

# Reduction Methane emissions from landfills around the world!

## ~ Exploring opportunities of the Fukuoka Method~

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Dr. Yasushi Matsufuji

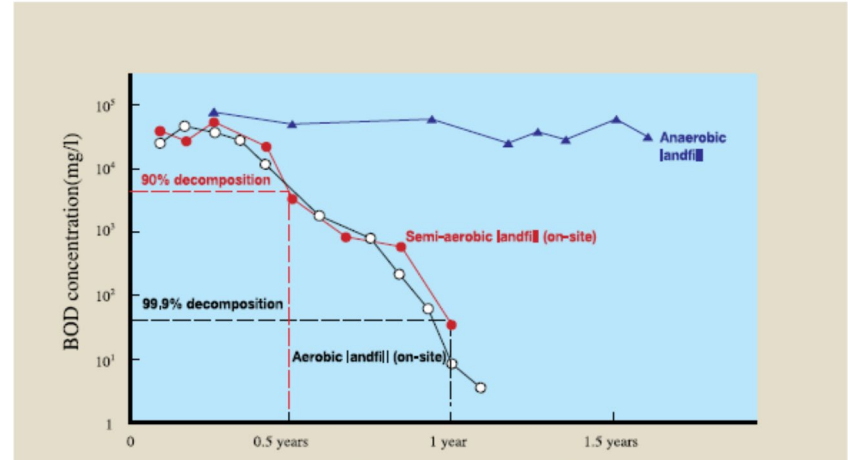
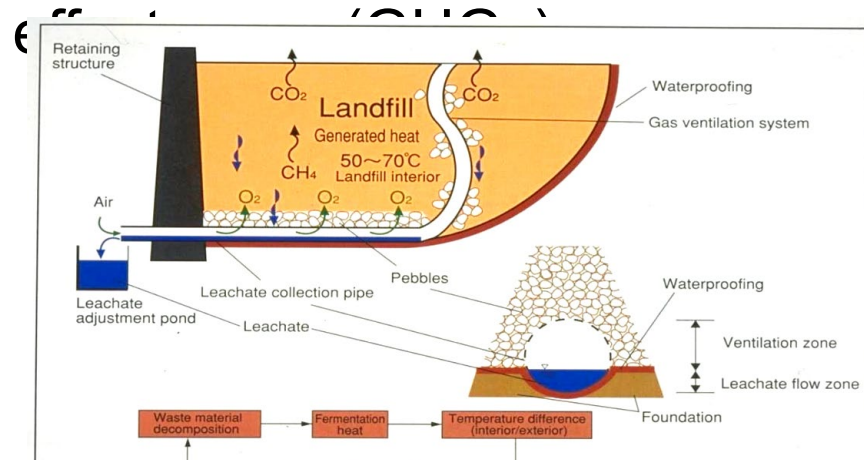
Professor Emeritus, Fukuoka University  
President, Solid Waste Advisers Network (SWAN)-  
Fukuoka



# What is Fukuoka Method

The Fukuoka Method is a semi-aerobic landfill technology developed jointly by Fukuoka University and Fukuoka city in 1970s, now a standard method for all local governments in Japan.

By maximizing the aeration of waste, it increases the rate of biodegradation and decreases release **20~50 %** of greenhouse



# Why is Fukuoka Method ?

- Low cost
- Low technology
- Environmentally friendly (Reduce pollutant of Leachate and GHGs by 20~50%)
- Re-use of land after completion
- Locally adaptable (materials, labor)
- Possible to implement the principles for new construction, for rehabilitation, improvement, for closure

UNFCCC approved as a new CDM at July 2011 (NM0333)<sup>3</sup>

# Transfer Technology to Developing Countries based on Fukuoka Method




**On going 21 pilot projects**

# First Fukuoka Method Technology Transfer to **Malaysia**: from open burning dumpsite to sanitary landfill



# Ongoing project in Ethiopia

## Addis Ababa city 2017-2023

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- ✓ Emergency Rehabilitation
  - ✓ Onsite training
  - ✓ Engagement of wastepickers
  - ✓ Improvement of SWM system

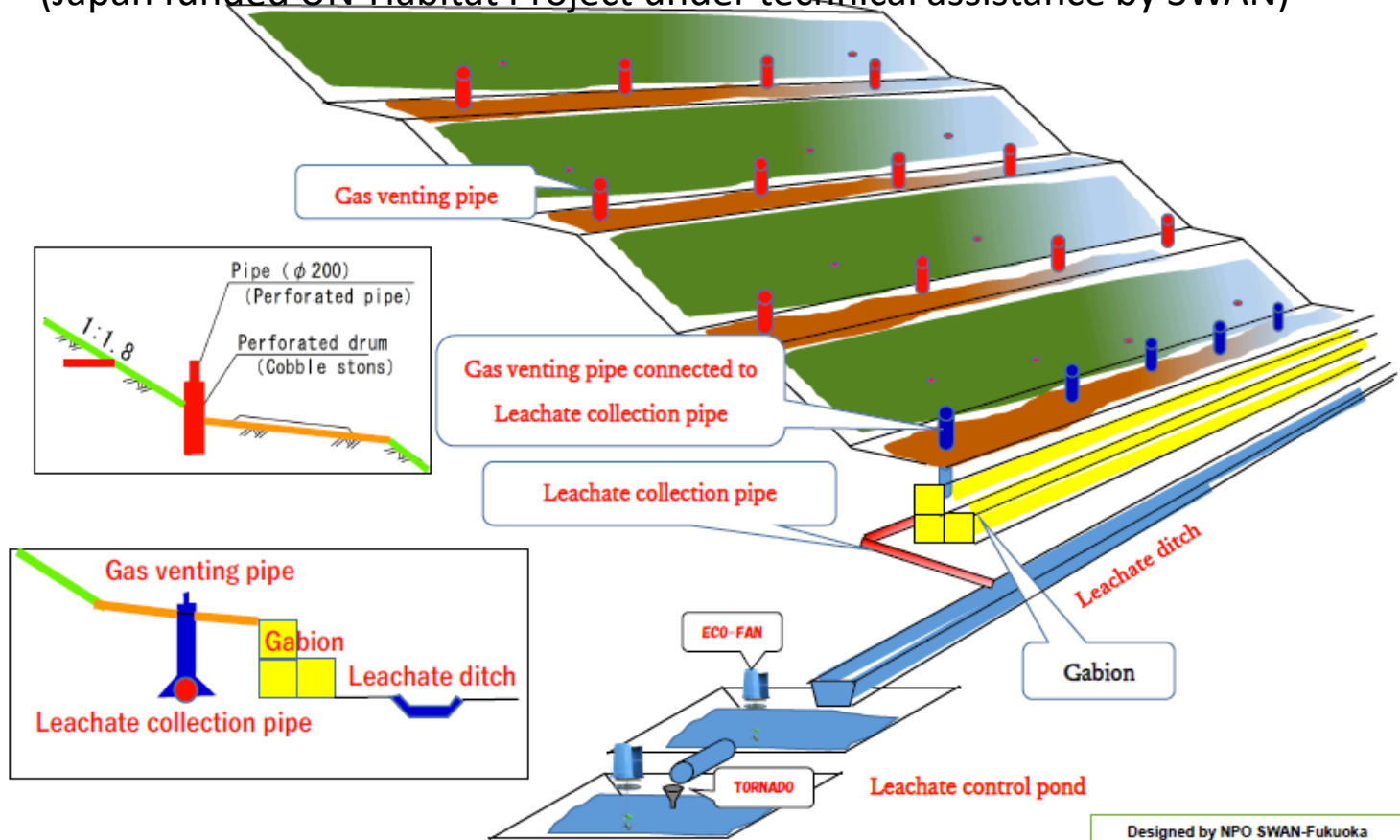
# Koshe/Reppie Dump Site Collapsed in March 2017; taking more than 100 lives of wastepickers and surrounding community



Similar dump site collapse, slide, fire are increasing globally such as Mozambique, Myanmar, Indonesia, Sri Lanka, etc.

# Our intervention for improvement and stabilization of the slide area of Koshe Dump site

(Japan funded UN-Habitat Project under technical assistance by SWAN)





Before  
Implementation



After  
10 months





**4 months** after project completion:  
July 2019



**6 months** after project completion:  
Vegetation sprouting by effect of Fukuoka Method



← Before

After ↓



Onsite training for  
waste pickers  
for safer and efficient  
operation & management

## Zoom meeting



# On going project in Yangon 2017~

2018.4



2022.11



2022.4



2021.3



# Fukuoka Method can contribute to Goal-2, 3, 4, 6, 11 and 13 of the 17 goals in SDGs !

Let's move forward together !!



Japan has declared its desire to disseminate the “Fukuoka Method”  
to the world in the future !

at


the Maputo Declaration of TICAD 6,

- COP 27 in Egypt 2022

the 2<sup>nd</sup> ACCP Yokohama Meeting in  
2016,

the 3<sup>rd</sup> ACCP Chenis Action  
Guidance in 2022,





Sustainable solid waste management  
contributing to peace and SDGs

Let's do our best!!



(1P)

Distinguished guests, Honorable guests, Ladies and Gentlemen. Good Afternoon!!

I am Yasushi Matsufuji, emeritus Professor of Fukuoka University, Japan.

It's my great pleasure to meet you today.

I would like to make a brief introduction of landfill technology, commonly called "Fukuoka Method": The technical feature of "Semi-aerobic landfill type" and effectiveness of the reduction of methane gas.

(2P)

First of all, let me explain on the structure and mechanism of Fukuoka Method. Pls see Figure 1. It shows the structural key points of the Fukuoka Method as shown in this Fig.

1. The "leachate collection pipes" covered by crashed stones are placed at the bottom of a landfill, which allows rapid drainage of leachate in waste layers, and natural inflow of air.
2. In addition, vertical "gas venting pipes" installed in the landfill to ensure that Landfill Gas (LFG) produced in waste layers are quickly released.
3. Air is naturally supplied to the waste layers by "thermal convection" through leachate collection pipes, resulting in aerobic conditions in landfill layers.
4. The mechanism of the air supply in Fukuoka Method is the "fermentation heat", produced from aerobic microbial decomposition of waste, which uses "thermal convection" caused by the temperature differences between inside and outside of landfill. It allows air to flow naturally into the waste, eliminating the need for electricity or other energy sources, making it an environmentally friendly landfill technology.

(3P)

Next, I would like to talk about the effects of the Fukuoka Method. In anaerobic landfill type, where organic waste such as garbage is buried as it is, and anaerobic decomposition by micro-organisms produces methane gas and carbon dioxide. However, it has been proved that by switching it to the Fukuoka Method can reduce greenhouse gases (GHGs) emissions by 20-50 % in terms of carbon dioxide emission conversion. This improvement approach was officially recognized by the UN as a new CDM (Clean Development Mechanism) approach in 2011 shown in this slide (Figure 3).

The main advantages of the Fukuoka Method are that it reduces methane gas emission and contributes to the reduction of greenhouse gases. In addition, following advantages have already been demonstrated not only in Japan but also in many developing countries

Next, I would like to other advantages of Fukuoka Method.

1. Fukuoka Method stabilizes waste as quickly as possible by using the purification functions in landfill layer.
2. It accelerates the decomposition of landfill waste, and leachate becomes better quality.

3. The stabilization of landfills is facilitated, enabling early safety closure of landfills and the utilization of closed landfills.

4. Locally available materials can be used for Fukuoka Method. Therefore, selection of materials is quite flexible and making it cost-effective in many development countries.

As explained, the Fukuoka Method is a landfill technology, developed in Japan with advantages of simple technology, easy maintenance, low construction & maintenance cost. Please see this figure. This method is currently being adopted and challenged in 21 developing countries under the environment so called “Lack of 3 M’s”, that means, “Lack of Money, Man-power and Materials”; or by adding “Lack of 6M’s”, that means, “Lack of Management, Maintenance and Motivation”.

(4P)

Due to time constraints, I will skip the detailed introduction of Fukuoka method. If you need further information, please contact with the Secretariat after this Seminar.

(5P)

From now, I would like to introduce some case studies which Fukuoka Group has technical cooperation with to date. This is the case study of JICA project in Malaysia, the 1st overseas technical transfer of Fukuoka Method in 1988. These photos are progress of improvement from open burning sites to sanitary landfills by Fukuoka Method.

(6P)

Next, let me talk about the recent project of landfill collapse prevention. As you know, due to the climate change caused by global warming, series of disasters occurred in various place in the world.

One of them was happened in Addis Ababa, capital of Ethiopia in March 2017. Landfill slope collapsed after heavy rainfall killing over 200 peoples. This area was 40ha and its high was 50m and slope was very steep. Right after the abnormally heavy rain, the landfill slope was collapsed, and many peoples died overnight.

(7P)

Unfortunately, rescuers couldn't save everyone. Following the accidents, the Ethiopian Government sought an urgent assistance from us through the UN-Habitat Fukuoka Office and the Japanese Government. In response, we have offered technical transfer in prevention of collapse.

This is a part of the drawing that we have proposed for improvement and stabilization of landslide area based on Fukuoka Method as shown in this Fig.

(8P)

In the recent 3 years of the project, we have installed collapse prevention measures all over the surrounding area of landfill site and it is being improvement day by day with cooperation from

local staffs and waste pickers as shown in this photos.

(9P)

This photo is 4 month after project completion on July 2019. You can see many gas venting pipes on every terraces.

(10P)

This photo is 6 month after project completion. You can see the vegetation sprouting by effect of Fukuoka Method.

(11P)

We aim to close the site safely in the future and also we are going to on-site training for waste pickers for safer and efficient operation and management under the slogan, "Let's convert landfills into an urban eco-park!". If this project succeeds, it will become one of the model project for landfill improvement by the "Fukuoka Method" in Africa.

(12P)

Even after COVID-19 Pandemic, we were conducting the activities together with the dumpsite local staffs. And also, the project did not give up. And regular online meeting were conducted between the Japanese experts and the counterparts as shown in photos.

(13P)

This photo is one of the case-study by Fukuoka Method in Yangon, Myanmar ongoing project before and after COVID-19 pandemic.

(14P)

As time is limited today, I will leave the detail explanations for the next opportunity. Finally, I would like to summarize the "Fukuoka Method", which is our way of sending messages to the world, and challenging technology transfer in a sustainable manner.

(15P)

In today's seminar, I introduced "Fukuoka Method", the technology for preventing global warming, which is also the main theme of this COP 28. I believe that everyone participating today already understands the features and advantages of Fukuoka Method.

As you know, Fukuoka Method is a landfill technology that can contribute to Goal-2, 3, 4, 6, 11, and 13 of SDGs that you are interested in shown in this Fig.

(16P)

In particular, the Government of Japan has declared its desire to disseminate the "Fukuoka Method" to the world in the future, at the Maputo Declaration of TICAD 6, the 2nd ACCP Yokohama Meeting in 2018, the 3rd ACCP Chenis Action Guidance in 2022, and COP 27 in Egypt last year.

(17P)

At the seminar co-hosted by the Ministry of the Environment of Japan and Fukuoka City at COP 28, action guidelines of the Government of Japan, and the advantages and characteristics of Fukuoka method for preventing global warming have been introduced. I hope you have gained a better understanding of how Japan and the world can work together to reduce greenhouse gas emissions and achieve the SDGs.

Ladies and Gentlemen, Let's do our best! Thank you very much for your attention.