



Formulation of State Solid Waste Management Strategy and Action Plan based on waste flow analysis



Federated States of Micronesia

Yap, Chuuk, Pohnpei, Kosrae

KEY WORDS

SWM Information, Policy formulation, informed decision making, Baseline survey, WACS

Target Audience

Officials of PICs
Donors

Publication Date

August 2020



How SSWMSs are successfully formulated

J-PRISM II has been supporting four states of FSM to formulate state solid waste management strategies (SSWMSs) as an important outcome of the project. Supports for strategy formulation were provided by its predecessor J-PRISM I, as well as other donors, but the support of J-PRISM II is significantly different from the previous support in emphasising the importance of understanding the current SWM situations technically as well as quantitatively, through a baseline survey in order to set strategic goals and actions. The formulation of SSWMSs is carried out according to the following two-step approach.

Step 1: Understanding the current SWM situation technically as well as quantitatively

Officers-in-Charge in each of the four states, and J-PRISM II experts, jointly conducted a series of SWM baseline surveys in each state, including waste amount and composition survey (WACS), incoming waste amount survey at landfill sites, time and motion survey, public opinion survey, etc., in 2017, the first year of J-PRISM II. After that, the SWM situation was summarized so that the Waste Flows were understood technically as well as quantitatively. Finally, the more urgent SWM issues and challenges in each state were identified and shared amongst key stakeholders.

Step 2: Formulating strategies to tackle SWM issues and challenges identified

Based on the common understanding and perception of these waste issues and challenges, the key stakeholders formulated a SSWMS for each state. These SSWMS list several priority activities that each state should undertake. Among the priority activities, the ones each state should tackle urgently were chosen as project outputs of J-PRISM II, and the local counterparts in each state are currently involved in the effort to improve the situation with assistance from J-PRISM II experts. (Note: PDF files of all SSWMSs are available on the SPREP Web site. <https://www.sprep.org/j-prism-2/report-and-materials>)

Leading Agency(s)

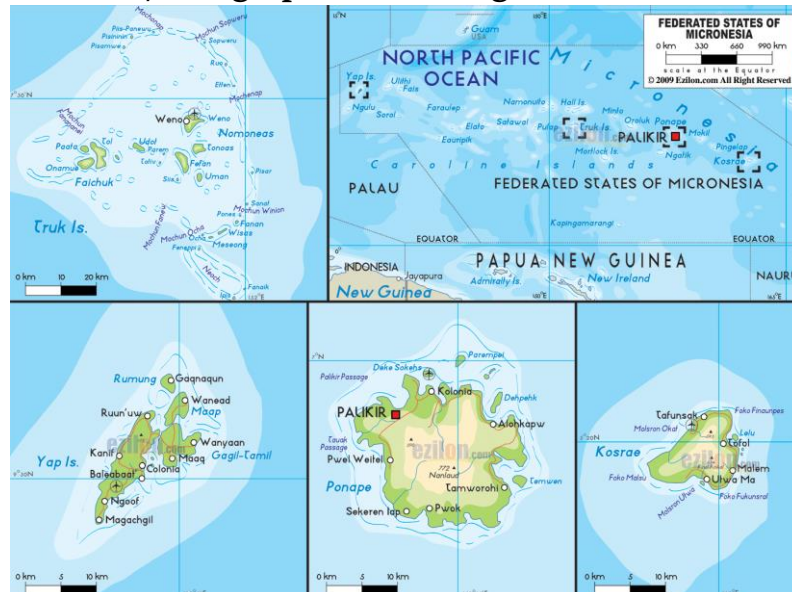
Yap: DPW&T, Yap EPA, Island Paradise Company

Chuuk: Chuuk EPA, DT&PW

Pohnpei: Pohnpei EPA, T&I, Pohnpei Waste Management Service

Kosrae: KIRMA, DT&I, Micronesia Eco Inc.

Location/ Geographical Coverage



Measures/ Approach

Step 1: Understanding the current SWM situation technically as well as quantitatively

A series of baseline surveys were carried out in order to develop waste flows in each state. A concept of the waste flow consisting of generation, discharge, collection, dispose and recycling is shown in the Figure 1. The following are a series of SWM baseline surveys which are essential to create a waste flow.

- A. Waste Amount and Composition Survey (WACS)
- B. Public Opinion Survey on waste discharge manner (POS)
- C. Population data of both collection and non-collection areas
- D. Recycling survey, especially data on container deposit recycling
- E. Incoming waste amount surveys at landfill sites

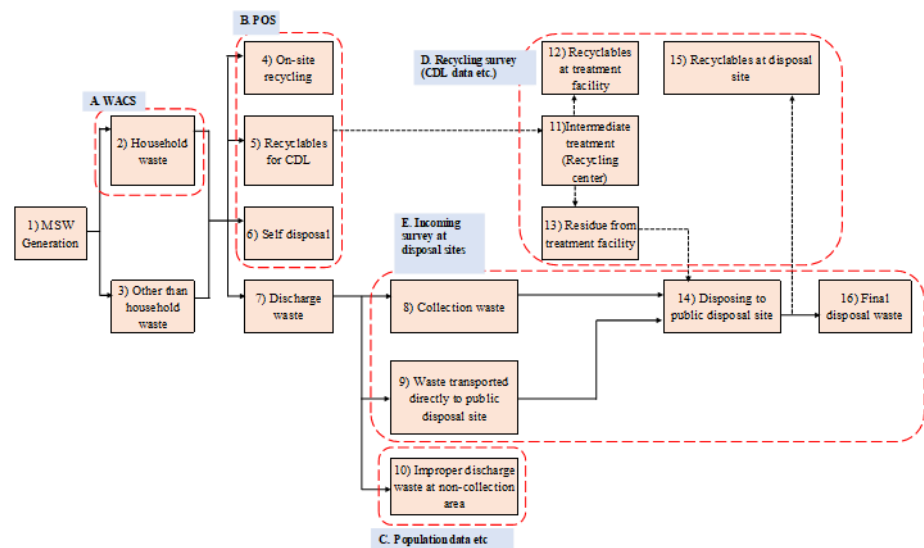


Figure1: Conceptual waste flow and necessary baseline surveys

Waste Amount Composition Survey (WACS)

Generated waste amount per person per day, and its composition, were determined by WACS which were conducted either during J-PRISM I or J-PRIMS II. As an example, findings of WACS implemented in Pohnpei under J-PRISM II in 2017 are shown below:



- Discharged household waste amount per person per day and its composition was surveyed. The number of sampled households was 20 in total. Ten samples were selected from Kolonia Town

State	Generation amount of state solid waste g/person/day (lb/day)	Generation amount of Household waste g/person/day (lb/day)
Pohnpei	1,147(2,529)	743(1,638)
Chuuk	916(2,020)	582(1,283)
Kosrae	1,128(2,487)	772(1,702)
Yap	1,292(2,849)	834(1,839)

Government and ten from Kitti Municipal Government. Kitchen waste and the other waste were requested to be discharged separately in order to carry out composition survey. The survey team collected wastes from sample households every day for a week consecutively. The result of the survey showed that the discharged amount of household waste was in total 356 g/person/day; 75g/person/day for kitchen waste and 281g/person/day for the other waste.

- By weight, kitchen waste accounts for 30% of the discharged waste from a typical household. Considering that kitchen waste is recycled in many household as a feed of livestock, the percentage of kitchen waste in the household waste generation is high. Plastics - including PET bottles - account for 16 % by weight, with the next highest component by weight being diapers at 10 %, an indication of the numbers of young children per household.

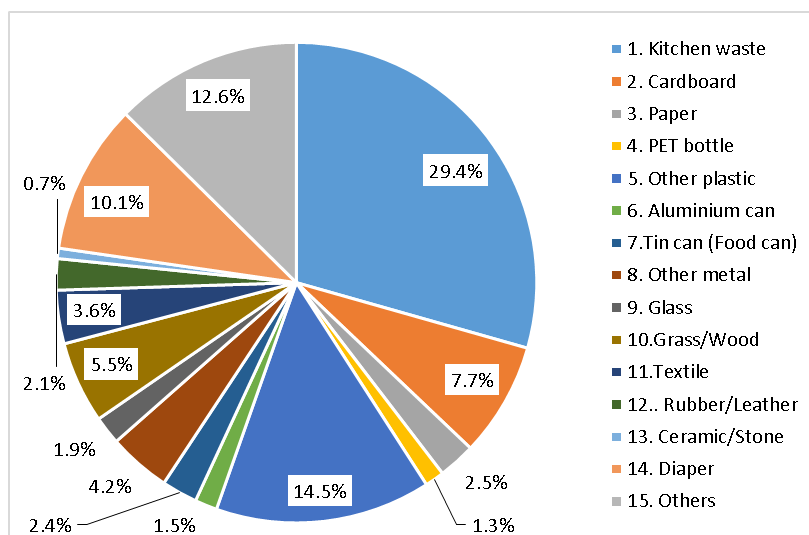


Figure2: Composition of household waste in Pohnpei

Incoming waste amount survey at landfill sites

To find out the final disposal amount, all incoming vehicles which transport waste to a disposal site were surveyed each day for a week. Waste is estimated by volume and then converted to weight. Survey items are (i) type of vehicle, (ii) type of container on the vehicle, (iii) type of collection (public collection, direct haulage by households or business) and (iv) type of waste (household, commercial, green, bulky, etc.) The results are shown in Figure 3. The average amount of incoming waste at Pohnpei landfill site is 22.9 tons per day, while the average number of incoming vehicles is 140 per day. Of the disposed amount, 54.2% is transported directly by residents, stores and other such sources, 26.6% is collected by local governments and 19.2% is collected by the private business operator, Pohnpei Waste Management Service. The rate of household waste disposed at the landfill site was around 30% and other waste such as commercial waste and public waste was around 70%.

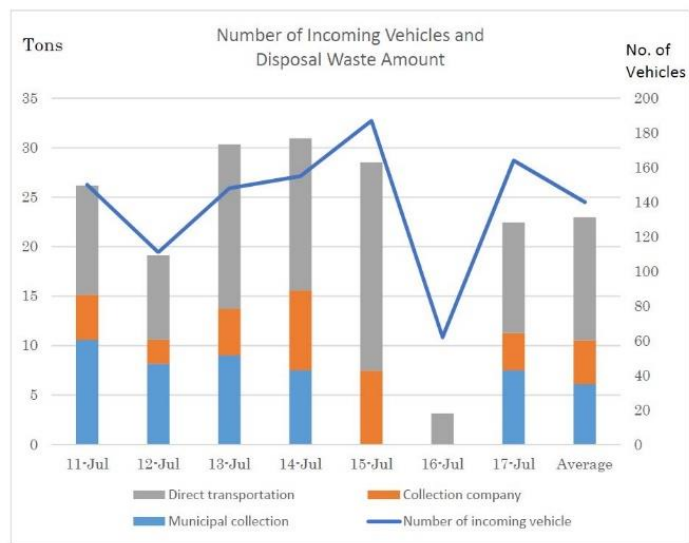
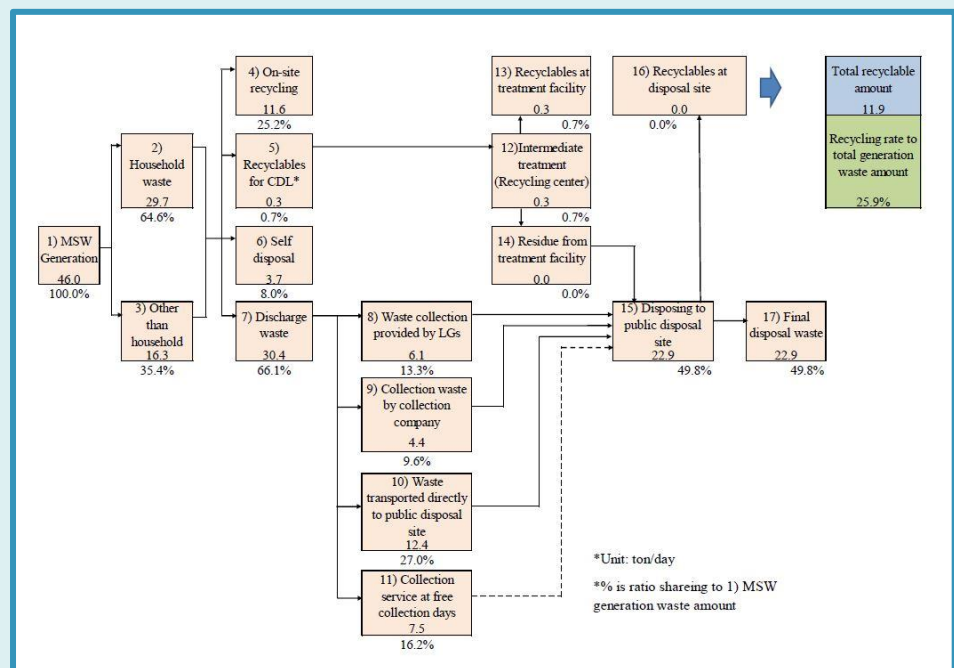


Figure3: A result of incoming survey

How to read Waste Flows - Example of Pohnpei

1. 46.0 tons of waste is generated daily on the main island of Pohnpei.
2. 29.7 tons of that 46.0 tons are generated from households.
3. 16.3 tons of that 46.0 tons are generated from non-households such as businesses, shops, schools, etc.
4. Of the total of 46.0 tons generated, 11.6 tons are not discharged but reused or recycled as feed to animals and/or used as fire wood.

5. Of the 46.0 tons generated, 0.3 tons are not discharged but recycled under the container deposit legislation program.
6. Of the 46.0 tons generated, 3.7 tons are not discharged but disposed within the premises of the people who generated that waste.
7. Of the 46.0 tons of waste generated, 30.4 tons are discharged.
8. Of the 30.4 tons discharged, only 6.1 tons are collected by the public collection services.
9. Of the 30.4 tons discharged, 4.4 tons are collected by the private collection company.
10. Of the 30.4 tons discharged, 12.4 tons are directly transported to the final disposal site by residents themselves.
11. Of the 30.4 tons discharged, 7.5 tons are collected and disposed at clean-up days held several time in a years.
12. Finally, only 22.9 tons (6.1+ 4.4 plus + 12.4 tons) are disposed at the public disposal site every day.



Step 2: Formulating strategies to tackle SWM issues and challenges identified

A series of consultation meetings were held to disseminate the result of the SWM baseline survey, as well as to help the participants to have a common understanding and perception of the waste issues and challenges in each state. Key stakeholders could then contribute to formulate SSWMS for each state. These SSWMS have now been formally endorsed by the governor of the respective state.



SSWMS in each state



Stakeholders/ Actors

SSWMS include the entire waste system, namely collection, disposal, recycling and environmental awareness; identify urgent SWM issues, and set out future directions. Key stakeholders for collection, disposal, recycling and environmental awareness are shown in the next table.

	Collection	Disposal	Recycling	Awareness
Yap	Private Companies	Private Company supervised by DPW & T	Private Operator supervised by Yap EPA	Yap EPA
Chuuk	DTPW	DTPW	Not yet in place	Chuuk EPA
Pohnpei	Town/ Municipal Governments	Private (Pohnpei Waste Management Service) contracted with T&I	EPA/ Kolonia Town Government/ Madolenihmw Municipal Government	Pohnpei EPA
Kosrae	DT & I	DT & I	Private Operator supervised by KIRMA	KIRMA

Results/ Outputs

As noted above the completed SSWMS have been officially approved by the Governors of each state. Now some key strategic actions detailed in the SSWMS are being implemented. Examples of such actions are introduced below.

YAP: Pilot Project to expand the public collection service

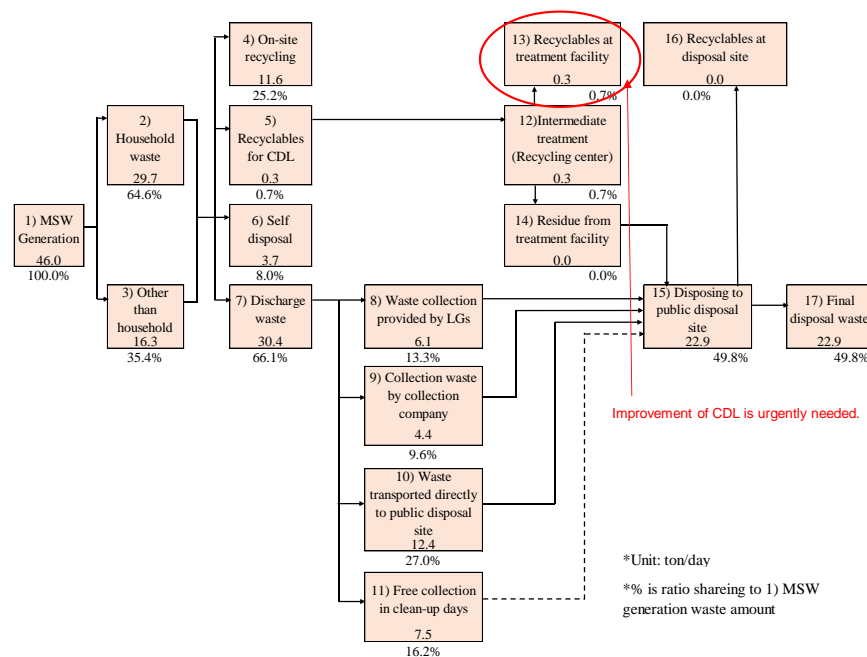
As understood by the Waste Flow of Yap, the expansion of waste collection coverage is the biggest challenge in Yap. The Department of Public Works and Transportation, Yap EPA, and J-PRSIM experts gathered together and decided to tackle this issue by implementing a pilot project. As a first step, the collection of the northeastern part of the main island where waste collection is most needed was



targeted. In this area, a collection station method, as well as a fee collection system, is being tested to see if this is workable for Yap.

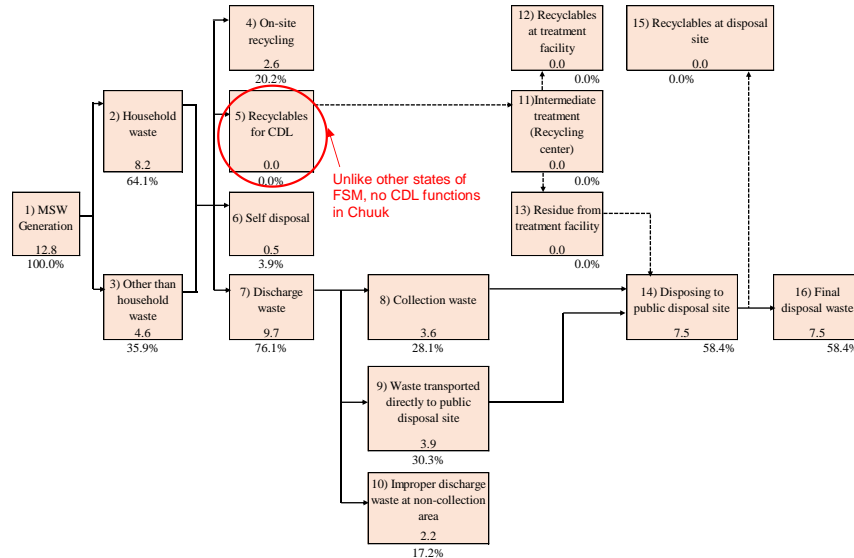
POHNPEI: Improvement of Container Deposit System (CDS)

As seen in the Waste Flow, only 0.3 tons of beverage containers are handled under the CDS in Pohnpei, since only aluminum cans are collected several times a year under the current state recycling program of Pohnpei. However, in Yap and Kosrae where CDS functions very regularly, not only aluminum cans but also PET and glass bottles are collected. Key stakeholders in Pohnpei, in particular Pohnpei EPA, demonstrated a commitment to improving the system. EPA applied for the grass-roots grant aid from Japan to construct a new and bigger recycling center, which was awarded in late February 2020. Also, a newer and bigger press machine, similar to that which is currently in use in Majuro are under procurement by the Non-Project Grant Aid of Japan.



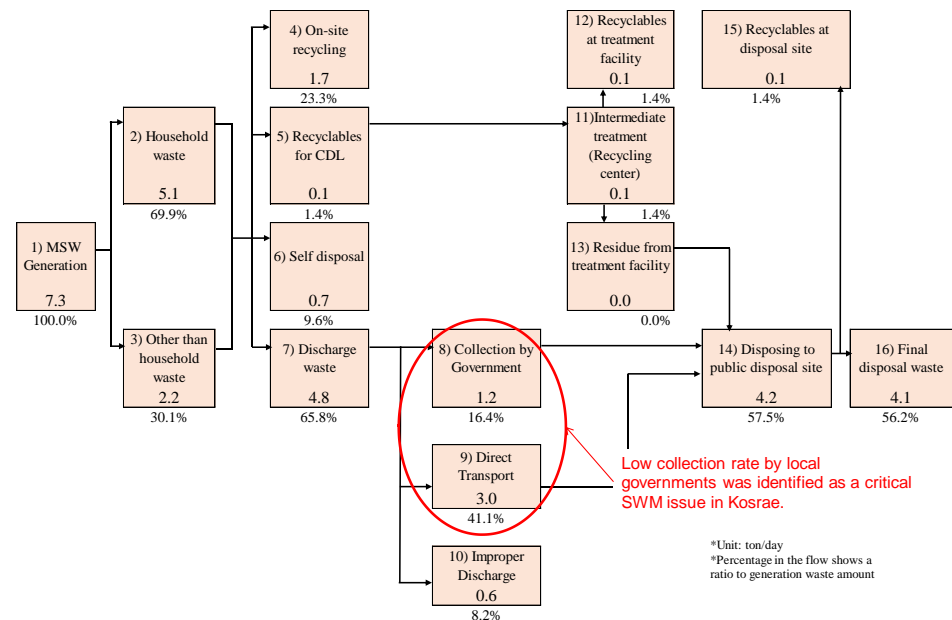
CHUUK: Re-introduction of CDS

Chuuk has a history of being the first state to adopt a CDS recycling law among the four states of FSM. However it is currently the only state that does not have any recycling activities in the FSM. In order to inaugurate a CDS once again, key stakeholders in Chuuk, especially Chuuk EPA, took the first step to procure press machines by utilizing the Japan's grant assistance for grassroots projects.



KOSRAE: Introduction of Inter-Municipal Collection System (IMCS)

Through analysis of the SWM situations of Kosrae technically as well as quantitatively, Department of Transportation and Infrastructure (DT&I), Kosrae Island Resource Management Authority (KIRMA), and J-PRISM II experts reached a common conclusion that collection system improvement is the most urgent issue to be tackled in the state.



<Before IMCS>

In Kosrae, where four municipalities are mandated to provide collection services to the residents, those municipalities with weaker finances had been struggling to provide regular collection services to the residents. The picture shows the notice board installed by KIMRA to notify people not to dump in open spaces. Illegal

heaps of wastes had been observed especially in the municipalities with no regular waste collection services. These illegal dumps have been removed, through the efforts of KIRMA, in collaboration with DT&I. However, this picture clearly shows the negative impact of a lack of regular collections in some areas.

<Introduction of IMCS>

Two factors became clear in time: I) procurement of a new 4-ton compactor truck by the Non-Project Grand Aid of Japan was a great advantage, and II) only 18 tons of waste per week are discharged from all four municipalities. Using the new compactor truck, all of the waste generated across the entire island can be collected and transported to the public disposal site, and so therefore the J-PRISM II experts recommended to key stakeholders to consider the introduction of IMCS where all municipalities used a single collection system. The key stakeholders, such as mayors, DT&I, KIRMA, and the Governor's Office, conducted a series of discussions and decided to introduce the IMCS.



<Features of IMCS>

In order to introduce an IMCS three issues needed to be clarified: (I) who operates the IMCS, (II) how to finance IMCS, and (III) which collection system shall be employed. Firstly, for (I) key stakeholders agreed that DT&I should be the operating agency. In other words DT&I, instead of the municipalities, would provide a waste collection services to all residents of the island. This became possible by amending the state code which defines the roles and responsibilities of DT&I. Now the provision of waste collection is formally defined as a responsibility of DT&I. Next, (II) In order to financially sustain the IMCS, US\$16,000 is required annually. US\$10,000 will be borne by the regular budget of DT&I. The remaining amount, US\$6,000, will be paid by each municipality in proportion to their population size. Finally, (III) Curb-side collection is employed in most areas, since most people live along the main roads in Kosrae. The collection truck has a sound system which plays music on the collection days. People bring their wheelie bins to the road side when the music approaches. IMCS has now started after a series of community meetings and awareness raising activities.

Success Factors

In order to formulate the SSWMS, a current waste flow analysis in each state was created based on various baseline surveys to quantitatively grasp the current status and issues of waste management. This deepened the understandings of the key stakeholders and made it possible to take concrete strategic measures,

especially for short-term priority issues.

Constraints

The initiative and ownership of a lead agency is essential. However, it is often difficult for a lead agency to do this when they are usually very busy with tackling the mounting daily tasks of waste management; to find time to sit, discuss and formulate plans and strategies. Also, the waste flow analysis needs some technical knowledge and experience to be done. Thus assistance with planning and strategy formulation using external support, as provided by J-PRISM II, can be a great advantage to State Government agencies.

Sustainability

The SSWMS covers a period of ten years. In every SSWMS, key strategic actions were identified with the estimated costs and the responsible organizations. The SSWMSs are formulated by paying special attentions to financial sustainability, organizational sustainability and technical sustainability.

Replicability and/or Up-scaling

Understanding the current SWM situation technically as well as quantitatively through a waste flow analysis is the distinguished feature of this process, but it is this very feature that requires technical intervention and support in the planning and development phases.

Revision of these SSWMS can be more easily done without technical intervention or support, if and only if the officials who formulated the first strategy together with J-PRISM II experts are still in the same position.

Lessons Learnt and Conclusion

Formulation of a waste management strategy based on waste flow analysis is proven to be an effective way to propose sustainable improvement plans.

As the current state of waste management can be best grasped by waste flow analysis quantitatively as well as technically, so stakeholders become able to deepen their understanding of the SWM problems faced. By formulating a waste management strategy that addresses these pressing SWM problems, it is possible to incorporate highly effective priority activities.

In four states of FSM, the following priority activities are under way, as seen above in the section of Results/Outputs:

- YAP: Pilot Project to expand the public collection service
- CHUUK: Re-introduction of CDS
- POHNPEI: Improvement of Container Deposit System (CDS)
- KOSRAE: Introduction of Inter-Municipal Collection System (IMCS)



Contributions to SDGs

This highly contributes to the **Target 12.5** *By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse of* the **Goal 12 Responsible consumption and production**.

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Relevant Websites/ Resources

None

Publisher

J-PRISM: The Project for Promotion of Regional Initiative Solid Waste Management, JICA: Japan International Cooperation Agency

Acknowledgments

SPREP: Secretariat of the Pacific Regional Environmental Programme