

Solid Waste Management Country Profile

Federated States of Micronesia

BACKGROUND

The Federated States of Micronesia (FSM) consists of four states, Pohnpei, Chuuk, Kosrae, and Yap, and covers an area of 700 square kilometers. The capital, Palikir, is located in the state of Pohnpei. According to the 2010 census, the total population of the four states in that year was 102,843, of which 36,196 were in Pohnpei, 48,654 were in Chuuk, 6,616 were in Kosrae, and 11,377 were in Yap¹. Gross national income (GNI) per capita in the FSM was estimated at USD 3,400^{2,3} in 2018. While export value reached only USD 136.5 million, import value was USD 653.3 million⁴, indicating that the FSM depends upon imports for most of its necessities, and the trade balance is constantly in the red.

INSTITUTIONAL ASPECTS

The FSM has three administrative layers: national, state, and local government. At the national level, the Department of Environment, Climate Change and Emergency Management (DECEM) is responsible primarily for drafting national environmental policies and coordinating among state environmental departments. Actual waste management is carried out by the state agencies in each state based on the state codes.

State of Yap

The following are major regulations governing waste management in Yap⁵:

- Recycling Program Regulations 2014
- Plastic Bag Prohibition Regulations 2014
- Solid Waste Management Regulations 2015
- Hazardous Substance Regulations 2015

Promotion of environmental policy, environmental education, and recycling are carried out by the Yap Environmental Protection Agency (Yap EPA). On the other hand, the operation and management of waste collection, transportation, and disposal are carried out by a private company under the supervision of the Department of Public Works and Transportation (DPW&T). In Yap, a beverage

container deposit scheme has been introduced, and is operated sustainably. A private company commissioned by Yap EPA is responsible for the recycling activities.

State of Chuuk

The major laws related to solid waste management are compiled in the Chuuk State Code as seen below⁶:

- Title 21, Chapter 13: Sanitation Act
- Title 22, Chapter 1: Chuuk State Environmental Protection Act
- Title 22, Chapter 3: Littering Act

As a recent development, the Clean Environmental Act 2018 CSL No.14-18-20, which includes a clause prohibiting plastic shopping bags, was passed at the state legislature in 2018.

Chuuk Environmental Protection Agency (Chuuk EPA) is in charge of environmental policy planning and environmental education, while the Department of Transportation and Public Works (DT&PW) is in charge of waste collection and transportation, and operation and management of the disposal site.

State of Pohnpei

As seen below, the major laws related to solid waste management are compiled in the Pohnpei State Code⁷:

- Title 27, Chapter 1: Pohnpei State Environmental Protection Act
- Title 27, Chapter 2: Littering in Public Places and Premises
- Title 27, Chapter 3: Beverage Container Recycling
- Title 27, Chapter 4: Prohibition of Importation and Use of Single-Use Plastic Bags

Pohnpei Environmental Protection Agency (Pohnpei EPA) is responsible for planning environmental policies, and promoting environmental education and recycling. A private company is responsible for operation and management of the landfill site under the supervision of the Office of Transportation and Infrastructure (T&I). Waste collection and transportation is carried out by each municipality.



State of Kosrae

In Kosrae too, the related laws are compiled in the Kosrae State Code⁸:

- Title 19, Chapter 5: Hazardous Substances and Pollution
- Title 19, Chapter 6: Waste Management and Recycling
- Title 11, Chapter 9: Control of Plastic Wastes

Kosrae Island Resource Management Authority (KIRMA) oversees environmental policy, environmental education, and promotion of recycling. Meanwhile, the Department of Transport and Infrastructure (DT&I) manages waste collection, transportation, and operation of the disposal site. In Kosrae, beverage container deposit scheme has been introduced, and is operated sustainably. A private company commissioned by KIRMA is carrying out the recycling activities.

Solid Waste Management Strategies

State Solid Waste Management Strategies (SSWMSs) have been formulated in each of the four states and approved by their governors⁹. Under these strategies, four common principles have been adopted: i) establish financially sustainable SWM systems with due consideration of “Post 2023”, the end of financial assistance from the US, ii) reduce waste amount through maintaining current practice of using kitchen waste as feed for animals and/or by improving the existing beverage container recycling system, iii) capacity building of human resources for waste management, and iv) Commitment to the clean and beautiful pacific region achieving the clean and beautiful Pacific region.

TECHNICAL ASPECTS

Waste Generation and Composition

In each state of the FSM, about two-thirds of daily waste generated comes from households, while the remaining one-third comes from other sources.

Waste generated in the FSM (tons/day)

State	Waste Generated (tons/day)		
	Household waste	Other sources	Municipal waste total
Pohnpei	30	16	46
Chuuk	8	5	13
Kosrae	5	2	7
Yap	6	3	9

Source: Solid waste management strategies formulated by each state

Based on surveys of current circumstances, waste flows were developed in all states, which quantitatively revealed the actual situation and clarified the issues with regard to waste management. The amount of solid waste generated is highest in Pohnpei at 46 tons per day, followed by Chuuk at 13 tons per day, Yap at 9 tons per day, and Kosrae at 7 tons per day. Since raising livestock (mainly pigs) with kitchen waste as feed is a traditional practice in the FSM that remains common, most kitchen waste is recycled. In each state, approximately 80% of discharged waste is disposed of. It should also be noted that a considerable amount of waste is brought to the landfill sites by residents themselves, which is a characteristic common to all four states in the FSM.

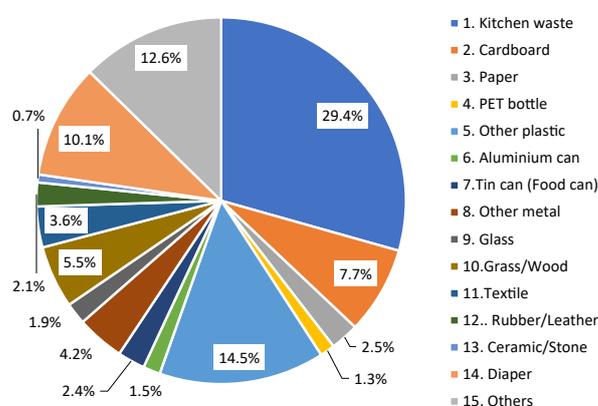
Volume of waste managed by waste management services in the FSM (tons/day)

State	Generated	Discharged	Disposed
Pohnpei	46	30	23
Chuuk	13	10	8
Kosrae	7	5	4
Yap	9	7	6

Source: Solid waste management strategies formulated by each state

The composition of household waste by weight is as follows: kitchen waste comprises the highest percentage at 30%, followed by plastics including PET bottles at 16%, disposable diapers at 10%, and cardboard at 8%.

Composition of Household Waste (weight base)



Source: Solid waste management strategies formulated by each state

In addition, it is impossible to ignore the challenges imposed by some difficult-to-manage types of waste, which are not captured by the waste composition survey for households. The FSM has a significant problem with



end-of-life vehicles, old tires, and dumping of waste on seashores. Discarded heavy equipment is often dumped on reef flats. Although the quantity of such waste has not been fully ascertained, it is a common waste management challenge for many island states.

Waste Collection

Each state of the FSM is actively utilizing various forms of assistance from the Japanese government to acquire waste collection vehicles, covering waste collection costs with the state/ municipality's own financial resources or with collection fees, in order to provide a waste collection service to its residents.

State of Yap

Currently, the waste collection service in Yap is provided only to public institutions such as schools, hospitals, and government offices in the Colonia area through a private company contracted by DPW&T. Waste from other sources in the Colonia area is collected by private collection companies that have contracts with business establishments and households. In addition, Tamil municipality, one of the 11 municipalities on Yap's main island, has set up waste collection stations in individual villages since 2017, aiming to close dump sites run by the municipality itself. A private collection company contracted with the villages has started collecting waste at waste collection stations in return for a waste fee charged to residents. Waste collected by the state government accounts for only 14% of the amount generated and 21% of the amount discharged, which is the lowest collection rate among the four FSM states. As residents often transport waste to disposal sites themselves, the low rate of collection by the public sector does not lead to illegal dumping. However, the relevant state agencies are considering expanding the collection area covered by the government.

State of Chuuk

The state code defines waste management as a role of DT&PW; however, there is no section dedicated to SWM in DT&PW. Garbage collection is provided by a combination of "station collection" and "horn collection." Station collection is a method whereby businesses and residents discharge their waste to a waste collection station installed along the main road in a densely populated area, whereas horn collection is a method whereby the garbage collection truck's horn is sounded to notify the residents of its arrival in an

area where houses are scattered. Garbage collection using both methods provides a good overall collection service, with a public sector collection rate of about 50% of discharge, which is higher than in other states. However, challenges still remain in the eastern half of Weno Island, the central island of the state, where collection services cannot be provided due to poor road conditions and no waste collection fee is charged. Elsewhere in the state, an even more efficient collection service has started since the Japanese government provided two 4-ton compactor trucks in 2019.

State of Pohnpei

On the main island of Pohnpei, the six local governments (one town government and five city governments) collect municipal waste mainly using 4-ton compactor trucks provided by the Japanese government through grant aid. The collection rate for all six local governments is estimated to be about 20% of waste discharged. The collection systems differ from one local government to another, including regular collection on a fixed day of the week, and paid-for collection, which is provided only to those who have paid the garbage fee. Furthermore, many households are accustomed to storing their waste in their premises until "cleanup days," held several times a year, when no waste collection fee is required. This causes not only public health issues, but also aesthetic issues; thus, waste collection is one of the main areas of waste management to be improved in Pohnpei.

State of Kosrae

Kosrae consists of four municipalities, each of which was supposed to provide waste collection and transportation services to its residents. However, municipalities with fragile finances have been unable to provide regular collection, and illegal dumping has been found in such areas. Following the provision of a 4-ton compactor truck through the grant aid from the Japanese government, the relevant organizations (KIRMA, DT&I, and the four municipalities) held a series of discussions, and with the technical support of J-PRISM II, an Inter-Municipal Collection System (IMCS) was introduced.



The Inter-Municipal Collection System shortly after its introduction (2020)

In order to implement this inter-municipal collection, the state code was revised to make DT&I responsible for waste collection, a financial mechanism was created to share the cost of collection among the state and the four municipalities, uniform collection containers were distributed, and a system was developed to collect waste efficiently. The Inter-Municipal Collection System began in February 2020, and regular weekly collection is now provided to all residents.



Group photo of members of the relevant organizations when the Inter-Municipal Collection System was launched (2020)

Final Disposal of Waste

Three states of the FSM, excluding Chuuk, have set up semi-aerobic landfills, or so-called Fukuoka-Method disposal sites, with the financial support of the Japanese government, and are properly disposing of waste discharged in the islands.

State of Yap

Yap has a state-owned public disposal site built in the

Colonia area with the support of the Japanese government. The landfill site area covers 8,370 m² and is divided into three sections; one is an old section that was used previously, and the other two are newly added sections that were constructed using the Fukuoka Method with the support of the Japanese government. One of the new sections has been in use since 2014, and the water quality of the leachate reservoir is regularly monitored by Yap EPA. For the old section, degassing pipes were installed, and final soil cover was placed over it in 2015 to facilitate safe and stable closure. The new sections were constructed with ancillary equipment such as degassing pipes, leachate collection and circulation equipment, and leachate reservoirs. This disposal site handles 86% of the state's discharged waste and 60% of its generated waste. Meanwhile, several dump sites managed by local communities still remain in Yap; in order to close these dump sites, improvement of collection throughout Yap's islands would be advisable.

State of Chuuk

Since 2016, waste discharged on Chuuk's Weno Island has been disposed of at a waste dump site near the port—commonly known as the Marina Interim Dump Site—due to the closure of a former disposal site. In the state as a whole, 77% of discharged waste and 58% of generated waste is brought to this dump site, but due to restrictions on the use of the site, it is not possible to increase the level of waste any further. Accordingly, the state government has secured 1,600 square meters of landfill area on the former disposal site, aiming to use it as another interim waste disposal site until a new landfill site is developed. Given that construction of a new landfill site is essential to address the waste management issue in Chuuk, an environmental impact assessment (EIA) is currently underway at a proposed site.

State of Pohnpei

In the island of Dekehtik, along the road from the airport to the city, there is a 4-ha public disposal site owned by the state government. The operation and maintenance of the disposal site is carried out by Pohnpei Waste Management Service (PWMS), a private company commissioned by T&I, an agency of the state government. In Pohnpei, 75% of discharged waste and 50% of generated waste is disposed of at this site. Of this waste, 54% is brought in by residents and shop workers themselves, 27% is collected by the city government, and 19% is collected by the private compa-



ny (PWMS). With the technical support of J-PRISM II, this disposal site adopted the Fukuoka Method in 1997, incorporating environmental measures such as the installation of leachate collection equipment and an oxidation pond¹⁰ in the first cell, and started operation. Since the first cell became full in 2018, PWMS used Compact funding from the US to construct a second cell based on the experience it had gained from the first cell, and it is currently using this second cell.

State of Kosrae

Kosrae has a state-owned public disposal site of about 0.6 ha in the village of Tofol in Lelu Municipality. This disposal site was the first in the FSM to apply the Fukuoka Method, and landfilling started in 2009. With the support of the Japanese government, its construction included a gas ventilation pipe, leachate collection equipment, and sewage circulation equipment. As part of the disposal site's management, surface compaction is undertaken several times each month using heavy machinery. Also, the types and amounts of waste, and their origins by types of vehicle, are regularly recorded as a means of waste control.



Aerial photo of the public disposal site in Kosrae (2019)

Recycling

In the FSM, Container Deposit Schemes (CDSs) for beverage containers are gaining ground. A CDS is a system whereby a small extra deposit is added on top of the retail price when eligible beverages are sold. The deposit is partly refunded when the empty beverage container is returned to a redemption center.

The reason that CDSs are gaining ground in the FSM is that the products covered by this system are not manufactured in the states. They are all imported products, and thus it is relatively easy to charge a deposit at the time of import. Among collected containers, aluminum cans are regularly exported owing to their high resource value,

which also contributes to material recycling. However, for other beverage containers (mainly plastic bottles), all the states are experiencing difficulties in securing export destinations due to the sluggish recycling market for plastics.

State of Yap

The Container Deposit Scheme in Yap was launched in 2003 with the support of the United Nations Development Programme (UNDP). Under the state's CDS law, the Island Paradise Recycling Company, which operates a redemption center, has been responsible for recycling activities since the beginning of the system under a contract with Yap EPA. The CDS targets aluminum beverage containers/cans, glass beverage bottles, plastic beverage containers, and cooking oil containers. The deposit is 6 cents per container, of which 5 cents is refunded to the consumer and 1 cent is paid to the redemption center operator as the operating fee and commission. As in other states, it is difficult to secure export destinations for recovered resources other than aluminum cans.



An recycler who operates the redemption center in Yap (2019)

State of Chuuk

In Chuuk, a Container Deposit Scheme existed for specific beverage containers in 1979, even before the FSM gained its independence, but it is no longer operational. Now, with J-PRISM II's assistance, recycling laws are being revised and the Japanese government is supporting the installation of can pressing machines in order to re-introduce the CDS.

State of Pohnpei

The Container Deposit Scheme in Pohnpei was launched in August 2012, based on the related chapter of the Pohnpei State Code, pertaining to the recycling of bev-



erage containers. In 2016, this chapter was amended to make importers pay deposits on import, instead of retailers paying deposits on the first retail sale. Only aluminum beverage cans are eligible. The deposit fee paid by importers is 6 cents per can, of which the refund to consumers who take containers to the redemption center is 5 cents per can, and the remaining 1 cent is paid to Kolonia Town Government (KTG) and Madolenihmw Municipal Government (MMG) as an operating fee. At present, the CDS in Pohnpei is operated in such a way that the redemption center is run by Pohnpei EPA in collaboration with KTG and MMG; however, it will be necessary to consider entrusting the operation of the redemption center to a private company, like in Yap and Kosrae, as described later. Furthermore, KTG and MMG own the redemption center, but it is small and the capacity of its pressing machine is very limited, so beverage containers are accepted only about once every few months. Currently, with the support of Japan, the procurement of a large can pressing machine and construction of a new redemption center are in progress. The new redemption center is being constructed on the premises of the disposal site. The plan is to revise the CDS-related law (to add new target items) and privatize the recycling business in conjunction with the start of operations at the new redemption center.

State of Kosrae

Kosrae's Container Deposit Scheme was started with the support of the UNDP in accordance with the Recycling Program Ordinance enacted in 2007, and is operated and managed under KIRMA's supervision. Kosrae's CDS covers aluminum cans, glass bottles, plastic bottles for beverages, and car batteries. Importers pay a 6-cent deposit per container (USD 4 per car battery). Then products are sold at retail stores for a retail price including the deposit. After the products are consumed, consumers take the empty containers or batteries to the redemption center to receive a refund of 5 cents per container (or USD 3 per car battery). The difference covers the operation cost of the redemption center. In Kosrae, which has the smallest population and economy among the four states, it is very difficult to operate and maintain the redemption center with the difference of only 1 cent. Therefore, the ordinance is currently being amended to set the deposit at 7 cents per container in order to contribute 2 cents per container toward operation costs. As mentioned earlier, it is difficult to secure export destinations for collected resources except for aluminum cans, and they are currently stored in the redemption

center. The beverage container collection rate (total number of refunds/total number of deposits) reached almost 90% each year between 2015 and 2017.



Residents in Kosrae bringing empty beverage containers on the weekly recycling day (2018)

FINANCIAL ASPECTS

The country's economy is highly dependent on financial support from funding based on the Compact of Free Association with the US (US Compact funds). This funding includes the Small Sector Grant (Environment), which has been used for waste management in each state; however, the rules regarding use of the Small Sector Grant were changed in 2019, requiring each state to undertake difficult adjustments.

State of Yap

In Yap, waste collection in the Colonia area had been covered by the Small Sector Grant (Environment) until it was cut back. Now state funding is used for this purpose. On the other hand, private waste collection is carried out on a village-by-village basis in some communities, and the cost is collected from residents as a waste collection fee.

State of Chuuk

In Chuuk (Weno Island), the Small Sector Grant (Environment) has not been used at all for waste collection or the operation and maintenance of the disposal site, and no waste fees or tipping fees have been collected either. Waste collection and the disposal site have been funded by the state's own financial resources, which are still being used today.

State of Pohnpei

Expenses related to the operation and management of



the disposal site (outsourcing costs) had been covered by the Small Sector Grant (Environment) until 2019, however, since the grant became unavailable, funding has been secured from the state government's budget. For waste collection, two municipalities out of six in Pohnpei cover the cost entirely with their own financial resources. Although the remaining four municipalities have a waste fee system, the fee collection rate is very low, and the municipal governments of Kolonia and Sokehs, which are relatively well funded, supplement the waste fee with their own financial resources to collect waste. The other two municipalities provide collection services only for residents who pay the fee.

State of Kosrae

Previously, operation and maintenance costs for the disposal site were partially covered by the Small Sector Grant (Environment), but now the entire budget is covered by the state government. Collection and transportation are funded by the state government's budget as well as contributions from the four municipalities.

CONCLUSION

Securing and maintenance of garbage collection vehicles

Since the life of collection vehicles is relatively short in these islands, where salty wind blows, both proper vehicle maintenance and regular replacement are required. However, it is difficult for the national and state governments to procure vehicles with their own financial resources, so vehicles need to be acquired systematically using grant aid schemes such as those from the Japanese government. It is also necessary to utilize assistance from international donors to provide vehicle maintenance training to enable appropriate maintenance skills to be acquired.

Securing financial resources for waste management (collection and transportation)

From the viewpoint of public health and environmental protection, it is desirable to provide waste collection equally to as many residents as possible. In order to continue or expand regular collection, it is necessary to secure sufficient financial resources, but state and local governments are having difficulty in securing financial resources. In each state, local governments tend to collect waste fees from residents who generate waste, but the collection rate remains low despite the substantial

work required to collect the fees. In order to improve this situation, it would be advisable for the FSM to consider collecting disposal fees from businesses that discharge large amounts of waste and/or levying special taxes on imported products that have a significant impact on the environment. It is necessary to consider methods of securing financial resources that suit the actual circumstances of the country. Furthermore, there is an urgent need to consider measures such as collecting tipping fees from large-scale dischargers who bring their waste to disposal sites themselves.

Management of final disposal sites

In many states, Fukuoka-Method disposal sites have been established with the support of the Japanese government, and efforts are being made to ensure appropriate waste management. At the disposal sites, where waste arrives constantly, it is important to monitor conditions regularly and estimate remaining disposal capacity. Furthermore, all four states of the FSM need to plan for new landfill sites well in advance, as suitable land is scarce.

Continuation of recycling activities

As mentioned earlier, CDSs are widely implemented in many states, but the sluggish recycling market makes it difficult to export resources other than aluminum. Even under such circumstances, continuation of the CDSs remains meaningful in terms of preventing the beverage containers from becoming waste and taking up valuable space in landfill, or ending up scattered around the island. Until the resource market recovers and exports can be resumed, it is essential to store the collected resources in a corner at disposal sites or redemption centers in order to protect the environment.

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¹ FSM 2010 Census of Population and Housing

² World Bank, 2018

³ USD 1 = JPY 104.45 (November 2020, JICA)

⁴ Asian Development Bank, 2018

⁵ <http://fsmlaw.org/yap/index.htm>

⁶ <http://fsmlaw.org/chuuk/index.htm>

⁷ <http://fsmlaw.org/pohnpei/index.htm>

⁸ <http://fsmlaw.org/kosrae/index.htm>

⁹ Pohnpei State Solid Waste Management Strategy 2020–2029

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¹⁰ A man-made shallow pond designed to treat wastewater through various natural treatment systems, such as decomposition using bacteria and uptake of nutrients by plants.

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