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Garbage Disposal Problems in Indonesia

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Introduction

This research report will present the situation with respect to the problem of disposal of waste (garbage) and the role of the administration in dealing with the problem in two areas of Indonesia, Bali and Toraja. Both are famous, government-designated tourist spots and are where most of the nation's foreign currency is earned. The inhabitants lead a traditional way of life peculiar to their respective cultures, and this has attracted foreign tourists to both areas. The two areas have been dragged, like to or not, into the economic development programs initiated by the government and undergone rapid development. Tana Toraja in South Sulawesi is inhabited by a mountain people, the Toraja tribe. One is struck in both places by the sharp increase in the amount of waste materials evident in recent years. Population centers on the island of Bali, famous throughout the world as an exotic sightseeing spot, are littered with waste. In many parts of Indonesia maintenance of infrastructure for road and communication systems has been improved, but the administration has been slow to take adequate measures to deal with the disposal of waste. A further problem is a lack of awareness on the part of the inhabitants of this issue of waste disposal.

The present study begins with an analysis of how waste is now being disposed of in Bali and Toraja, then traces the development of the problem. I will comment on the society whose development has been initiated by the government and changes in the environment, considering the development which has brought about the waste problem, I point out that the increase of waste in the two areas studied is an indication of urbanization.

Lastly, I will compare the stages of the increase of waste between Bali, a major city, and Toraja, a provincial area. I will also pose a question on the role in Japan in solving such waste problems.

I. The Present Waste Situation on Bali

1. Population Density

This research focused on the problem of the recent increase of garbage in the outskirts of Denpasar. Denpasar is the most densely populated area in Bali, and many foreigners work here. Besides this large population of residents, Denpasar attracts the largest number of foreign tourists of any place on Bali. The services provided to these tourists cater to a western lifestyle, thus producing enormous amounts of garbage. The population of Bali is 2,938,000 (1998), whereas in Buleleng, which has the largest population, there are about 418 persons per square kilometer. In Denpasar, however, tourists swell the figure to about

3,110 per square kilometer. In 1994-1998 there were 1,200,000-1,300,000 tourists, 50% of the population in Bali. Most of them are concentrated in Denpasar. If drifters who work in tourism related business are added, the population is concentrated, further increasing the population density in Denpasar.

2. Type of Waste

Waste in Denpasar can be classified into three main categories. One is the waste that tourists throw out, either directly or indirectly, at hotels and other lodgings, restaurants and shopping centers. Another is waste which the city's 79,716 households produce. Yet another is waste from hospitals, government offices and other facilities used by residents, and waste material from factories.

(1) Tourist-generated Waste

This mainly consists of paper, cans, bottles and plastic drinking water bottles. Other tourist-generated waste includes the food left uneaten at hotels and restaurants and used dry batteries. Human waste is considerable, but disposal is taken care of by the hotels themselves. The massive toilet paper consumption in Denpasar is also attributable to tourists, as the Balinese do not use toilet paper in their bathrooms. At big hotels and restaurants toilet-paper can be disposed of in flush toilets. But medium- and small-sized accommodation facilities do not have flush toilets, providing instead a basket near the door where toilet paper is thrown away, to be disposed of later with other paper waste.

(2) Household Waste:

The kinds of waste produced in homes are used daily-necessities, leftover food, vegetable waste, paper, cans, bottles, branches cut from trees in the garden, grass and flowers, vinyl, plastic, plastic bottles, etc. Electric appliances like TV sets, radios, and refrigerators are not thrown out with the garbage, but are "recycled." Electronic appliances are stripped down, not thrown out as in countries where there is a glut of such commodities.

(3) Hospitals and Office Waste:

There are fewer kinds and lesser quantity of waste in Bali than in Japan. Bandages, injection-needles, packages for medicine and others are just ordinary wastes that are mostly paper used by the employees of the hospitals and garbage of leftover food produced. There is also less "office automation waste" from offices here than in Japan. The problem is that the various types of waste mentioned above are collected without being sorted. Bottles, however, are picked out by informal sector workers using push carts or bicycles, and these bottles are sold to dealers for recycling in Java. Otherwise, there is no market for recycled goods, and thus no stable recycling business.

3. Methods of Garbage Collection

There are two types of garbage collection, one by the public administration and the other by the private sector. The former, administered by the Dinas Kebersihan dan Pertamanan, handles the sweeping of roads, trimming of roadside trees, and management of parks. The latter, or *swasta*-run type involves private companies that collect garbage in trucks. Even the government has no data on the extent of this private sector garbage collec-

tion, but if the many individuals operating with just a single push cart are included, it is no doubt quite considerable.

(1) Information from Interview at Dinas Kebersihan Dan Pertamanan on Feb. 8th, 2000

Public garbage collection trucks can be identified by their yellow color. Dinas in Denpasar currently has 19 such trucks, which operate from 7:00 in the evening in order to avoid the rush hour. There are still people who put garbage out in the morning, however. Garbage is collected from markets, hospitals and private households. In the markets those who use common places share the charges. One truck can carry 4 cubic meters, thus 19 trucks are capable of carrying a total of 1,250 cubic meters. By simple calculation, one truck goes back and forth 16 times between the disposal places. There are 279 drivers on the staff and 80 office workers. There are both large (6W) and small (4W) trucks. Collection charges in the case of the large trucks are Rp3,500 (Rp = Indonesian rupiah) per month and in the case of the smaller trucks, Rp2,500 (2000 figures). All the staff receive a monthly salary of Rp150,000, a low wage for such hard work. The current number of trucks is not considered sufficient, and as they are old, they are often in need of repair. Unlike Japanese garbage trucks which crush the garbage by rotating, these trucks only collect and carry the garbage, doing nothing to reduce the volume.

(2) Information from Interviews Made in Tohpati Area in the Suburbs of Denpasar on Feb. 9th, 2000

This is a new residential area in the Denpasar suburbs, and residents are well-off enough to own their own homes. In Menuri, one area of Tohpati, there are 350 households. A typical family employs a servant who does the washing, cleaning and cooking. Most families consist of 5 to 7 members, including parents and children. Private garbage collecting trucks come to this area three times a week. Collection charges for a month come to about Rp7000. However only 100 families, about 30% of the total, pay the proper collection charge. Four staff, including a driver, work on each truck, but when expenses are deducted, income is not sufficient. Farmers who need the extra income often perform private collection of garbage. Even though this is a new residential area, all the vacant land in the area has become a garbage dump, where cows, chickens and dogs forage for food scraps.

Human waste is collected by a private company which uses a special night soil truck with suction equipment. The charges are higher than for the garbage collection mentioned above. Collection days are also irregular. Toilets in the homes in this area are located in the bathroom and human waste is drained off through a hole in the wall of the bathroom. The same principle is applied to the kitchen drainage system as well. A brick and cement tank, without a paved bottom, is embedded in the back yard allowing the human waste to seep into the earth. When the tank becomes full, the householder asks the human waste collection company to pump it out. Because Balinese don't use paper in the toilet, human waste seeps easily into the earth, but in the rainy season, the tanks tend to overflow. Filthy water flowing from the kitchens also floods, polluting the area and causing a widespread stench. Sewage, other than human waste, is drained into the river. There are many houses which do not have a drainage system connected to the sewage pipes, because the houses went up before a land plan and sewage plan for the area was made.

Thus there is no garbage separation for either the Dinas nor *swasta* collection system.

The low wage of the staff can be pointed out as a problem. Users of garbage collection services, whether households, companies, or hospitals, have in common a tendency to ignore their duty to pay for the service. The fact that both users and providers of garbage collection services do not fully understand the importance of these services may become a problem to be tackled in the future. The fact that private companies and private households are under stringent financial circumstances which have forced them to economize by non-payment for garbage collection can not be ignored.

II. The Present Waste Situation in Hillside Toraja

1. Emergence of Mass Production of Garbage

Tana Toraja, covering an area of 3,250.77 square kilometers, is mountainous terrain ranging from 300-2,889 meters above sea level. According to the prefectural statistics for 1998, the population is 383,214. Unlike Bali, it is not yet densely populated nor is the population concentrated in one area.

The towns of Makale and Rantepao are centers of transportation and travel facilities. The district administration office, with its various departments of public administration, is located in Makale. Rantepao is a bustling town and a commercial center. Both towns are tourist centers. The inflow of people from outside who have come to work there are recognized. Most large hotels and restaurants are in Rantepao and Makale. Since 1995 the number of foreign tourists has been about 50,000-60,000, that of Indonesian tourists, 200,000, although the latter figure has decreased to 100,000 as a result of the domestic economic crisis in 1998. Therefore my research on the garbage issue focused on these areas. The amount of garbage has increased since 1990, when tourists began to visit the area. Within these few years, but especially since 1995, changes have been observed. While the number of tourists here cannot be compared with that of Bali, the quantity of garbage has definitely been increasing. Garbage in Toraja consists mainly of what is brought in by the tourists from outside, or the leftovers from what they have been served here.

2. Type of Waste and Disposal Method

Waste consists mostly of paper, bottles, cans, plastic bottles, vinyl and a very small amount of industrial waste. There is much less leftover food here than in Denpasar. Makale and Rantepao are in rural areas and have less waste, and the people, mainly farmers, having a life style dependent on nature. Food scraps, for instance, are fed to the poultry. People make use of natural materials to meet their daily needs, thus contributing towards conservation of nature. This is an important reason why they do not produce garbage or excessive waste. Juice and beer bottles are collected for recycling only at big hotels; they are sent to Makassar, the capital of South Sulawesi district, and then to Surabaya. This is an expensive operation, yielding only a small profit, which is why collection is confined to big hotels.

Since 1996 people who came to work from other islands have stayed on in Toraja and the population has increased to about 20,000. These people make their living as pedicab drivers or scavengers of used bottle. While scavenging supplements their meager income, it does little to address the recycling problem as a whole.

(1) Data Collected at the Village of Kete Kesu, Sanggalangi Township

Kete Kesu is located on the outskirts of Rantepao. The rows of beautiful, boat-shaped houses with their raised floors is what draws tourists to the area. At present the most serious problem the village faces is disposal of bottles. Local people smash, then bury, the used bottles left by the tourists, often getting injured in the process. They don't put these bottles out for collection, both because the amount is small compared to that from big hotels, and because the schedule for collection of garbage often does not coincide with the time when tourists are in the district. Because the local people lead fairly waste-free lives, they have a very limited awareness of the garbage issue. On the other hand, they might be following the custom of burying whatever is considered as extra. Paper waste is collected and burnt. When vinyl is mixed in with burnable waste, sooner or later this will become a problem.

This area has been proposed as a World Cultural Heritage site and plans are underway to build a park. Although the government anticipates an influx of visitors, no garbage disposal plan has been incorporated into the park project. If local people are to handle waste disposal, the public administration will have to do everything from deciding the sites and method of disposal – where the trash cans are placed, for instance – to the method of collection, separation of garbage, and the method of post-sorting collection. It will be difficult for the local people to do this. The public administration will have to take positive measures and implement them. If the area does become a World Heritage site, the local people will have an added burden of keeping it beautiful. Therefore it is hoped that the public administration will take responsibility for the disposal of garbage so as to lessen the burden on the local people.

(2) Human Waste Disposal

The situation with respect to disposal of human waste is almost the same as in Bali. In other words, the restroom serves as both toilet room and bathing room and human waste is washed down the drain. Local people still have an agriculture-based way of life and retain the habit of relieving themselves on the empty fields or in the river. This research therefore focused mainly on the topic of human waste disposal at the hotels where tourists are accommodated.

(2)-1 Information from Interview at a Big Hotel, Novotel

Novotel is a large hotel that accommodates about one third of the tourists that visit Tana-Toraja, most of whom are Europeans. They use a large amount of toilet paper in the restrooms. The sewage tanks are embedded in the ground of each block consisting of several cottages and are designed so that the flushed human wastes drain into them and are then absorbed into the soil. Potted plants hide the tanks from view. Pipes to let out gas are also set up in such a way that they are not noticeable from the outside.

(2)-2 Information from Interview at a Middle-sized Hotel, Misiliana

Here also there are embedded sewage tanks, one per block of ten cottages, and the waste seeps into the soil. As they are at the back of the hotel, an area off limits to guests, there is no need to camouflage them with plants. Attempts are being made to have a vegetable patch in a corner of the site. Fallen leaves in the hotel garden are swept and gathered in one place to make a compost pile for use as fertilizer for the vegetable patch. Only staff have access to this place.

(2)-3 Information from Interviews at Other Smaller Hotels

The situations at other hotels are almost the same as above. For example, at the Losmen hotel run by the prefecture, human waste is drained from the restrooms attached to the bathing room through narrow cement pipes into a cement sewage tank. No effort is made to hide it from view, and here too the waste seeps into the ground.

3. Methods of Garbage Collection

In this prefecture the Dinas Kebersihan dan Pertamanan collects garbage mainly at markets, hospitals and hotels. Private houses in general place baskets or cans along the street for garbage. Households pay an average of Rp1000 a month, while Novotel pays Rp50,000, Misiliana, Rp20,000, and Losmen, Rp9000. Garbage isn't sorted, vinyl, plastic, and paper being collected together, unsorted.

(1) Information from Interview at Dinas Kebersihan dan Pertamanan Toraja

The public garbage trucks are yellow. There are five large-sized trucks and one pickup at Makale and two large-sized trucks and four pickup trucks at Rantepao. There are 10 office workers in Dinas Kebersihan dan Pertamanan, and the garbage collection is done by 60 laborers on trucks. These trucks are ordinary dump trucks like in Bali, not rotary crushing types. They are very old and are in need of constant repair. Toraja pays Rp200,000-Rp250,000 per truck per month. The wage of the workers engaged in the garbage collection is, like in Bali, considered to be very low for such hard work.

III. The Aftereffects of Development

Development is necessary and is indispensable for economic growth. Both in Bali and Tana Toraja, government-initiated projects for the development of tourism have been successfully established and, with the growing number of tourists, provide an easy means of earning foreign exchange. However a problem largely neglected by those who made the development policies for these two places has now emerged: the garbage problem, an aftereffect of development.

Here, I would like to touch on a problem that complicates the issue: the problem of the final site for disposal of garbage. The final site for disposal of garbage is called TPA, which translated literally means "final dumping ground [*tempat pembuangan akhir*]," and has the added inference that, beyond here, no further disposal measures are necessary. First I would like to report on the present situation of the TPA.

1. TPA in Denpasar

The garbage of densely populated Denpasar is transported to a TPA in Suwung, which is situated in the southeast of the city, near the famous Sanur beach to the north.

(1) Information from Interview at the Tempat Pembuangan Akhir in Suwung

The TPA in Suwung has an entrance near the coastline about 1 km from the highway. A guard is posted at this entrance and only admits persons with permission from the Kantor Dinas Kebersihan dan Pertamanan. The TPA operates 24 hours a day with a manager and a staff of 27 who work in shifts. There are a lot of flies near the entrance. This TPA has been operating since 1992. Before that it was located at Cangu in the west of the city. Garbage

increased rapidly from 1990, and when the Cangu TPA reached its capacity, operations were transferred to the present site at Suwung.

The TPA at Suwung is divided into 5 blocks. Blocks 1 to 4 are full and now only the 5th block is usable. It was a mangrove forest before but was reclaimed to make the garbage disposal site, which had started in the area of 14.4 hectares and now has expanded to be 40 hectares reclaimed. The 5th block will be full in several years and plans are being made to move to another place.

(1)-1 Present Situation of TPA

The garbage collected at public places or private houses is carried to TPA without being separated. Publicly operated and privately operated garbage trucks carry the garbage one after another. Because the garbage is not sorted and collected, bottles, cans, plastic, paper, vinyl, cloth, kitchen refuse and tree branches are all mixed together. The workers mix the collected garbage with bulldozers, and after a certain lapse of time, they repeat this. In other words, rather than wait for the garbage to rot naturally, they use bulldozers to crush and pack it down so as to minimize the volume, making more space available for reclamation. From a distance, the garbage pile looks like a huge mountain wrapped in haze. The liquid oozing from the rotten garbage is muddy and smelly. The area covers about 40ha. Even the people of Bali do not know that this area covers as much as 40 ha. In the area which lies in the leeward in the neighborhood of Suwung people complain of a foul smell at night. During the summertime, when the temperature doesn't drop even at night, it is possible for fires to break out.

Since the garbage brought here is not separated and just left to rot, even though it is mixed with the bulldozer, things made of vinyl will remain as they are.

According to the manager of TPA, human waste and sludge from factories are filtered at another place and are not drained off as is. But the equipment to do this is presently out of order and cannot be used. As far as the block distribution figure is checked, there is only one filter here, certainly not adequate to dispose of all of the human waste and filthy liquid in Denpasar. Since it is confirmed that the night soil trucks let flow the human waste from the hotels into the garbage, it can be pointed out that a considerable quantity of human waste and filthy liquid is thus disposed of without being filtered.

(1)-2 The Back Side of TPA

Poor people come to TPA to scavenge. Men and women, young and old, come and take away bottles, cans and vinyl. They also pick out kitchen scraps to feed to their pigs. Other things are sold for a pittance to dealers who come to buy in pickup trucks. The dealers send them to Java together with what they have bought from other places. This kind of business is either overlooked or allowed by the staff in exchange for a bribe. I myself witnessed dealers offering a bribe at the gate when they left TPA.

Poor people often walk on the garbage pile, where there are injection needles, used bandages, and liquid refuse from hospitals. It is a very dangerous place; in fact, the staff are required to have a medical check once a month.

(2) Survey at Cangu

The TPA in Cangu, which is located to the west of Denpasar, has been closed for eight years. Set among fields, the entrance gate, filters and cranes, which must once have carried garbage, stand there, as yet unrusted. On both sides of the road from the entrance there are hills covered with grass, which, it is easy to see, were once garbage heaps. These garbage

heaps are covered with enormous vinyl nets, with grass growing on top. Faded blue and pink vinyl is exposed everywhere on the hill, attesting to the fact that these were once garbage heaps. The filter, called Rimbah, is a huge box made of cement. It is divided into three compartments, each side measuring 5 meters. It is hard to imagine that in a filter of this size could properly process human waste and sludge. Even though nearly ten years have passed since this site was in use, there is still vinyl on the ground. The same can be expected to occur when the Suwung TPA is reclaimed and disposal operations move to another place.

(3) TPA Garbage Capacity

In Bali state, there is a TPA in every prefecture. According to a report by Kantor Dinas

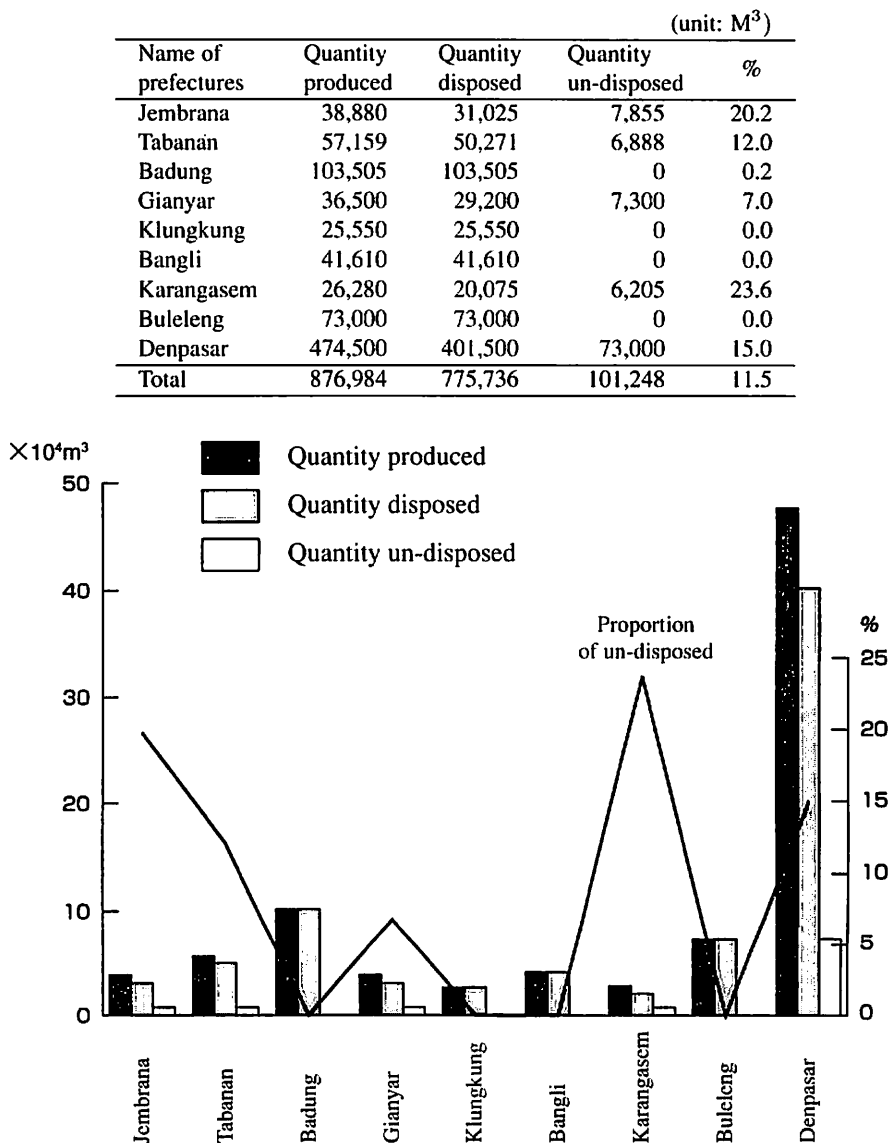


Figure 1 The amount of garbage and it's disposal in Bali (1997)

Kebersihan dan Pertamanan, the annual garbage production is 876,984 cubic meters, but the gross amount of garbage which cannot be disposed of is 101,248 cubic meters (Figure 1). There is garbage left uncollected in Denpasar and garbage that is left uncollected in other prefectures is 20%. Although the real situation is not known, one can assume that the problem of garbage is larger than that of TPA in Suwung. Based on an investigation in Tohpati, in the suburbs of Denpasar, TPA reported “zero” garbage uncollected there, but this is very doubtful. Even in Tohpati district, only 30% or so of all garbage is actually collected. Even if other prefectures are rural compared with Denpasar, one can imagine that the situation is similar there too. Driving along the coast and past fields, for instance, one commonly encounters garbage heaps. The same thing is true around residential areas, except for Tohpati. With regard to TPA, as long as the method of collecting and separating garbage is not reconsidered, more and more garbage will go undumped, and garbage processing work at TPA will continue to be hazardous.

2. Information from Interview at TPA in Tana Toraja

Tana Toraja has two TPAs, one in Rantepao and one in Makale. The TPA in Makale is in the Tampo district. Workers who burn, break and bury the garbage that is brought there live in small huts beside the dumping ground. Every afternoon they burn the garbage which has been brought in by truck in the morning. Pieces of broken bottles and cans remain unburnt. Bottles are broken into smaller pieces and buried. Cans are crushed and pressed and are also buried. The TPA in Tampo is on the hillside to the north of the village and fields spread out below. Usually a south wind blows, but when there is a north wind, there is a foul smell. At present the TPA covers an area of 1ha, but when it expands due to increasing amounts of garbage, it is feared that stench and soil contamination will reach the villages below.

Roads here are so narrow that it is not possible for vehicles to pass each other. They are not paved, so that when it rains the garbage trucks cannot bring in garbage, and is left on the bed of trucks in the city.

The TPA in Rantepao is also located on a hillside in the suburbs. Roads are wider there than in Makale. But there is no one to supervise the disposal of garbage at this TPA, so it is brought in by truck and thrown away there. Two wooden boards are temporarily provided for the trucks to maneuver on while backing up to dump their load down the hill. As there is no manager to supervise, the stench here at this TPA is so strong that one can smell it when passing by. The type of garbage is the same as in Makale. A lot of vinyl, cans and bottles, which do not decay, can be seen in the rotten garbage. When it rains, garbage trucks do not come. The TPA in Rantepao covers about 1 ha.

3. The Problem of TPA

The after-effects of development center on the issue of garbage processing. The problem will not be solved even when residents separate their garbage, if the administration is only concerned with collecting it and dumping it. Garbage will increase and so will the hazards it entails. The situation is indeed critical. In order to reorganize TPA, the following two points are important.

(1) Incentives for Garbage Disposal Workers

A wage raise and health care should be provided to workers engaged in garbage disposal, the staff at Kantor Dinas Kebersihan dan Pertamanan, and people working at the

TPA. The current wage of Rp150,000-250,000 that is paid for this hard labor is too low. Wage raises would make workers understand that their work has dignity and is as important, or more important, than other jobs. If it is difficult for the administration to give these workers a higher wage than those in other industries, bonuses, over-time and special work allowances should be added to their basic salary, giving them an incentive to work harder. Guaranteed such benefits, they would work to ensure that garbage disposal is carried out smoothly. There should be medical checks every month in Toraja, as in Bali, and they should be given allowances to cover treatment for work-related injuries and illness. It is also desirable to systematize the wage system to guarantee part payment for the days they are absent from work.

(2) Reconsideration of Garbage Disposal Method

Other methods must be introduced besides the present method, namely, collecting garbage, burning it, and burying it to reclaim land.

For example, if the administration encouraged people to sort and separate garbage, it would be desirable to construct facilities which would enable bottles and aluminum scrap to be sorted. Also if recycled items are to be sent to other areas, the government should introduce a system through which it could do it with responsibility. If the private sector cannot recycle waste in Bali, the government must take full responsibility for transporting it to Java. At least the method presently seen at TPA should be avoided.

Concerning the construction of waste processing facilities, it is important to urgently set up a forum where people can discuss the issue fully, taking into consideration the environmental problems which will affect not only the neighborhood, but also the whole island. In addition, if the waste processing facilities are more effective in every aspect than the present TPA, all necessary measures should be taken to carry out this method.

IV. Changes in the Recycling Type Model

This social structure as a recycling-type lifestyle indicates the life pattern of the people who live in Tana Toraja. A recycling-type lifestyle is one that reflects accumulated knowledge in how to live without burdening the environment, based on a system of judiciously making use of nature and making restoration to nature. The people of the Toraja tribes continue to live in their high-floored, boat shaped houses, built with a method of construction passed down from their ancestors, a method which does not make use of even a single nail. The timber used is obtained from the nearby forests in the mountains, but there is an agreement that limits the cutting of trees to the minimum. The number of years that a house is maintained (100-200 years) is much longer than that of trees growing (15 to 60 years). Houses are repaired many times as they age, but rarely is the timber, which took many years to mature in the forest, replaced. People live in hamlets where these houses stand in rows.

The people have many ways of making use of nature in their lives. Take bamboo, for example. Several tons of bamboo are used for roofing the houses, and bamboo is used in other ways too: as drainpipes for bathing, washing and cooking, to carry water or livestock, and also as utensils such as flower vases and tableware. When bamboo gets old or broken, it can always be returned to nature by just leaving it on the ground or burying it. Banana leaves are used for wrapping and carrying food, and when the meal is over, are returned to the soil.

When the rice crop is harvested, only the ears are collected. The stems and other parts of the plant are left in the paddy fields where they rot and become fertilizer. After the harvest, the grain is dried and stored in the granaries, to be taken out, husked, cooked and eaten only as needed. Food scraps are fed to the livestock, so there is nothing left to throw away. Thus, since everything here, from housing to daily lifestyle, is in harmony with nature, the people's lives do not place a burden on the environment. Living such a lifestyle, it would be practically impossible to produce garbage.

However, in recent years, with the inflow of people from outside through tourism development, the Toraja tribes people's environment-friendly "garbage disposal" has changed into garbage production harmful to the environment. The biggest cause is the increase of tourists. But the modernization promoted by the Indonesian government is another important factor. Vinyl and plastic are now typical items found in garbage. Goods made of these things are not manufactured in Toraja, but are brought in from other prefectures and cities for sale. People in Toraja are assumed to take part in modernization by consuming these goods. Garbage is not produced if they follow their traditional lifestyle, but the various products, and their wrappings, brought in as a result of modernization have become garbage for the local community.

Furthermore, in Toraja the garbage from the accommodations for tourists is collected and disposed of at TPA in the towns, but in the rural areas there is not much garbage. Therefore, the garbage at the TPA in the two areas comes from places related to tourism. One can point, then, to a flaw in the country's policy of tourism development: tourism is promoted but the garbage problem is ignored. Tourism development is not advanced to the extent that it can handle garbage disposal. As long as the amount of garbage keeps increasing while measures for disposal remain inadequate, problems could crop up that would affect the life of these people who live in a natural, environment-friendly style. For example, there exist health damage to the children, the decrease in food production due to the environmental change in the neighborhood of dumping grounds, a bad influence over the health and so on. And it is the local people who must bear the economic burden, the labor involved in disposing of the garbage.

The fact that the TPAs here are smaller than those in Bali is no cause for optimism: a great deal of damage is definitely done at the TPA here, even though they are on a smaller scale.

V. Official Environment Policy and Residents' Awareness

1. The Environment Administration in Bali

An environment section of the municipality office in Denpasar, Kantor Kota Madya Denpasar Lingkungan Hidup, was set up in June 1996. Efforts were made to make the residents aware of the garbage and pollution problem. For example, stickers saying "Do not throw garbage in the rivers" were printed and distributed, and staff visited the area community centers to explain their work to the residents.

The large factories in the suburbs of Denpasar, the T-shirt sewing factories, and the dye works were required to install sewage disposal facilities, and environment section staff check them regularly. As for cutting down trees in the forests, people who cut down trees in the forest are encouraged to reforest 10% of the area denuded.. Prospective house builders

are required to make compost piles.

Elsewhere in Bali, the residents of Gianyar and Klungkung, for instance, keep their surroundings beautiful in their own way. The environment section studies about the environment policies and pollution problems in Japan, and the staff are familiar with the MINAMATA DISEASE issue. The environment section has just started work in Bali, but it is expected to play an important role in public administration of environment issues.

2. Awareness of the Residents

People have little awareness regarding the garbage problem. They throw away garbage without understanding the damage it can cause through contamination. In both Bali and Toraja, people think of garbage as something of no use any longer, something that can be returned to the earth. So they do not seem to have any idea why garbage should be separated. Modernization was not introduced simultaneously in the two areas, and consciousness of the problem of garbage is not advanced yet. In Denpasar, air pollution caused by motor vehicle exhaust is particularly bad, but because there are trees along the roads, people don't worry about pollution and have no sense of danger. The people are not to be blamed; indeed, their own ways of life did not place a burden on the environment. However, development and modernization have taken place so rapidly that consciousness has not kept pace. But given the amount of garbage at present, something must be done immediately to promote residents' awareness. They need environmental education from childhood on sorting the garbage and other things related to their lifestyle. The environment section is right in including children in its public relations effort through the use of propaganda stickers. Projects like this need to be carried out continuously and perseveringly.

Conclusion

There are some common features in the garbage problems of the two areas, Denpasar and Toraja, on which I have focused my research. The kind of garbage is similar, and in both areas the method of disposal is not established.

Bali is a beautiful island that is being degraded by humans into a garbage heap. It is overpopulated with people seeking jobs at the resort areas, people who are not included in the statistics. According to the statistics for Denpasar, 15% of the garbage output remains uncollected. However, according to the investigation in Tohpati, the garbage in the city is piled up into a huge amount because only one third of the total is collected. Also, awareness of the garbage issue among residents is low. It is necessary to incorporate the garbage issue in the school education curriculum, so that children born after the onset of modernization, which has produced so much garbage, will learn about garbage problems and develop habits of separating garbage from early childhood.

The problem of TPA is not confined only to Denpasar and Makale, but exists in other areas of Indonesia, and is a result of the fact that in the state's development policy the problem of the disposal of garbage has been put off. What delays in solving the problem of TPA is the low pay of workers and the poor organization of garbage collection and disposal. There needs to be a complete reorganization of the staff and the organization itself. Also, I believe that investing Japanese financial aid in the solving of this garbage problem would be effective and would serve as a stimulus for the Indonesia government.

Many environmental problems have occurred, such as that of inadequate sewage disposal facilities, air pollution, and so on, that are caused by actions by the public administration with regard to city planning and by the low awareness of residents towards the garbage problem. In Denpasar, changes in the garbage situation should be seen as an urban issue, something that applies to Toraja as well. The garbage in Rantepao and Makale is not usually collected thoroughly. The TPA in Denpasar has almost reached its capacity, and when it is full, another TPA will be made from reclaimed land. This is not the way to work out a true solution to the problem.

Under these circumstances, there has been a rapid increase over the past ten years in the throwing away of dry batteries, broken light bulbs and glass, chemical paint and polluted fluid, with the fear of hazardous effects on human beings. This point must be taken into consideration in the investigation of the environment problem.

The volume of garbage in Toraja is small in comparison to that in Denpasar. However, the type of garbage and the TPA problem is the same, and the problem of garbage as a phenomenon of urbanization will certainly arise in Toraja cities soon. When tourism development is implemented in a society where people attach importance to ritual and to traditional customs, the public administration must take the lead in the sewage and garbage disposal as in urban areas.

Other areas in Indonesia have begun to be faced with similar garbage problems. The garbage problem as an urbanization phenomenon is growing. It is desirable to work immediately on what can be done to solve the garbage issue, and for this purpose, an adequate budget and a revamping of policy is called for.

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