SWM system, including strategic planning, contract procurement and administration, performance monitoring, financial and tariff management, public awareness, and operational management of the system.

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