

## B-2 SITUATION OF THE PROBLEM OF SOLID WASTE TREATMENT IN BALI ISLAND AND ITS SOLUTION

Kenta KUDAI<sup>1\*</sup>, Takumi KAIBORI<sup>2</sup>, Yumeko TANATA<sup>3</sup>

Shohei OHNO<sup>4</sup>, Kusda TETSUYA<sup>5</sup>, Yuko YAMAMOTO<sup>6</sup>  
and Koichi YAMAMOTO<sup>7</sup>

<sup>1</sup>Graduate school of Environmental and Life Science, Okayama University  
(1-1-1 Tushimanaka, Okayama 700-8530, Japan)

<sup>2</sup>Yamaguchi University (1 2-16-1, Tokiwadai, Ube, Yamaguchi 755-8611, Japan)

<sup>3</sup>Hiroshima City University (3-4-1, Ozuka-Higashi, Asa-Minami-Ku, Hiroshima 731-3194, Japan)

<sup>4</sup>Kagawa National College of Technology (355 Chokushi-cho, Takamatsu, Kagawa 761-8058, Japan)

<sup>5</sup>Research Institute for East Asia Environments, Kyusyu University  
(744 Motooka, Nishi-ku, Fukuoka-shi, Fukuoka 819-0395, Japan)

<sup>6</sup>Faculty of Eng., Hokkai-Gakuen University (1-1, Nishi 11, Minami 26, Chuo-ku, Sapporo, Hokkaido, 064-0926, Japan)

<sup>7</sup>Graduate school of Science and Eng., Yamaguchi University  
(2-16-1, Tokiwadai, Ube, Yamaguchi 755-8611, Japan)

\*Email: [k1127k38@yahoo.co.jp](mailto:k1127k38@yahoo.co.jp)

### 1. INTRODUCTION

Bali Island is a small island belonging to Indonesia which is located in the southwest-Pacific Ocean. Its population is about 4 million and its area is about 5,633 km<sup>2</sup>. Bali Island has a magnificent nature and original culture. This Island has attracted people from all over the world and the Island has become popular as one of the best sightseeing sites in the world. This global tourism has brought some good effects on Bali Island's economy. However, on the other hand, this is considered as a main reason for the current destruction of the Island's nature.

In a study tour in 2013, my group investigated Bali Island's solid-waste material problem which is one of the biggest causes of the island's environmental destruction to find the way to solve the environmental problem. We inspected mangrove forest and a landfill site to understand the extent of environmental pollution brought by solid waste materials which have been

thrown away illegally and the condition of this Island's waste-processing style. This thesis shows some problems we grasp by field investigation and our suggestions of solutions to clear the problems to protect Bali Island's environment.

### 2. INVESTIGATION OF MANGROVE FOREST

#### (1) Situation and problem

Mangrove is a general term for kinds of trees which grow near the foreshore. Mangrove forests have brought up many ecosystems because the forest has provided habitats for sea creatures. And it also protects seaside areas from erosion by sea water. Mangrove forest is necessary for keeping a good seaside environment.

We visited the Mangrove Information Centre and observed mangrove forest around the Centre. Many solid waste materials, such as plastic material, have been

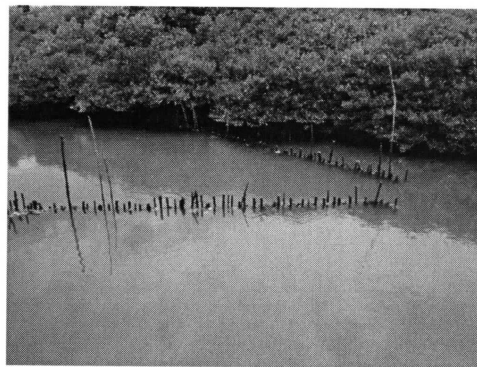
petbottle to clothes are founded in mangrove forest(fig.1) . Judging from the kinds of the waste material, the materials will be waste things from resident's lives. The natives has threw away waste things from their lives into area around their colonies from long ago ,because they have had custom to believe that waste things return to nature. Recently, Many kinds of things which contain refractory organic such as plastic material, vinyl has been brought into this Island from another country in globalized situation and they has been used in the Island-resident's dairy lives. The refractory materials which are threw in around resident's colonies are considered to remain in the natural world without taking biodegradation. The waste materials from nature were conveyed by water flow from upper area to mangrove forest located in around river mouth by flood in rainy season. We consider this is the main reason for the fact that

many waste materials are founded in the forest.

Waste material remain in mangrove forest will cause bad effect on the forest environment and ecosystems in that. To prevent the trashes from entering mangrove area ,some fences are equipped in entrance of the forest(fig.2).The waste material which is filtered by them are gathered by people about once a week. But more fundamental solution are needed to prevent seaside environment pollution .



**Fig.1** Waste materials in mangrove forest



**Fig.2** Fence made by wood in the river

## **(2)Solution**

Bali island's residents tend to throw waste things away and most of them don't know the extent of effect that the conduct bring on the islands. It is first step to change their consciousness. I suggest that specialists of environmental problems inform the island's residents for possibility and extent of environmental destruction caused by solid waste materials. And it is also important to enhance the facility for waste disposal.

But the island don't have enough economic power and technology to make the facilities . For this reason, developed countries such as Japan should support for the Island to develop the disposal system in its society in economic and technical aspects. International aid will be essential to improve Bali Island's waste disposal system.

## **3.INVESTIGATION OF LANDFILL SITE**

### **(1)Situation and problem**

We visited a open landfill site whose name is *Tempat Pembuangan Akhir* in suburb of. About 2,700 m<sup>3</sup> waste materials has been conveyed by trucks from some city areas including Denpasar investigated We investigated its condition to know waste- disposal level in Bali Island.

Large amount of solid waste material has piled up in the landfill site (fig.3). There are many kinds of waste material from inflammable material to unflammable material. Reusable refractory materials such as vinyl ,plastic are also founded in the dump of

waste materials. The fact tells that waste separation into each category such as flammable, unflammable, and recycle, and appropriate processing for each kind of waste material haven't been done in the island. In the landfill site, cows have eaten the waste materials and they have decomposed the materials in the process of digestion in their bodies(fig.4). But amount of waste materials has been far beyond of that of the materials which are eaten by them. To make the matter's worse, amount and diversity of organic materials which can be destructive to cow's health such as plastic have been increased among waste materials from Bali Island's society. One of the reasons is things that contains the materials tend to be brought on the islands by global trade. The landfill cite condition must have brought pollution on around environment because of sanitary problems caused by the waste materials and excrements from cows. It is considerable for landfill site to be source of bad smell, polluted water, pathogenic.



**Fig.3** Waste materials which are piled up in the landfill site



**Fig.4** The cows eating waste materials

## **(2)Solution**

First, waste separation rule should be made and the Island's dweller should be informed of the rule's contents. Secondly, enhancement both technology for waste-disposal to process each separated waste materials and recycle system for reusable materials are necessary to reduce whole amount of waste materials. Construction of high-qualified covered land fill systems is also important to prevent waste material in the areas from causing sanitary problem on around area.

Aid from developed country is essential to develop the comprehensive waste-processing system. For instances, developed countries should provide technical education for process of each kind of separated materials. And monetary assistant from the countries will be necessary to conduct development of the waste-processing system.

## **4 .CONCLUSION**

In this study tour, we visited mainly both of mangrove forest and a Landfill site to understand Bali Island's waste-material problems and we considered some solution to each problem.

Through our investigation, we realized a fact that appropriate waste processing have not been done in this Island. The problems have potential to cause catastrophe destruction of the Island nature in the near future. The main causes to solve the problems are considered to be both of the Island dweller's low consciousness for environmental issues and the island's short economic power not enough to develop synthetic waste-process system. To overcome these obstacles, revolution of the Island resident's consciousness for waste material problems made by mutual communication between specialists and residents will be needed. And economic support from developed countries to enhance comprehensive waste-processing systems should be conducted as soon as possible. Finally not only Bali Island's residents but also tourist to the Island should try not to make waste things. Many kinds of effort from individual level to international level will be required to solve Bali Island's waste material problem.