

# Report on the Willingness to Pay for Waste Management in Baa Atoll



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## **Executive Summary**

1. Solid waste management has become one of the greatest environmental challenges in Maldives where space is limited and the islands are spread over a large geographical area, making it difficult to implement waste management strategies.
2. The composition of organic (kitchen and green) waste is higher than any other type of waste in the islands, making up approximately 69% of the total waste generated.
3. This study was carried out in Baa atoll under the Baa Atoll AEC Project (UNDP-GEF) for the Ministry of Environment Energy and Water.
4. The main aim of the study was to assess the attitudes towards waste management and the willingness to pay by the local communities for waste management services in the atoll.
5. Waste is segregated to some extent on most islands in Baa Atoll. Open burning of combustible waste is practiced where smoke nuisance, vegetation die off and accelerated coastal erosion problems are experienced.
6. Non combustibles such as glass and metal cans are stockpiled where they accumulate water and serve as a breeding ground for mosquitoes, posing threats of disease.
7. Two types of in-person interviews were carried out to collect data: Focus group interviews and household surveys.
8. The contingent valuation method (CVM) was used to assess the willingness to pay by the local islanders for waste management services.
9. From the results of the survey, it was apparent that the islanders of Baa Atoll preferred to dispose of their own waste rather than for a contractor to collect it.

10. Majority of the people were willing to segregate waste as the household level.
11. While the feeling in the focus groups was for the government to pay for the operation of the Island Waste Management Centre, the results of the household survey showed that the local people felt a responsibility towards the costs.
12. There was a consensus for the development of a Regional Waste Management Centre throughout the atoll.
13. A large percentage (52.95%) was willing to pay a sum per month to remove the waste from the island.
14. The resorts in the atoll were also prepared to be involved in the waste management by helping in the transportation of waste, increasing awareness and also training the islanders to carry out proper waste management.

## **1. Introduction**

Solid waste management has been a serious issue for many societies, specifically with the increase in population along with the changes in industry and the increase in Gross Domestic Product (GDP). These problems are even more pronounced in small island states such as the Maldives where space is limited and the islands are spread over a large geographical area, making it difficult to implement waste management strategies. Solid and hazardous waste management has recently been identified as one of the greatest environmental challenges in the Maldives (MEC, 2004).

Several waste management issues that are relevant to small island states were stated in Halliburton KBR Pty Ltd (2002), including:

- Limitation of available land resources that can be allocated for waste management activities such as landfill sites.
- A heavy dependence on groundwater resources which often exists as a freshwater 'lens' and is highly permeable. Improper management of waste could result in complete degradation of this freshwater lens.
- Decentralized populations over a wide geographical area resulting in increased costs, and difficulties of providing waste management services to the different populations on a series of islands.
- Interruption of sea transport systems due to unfavourable weather conditions reducing options for a more centralised management of certain classes of waste.
- Limitations to implementing the taxation base for a proper waste management system due to low populations on most island states.
- High costs associated with the isolation from suppliers of waste management services and equipment.
- Problems with the coordination of waste management activities due to limitations to communication systems as well as environmental education programmes.

The waste management challenges in the Maldives have been attributed to several of the issues mentioned above. Rapid population growth, the uneven distribution of this population over a widely dispersed set of islands along with changing consumption patterns have worsened the waste management situation of the country. The tsunami disaster caused severe damages to buildings, infrastructure, crop and vegetation of several islands with an estimated total loss of 62% of the GDP (World Bank, ADB, UN System, 2005). Considerable amounts of vegetation, municipal waste from dumpsites, healthcare waste, hazardous waste, and construction and demolition wastes were accumulated across the impacted islands. Assessments undertaken by the UNEP following the tsunami in December 2004 highlighted the importance of tsunami debris and proper waste management in the country (MEEW, 2005).

The status of the present waste management situation of the Maldives has been well documented through various studies and investigations (MEC (2004), MHAE (2004), Halliburton KBR Pty Ltd (2002), ADB (2001)). Waste collection and transfer in Male' is carried out by Male' Municipality and other private parties (MEC, 2004). Waste is not segregated in the households and therefore, sorting at the domestic collection yard is a difficult and time-consuming activity. Waste from Male' is transferred to the Municipal landfill site, Thilafushi. The waste management situation is far worse in the islands than in Male' as there is very little provision of waste management services to these islands. Thus householders carry their own waste and dispose of it on their own through informal dumping, burning and even burying. Only 8.4% of inhabited islands have some sort of fee system for collection and transfer of waste, with only 1.97% having an established fee system (MEC, 2004).

The composition of organic (kitchen and green) waste is higher than any other type of waste in the islands, making up approximately 69% of the total waste generated (Anon, 2005). Waste segregation at the household level is practiced to

some extent by most households and the women of the household carry the waste in wheel barrows to the disposal site (MEC, 2004). Designated waste disposal sites exist on every island. However, due to lack of enforcement and an efficient waste management system, random disposal of waste is widespread.

Open burning of combustible waste is practiced in most islands where smoke nuisance, vegetation die off and accelerated coastal erosion problems are experienced. Non combustibles such as glass and metal cans are stockpiled where they accumulate water and serve as a breeding ground for mosquitoes, posing threats of disease (MHAE, 2004).

Waste Management Centres (WMC) has been established in Haa Dhaalu Kulhudhufushi and Seenu Hithadhoo under the Regional Development Projects, with funding from the Asian Development Bank. Waste processing equipment such as bull dozers, balers, tractors and shredders are present in these sites. However, due to high operating costs the centres do not function on their full potential. This highlights the expensive nature of establishing and operating WMC's both at the island and regional level.

The study was carried out in Baa atoll under the Baa Atoll AEC Project (UNDP-GEF) for the Ministry of Environment Energy and Water. The main aim of the study was to assess the attitudes towards waste management and the willingness to pay by the local communities for waste management services in the atoll. This study serves as a pilot project for developing a waste management strategy for Baa atoll which, if successful could then be applied to other atolls.

## 2. Study Area

Baa atoll (South Maalhosmadulu) is located approximately 125 km to the north-west of Male' (Figure 1). The atoll consists of 75 islands out of which 13 are inhabited (Table 1). The total population is approximately 11,986. The economic activities consist of masonry, carpentry, thatch weaving, fishing, agricultural farming and various tourism related activities (Ministry of Atolls Development Website). At present, there are five resorts in the atoll, namely, Reethi Beach Resort, Sonevafushi Resort, Club Valtur, Royal Island and Coco Palm. A sixth resort, Fours Seasons at Landaa Giraavaru is under construction and is expected to open sometime in the last trimester of 2006.

**Table 1. The islands of Baa Atoll and their respective populations**

<b>Island</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
Kudarikilu	256	279	535
Kamadhoo	208	209	417
Kendhoo	485	560	1045
Kihaadhoo	203	198	401
Dhonfanu	241	222	463
Dharavandhoo	466	486	952
Maalhos	269	274	543
Eydhafushi	1331	1456	2787
Thulhaadhoo	1182	1294	2476
Hithadhoo	548	612	1160
Fulhadhoo	157	141	298
Fehendhoo	113	134	247
Goidhoo	322	340	662
<b>Total</b>			<b>11986</b>

Island Waste Management Centres (IWMC) are planned to be constructed on 10 of the 13 inhabited islands with funding from the Australian Red Cross, Canadian Red Cross and UNDP. These centres will have capacity to segregate and store non-biodegradable waste in 3 compartments, namely, Plastics, Metals and



Residuals. A large area will be dedicated to composting activities of the organic waste. A locked area is also planned to store hazardous waste.

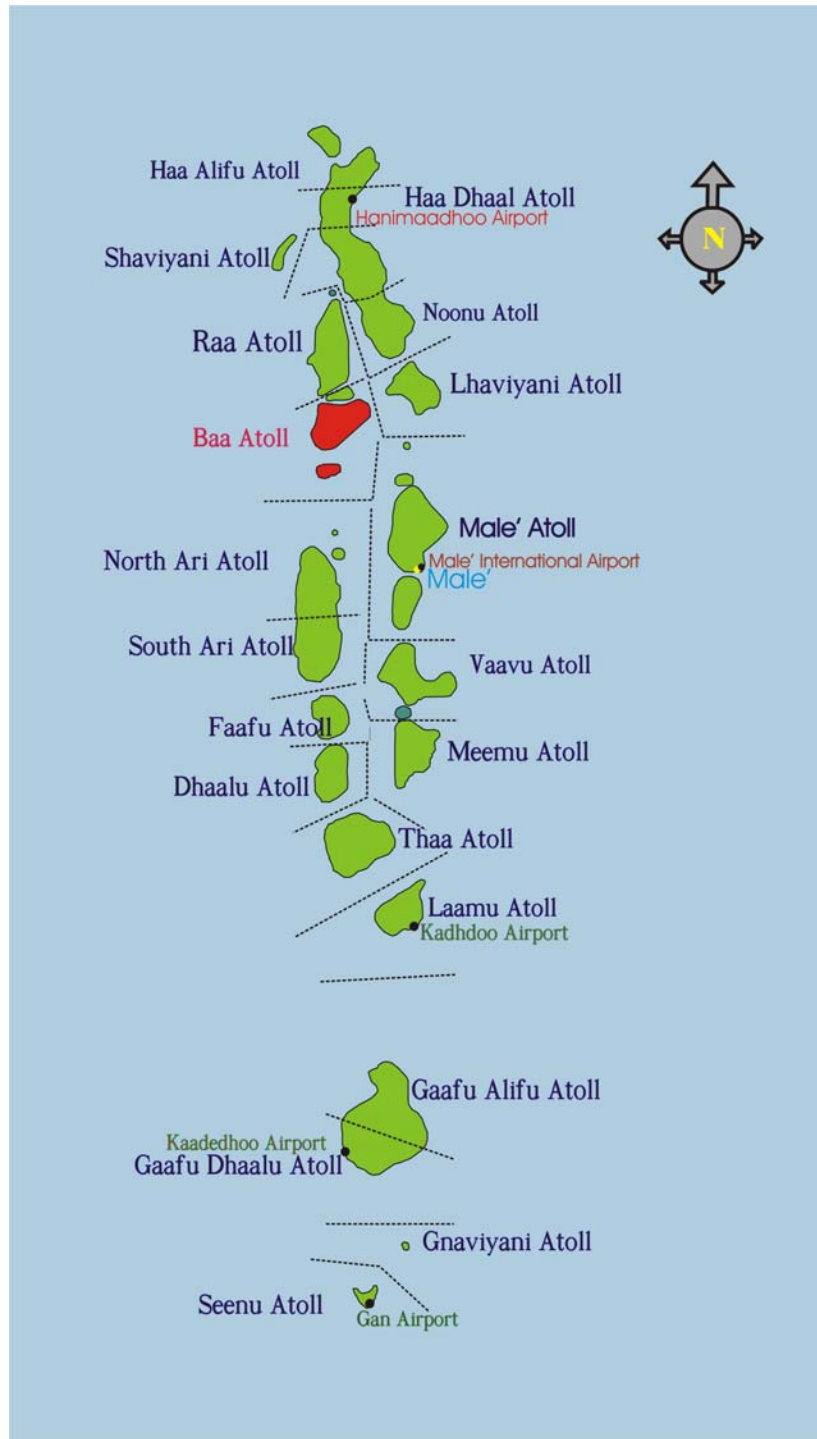


Figure 1. Map of Maldives with Baa Atoll highlighted in red

### **3. Methodology**

The contingent valuation method (CVM) was used to assess the willingness to pay by the local islanders for waste management services. This is a method used to estimate economic values for a variety of ecosystem and environmental services. It is the most widely used method for estimating non-use values although it can also be used to estimate use values (Website<sup>1</sup>). It is also the most controversial of the non-market valuation methods.

In a contingent valuation survey, a hypothetical, yet realistic, scenario is presented to local households and it involves directly asking people, how much they would be willing to pay for the services (Website<sup>2</sup>). The survey aims to find out their willingness to pay for environmental improvements or their willingness to accept compensation for environmental pollution. CVM seeks to put a monetary value on the opinions of local people about these environmental impacts by trying to find out their willingness to pay for solutions to the problem. While contingent valuation cannot be expected to produce “true” values for the environmental side effects of solid waste management options, it can offer policy-makers a guide to the public’s attitude to the options. The use of CV surveys may, in the absence of a structured consultation process about waste options, provide useful information to policy makers.

In-person interviews are generally the most effective for complex questions, because it is often easier to explain the required background information to respondents in person, and people are more likely to complete a long survey when they are interviewed in person. In this study, two types of in-person interviews were carried out on each local island.

The first type was focus group interviews. The stakeholder group was represented by the Island Office, Island Development Committee (IDC), Women’s Development Committee (WDC) and other youth groups and organizations working towards the development of the island. In some of the

focus group interviews, there were people present from the general public that were involved or interested in the waste management activities of the island.

The second type was household interviews where individual households were randomly visited and asked if they would be willing to participate in the survey. A person from the island accompanied the surveyor to each house. Twenty households were surveyed in the smaller islands (populations<500) and 25 in the larger islands (populations>500). However, these numbers were not completed in some islands due to lack of time or lack of inhabited households.

During both types of surveys, the interviewees were given information about the project and its plans to develop a waste management system in Baa Atoll. They were then posed questions on the most appropriate ways of carrying out waste collection, segregation, disposal to the Island Waste Management Centre (IWMC) and finally to a Regional Waste Management Centre (RWMC) or Thilafushi. The questionnaires, along with translations are provided in the Appendix.

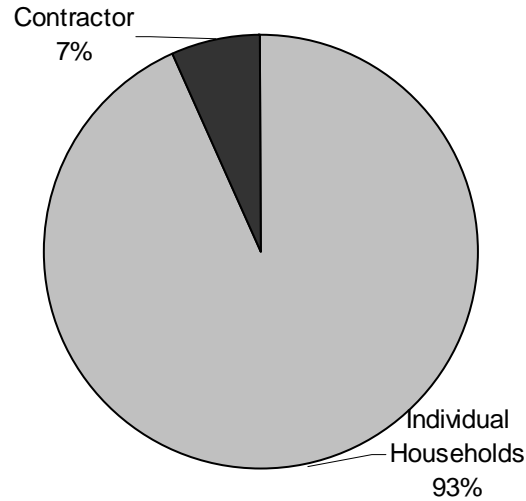
In addition to the local islands, 4 resorts were also visited (Coco Palm, Royal Island, Club Valtur and Reethi Beach). A small power point presentation was given at the beginning of the meeting. Cost estimates to implement and operate IWMCs and a RWMC in Baa Atoll were the focus of the presentation. Following the presentation, they were asked of the importance to them of developing a RWMC and what their role could be in the waste management system of Baa Atoll. They were also asked whether they could contribute towards an annual fund for the management of waste in the atoll.

## **4. Results and Discussion**

### **4.1. *Household survey***

It was mostly women who took part in these interviews. They had clear ideas of the best ways of waste collection, segregation and disposal. However they were hesitant in answering questions regarding money and their willingness to pay, as it is mostly men who are the main income earners and therefore responsible for the financial matters of the household. The concept of willingness to pay is also very new among the Maldivians. Many felt that they would be committed to pay the price they mentioned in the near future and therefore were very cautious when they finally mentioned an amount.

The results from the household survey showed that the majority of people of Baa atoll preferred to dispose of their waste at the IWMC on their own rather than pay a contractor for the collection of the waste (Figure 2). As they were already taking the waste to the respective waste sites on their own at present, they felt that it would not pose a problem in the future. It should be noted that most islands at present have 2 or 3 waste collection sites on different parts of the island, making it a short distance for them to transport the waste (Figure 3). However, only one IWMC is planned to be built on each island of Baa atoll and therefore this may create some resistance in the initial stages of operation of the site. Those who desired a contractor to collect the household waste made up only 6.53% and they were willing to pay a fee between Rf10 to Rf200 per month to the contractor for the service, with only one household out of the 289 visited stating the maximum rate. This household ran a private shop and operated a lacquer work carpentry and expressed that they were already paying someone Rf200 to dispose of their waste from the household as well as their businesses.



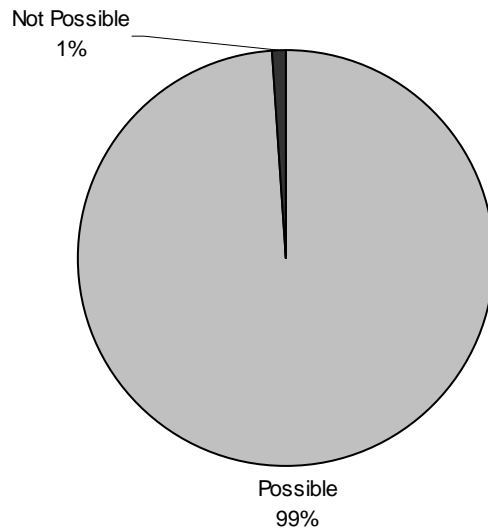
**Figure 2. Preferred method of disposal to IWMC**



**Figure 3. One of the numerous waste disposal sites at Kihaadhoo**

When asked if it was possible to segregate waste at the household level, 98.96% stated that they were already carrying out such activities at the household level to some extent and that it would not pose any problems to segregate into further categories (Figures 4 & 5). The few households (3 out of the 289 households surveyed) that were not in favour of segregating at the household level expressed concern of not having enough space to carry out the activity. However, it should be noted that if waste generated is disposed of on a daily

basis, it may be feasible for these households to segregate before bringing the waste to the IWMC. Majority of the households were willing to segregate the waste into the following categories: metals, plastics, glass, hazardous waste, residuals and organics. However, initially they may need assistance and training to understand the different types of waste and to ensure that the waste is segregated appropriately.



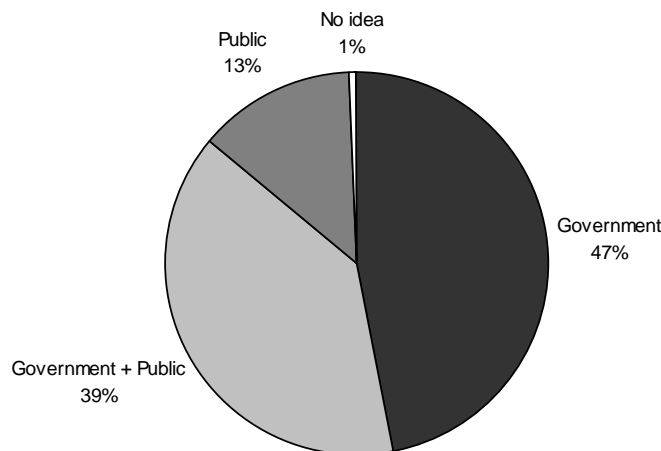
**Figure 4. Possibility of segregation at household level**



**Figure 5. Segregation of waste before disposal is carried out to some extent at present**

An explanation was given to the interviewee of how a basic IWMC will operate and they were made aware of some of the operational costs that would be involved, including the labourers' salaries, electricity and maintenance fees. When asked for their opinion on whose responsibility it was to pay for these expenses, 47.06% stated that it was solely the government's, while 39.10% thought that it was the government along with public support and 13.15% solely the public and a further 0.69% did not have any idea (Figure 6).

Those who stated that the government was liable for the expenses expressed that they felt the only way for this activity to run on a long term basis was if the government were to cover these expenses. They stated that if the public solely tried to generate the money every month, the process would fail after a few months as have happened in the past with other such projects. Many had the opinion that they had a responsibility towards the waste that they generated but felt that they did not have the means to dispose of it appropriately. However, when questioned about how much they were willing to pay monthly for the operation of the IWMC, the answer was overwhelmingly Rf0 (89.47%, Table 2). The remaining 10.53% were willing to pay between Rf4 and Rf200, with the mode being Rf50 (3.16%).

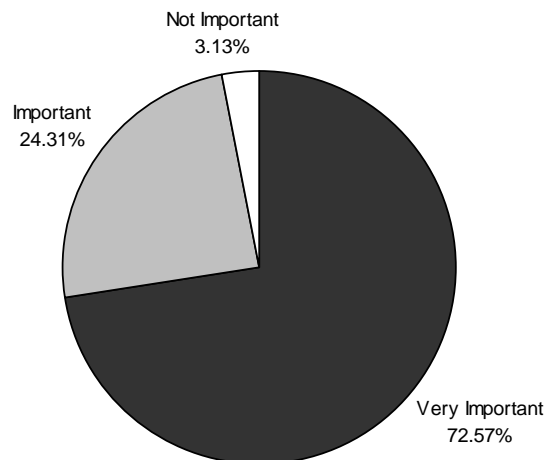


**Figure 6. Opinion on who was responsible to cover the costs for the operation of IWMCs**

**Table 2. Willingness to pay for the operation of IWMC**

Amount (Rf)	Frequency	Percentage (%)
0	255	89.47
4	1	0.35
5	3	1.05
6	1	0.35
10	2	0.70
15	1	0.35
20	5	1.75
30	2	0.70
45	2	0.70
50	9	3.16
100	4	1.40
200	1	0.35
<b>Total</b>	<b>289</b>	<b>100</b>

Next the interviewees were given an explanation about the possibility of developing a Regional Waste Management Centre (RWMC), either in Baa atoll, or in a nearby atoll. They were made aware that the waste from the IWMC would then be transported to the RWMC instead of Thilafushi, which is the only appropriate option at present. When asked how important it was to develop a RWMC, 72.57% believed it was very important while, 24.31% thought it was important and 3.13% not important (Figure 7). Majority of the people appreciated the fact that developing a RWMC would decrease disposal costs, which in turn meant that they had a better chance of getting rid of the non-biodegradable waste that piles up on the islands, on a more frequent basis.





### Figure 7. Importance of developing a RWMC

A large percentage (52.95%) was willing to pay a sum per month to transport the waste from the IWMC to a RWMC. They were prepared to pay a range between Rf3 and Rf200 per month for the service, with a major mode of Rf5 and a minor mode of Rf50 (Table 3). A further 12.45% did not have any idea on how much they would pay. The higher percentage willing to pay for transport of waste from the island compared to disposal of waste to the IWMC suggests the importance of frequent removal of waste from the islands.

Table 3. Willingness to pay for removal of waste from the island

Amount (Rf)	Frequency	Percentage (%)
0	100	34.60
3	1	0.35
4	1	0.35
5	35	12.11
10	30	10.38
15	9	3.11
20	14	4.84
25	6	2.08
30	7	2.42
40	1	0.35
50	34	11.76
60	1	0.35
100	11	3.81
150	1	0.35
200	2	0.69
No Idea	36	12.46
<b>Total</b>	<b>289</b>	<b>100.00</b>

## 4.2. Focus Group Discussions

The focus group discussions were held either inside the island office or its grounds, or in the school hall. An effort was made to make the discussions as informal as possible in an attempt to involve all present. Initially, an introduction to the project and the survey were given to the group before asking them any questions.

### 4.2.1. Collection of waste at the IWMC

The focus groups of all the islands of Baa atoll advised that the most appropriate way of collecting waste at the IWMC was for each household to take the

responsibility to dispose of their own waste rather than contracting a collector to do so. This may be feasible on the smaller islands where the populations are small and concentrated in a limited area. However, on the larger islands some conflict may arise with the implementation of a single IWMC, as the islanders are accustomed to having 2 or even 3 waste disposal areas at present. The distance to the waste disposal area has always been a concern in the islands and on many of them there were already complaints of those that dispose of their waste outside the designated areas merely for convenience. A suggestion was to fine those that do not abide by the rules, in an attempt to discourage such activity.

#### **4.2.2. Segregation of Waste**

The groups agreed that it was best to separate waste at household level and then take the segregated waste to the IWMC for disposal, with the exception of Eydhafushi, where the group was concerned with limited space in some households. However, out of the 25 households that were interviewed in Eydhafushi, only one household preferred not to segregate waste at home as they did not have the space to carry out the activity.

When asked which categories they could separate the waste into, the following were provided: Metals, Glass, Plastics, Hazardous waste, Organics and Residuals. At present they use a variety of things to collect the waste and segregate it, including *goani* bags and wheel barrows to gather the garden waste and bins with lids, empty paint cans, empty yellow cooking oil containers with the top cut off (*hanburi*), buckets and other such containers to collect glass, kitchen and residual waste. It should be noted that most houses own a wheel barrow at present which would help facilitate disposal at the IWMC.

#### **4.2.3. Operation of IWMC**

In the discussions about operating an IWMC, the focus groups of the different islands felt that they would need between 2 to 6 labourers to work at the centre, with a mode of 3 labourers (Table 4). The number was based on the size of the island, the population and present experience on the amount of waste generated on the island. It was suggested that they spent a range of 5 - 7 hours per day and

be paid a salary of Rf1500 - 2500 per month per person (Table 4). The labourers work would be to ensure that the waste was properly segregated, carry out composting and maintenance works and also to transport the non-biodegradable waste to the collection vessel for disposal at Thilafushi or RWMC on the assigned day. On some islands the focus group felt that additional help may be required on the designated days to transport the collected waste from the IWMC to the transporting vessel to be removed from the island.

When the focus groups were asked whether they had any idea on how much the monthly cost of an IWMC would be, some of them did not have any idea while others quoted amounts between Rf5000 to Rf20, 000. Most of the groups mentioned that apart from the labourer's salaries, they expected to spend about Rf2000 per month for maintenance and electricity. Subsequently they were asked about who would spend this money or where the funds would be derived from. The answer was varied with the group in Kihaadhoo suggesting that they could pay for the costs with the income from sales of the compost produced at the centre as well as the money derived from selling plastics, metals and other recyclables to the foreign companies that carry out this trade.

The groups in Kamadhoo and Kudarikilu felt that the government could pay for running the IWMC, but with a contribution from the community. In Kamadhoo, they were willing to pay for the electricity in-kind (the power generation on the island is provided by the community), therefore contributing their share to the cause. In Kudarikilu, the suggestion was for the different island committees and groups, along with the community to raise funds to contribute to the operation of the IWMC. They stated that each household could pay Rf15 per month without a financial inconvenience towards this fund.

Apart from these 3 islands, the remaining 10 islands of Baa atoll expected the government to solely pay for the operational fees of the IWMC. However, it should be noted that in the household survey, a significant percentage from

majority of the islands believed that they had some responsibility towards paying these fees (Figure 6).

#### **4.2.4. Removal of Waste from the Islands**

The focus groups of all 13 islands felt that it was important to develop a Regional Waste Management Centre (RWMC). Most of them were not aware on the scale of funds needed for such a project, although they all agreed that it was a large sum. When asked where it was best to derive these funds, 41% stated the government, 52.6% projects and 6.4% thought it was best to utilise the atoll account.

Following this discussion, they were asked how much a cargo boat would charge for a trip to carry the non-biodegradable waste from their respective island to a RWMC (assuming it was approximately a 2 hour trip). A range of Rf1500 to Rf5000 was given with a mode of Rf2000 (Table 4). Some islands were unable to give a price as they did not have any large cargo boats that carry supplies to the island. The group in Eydhafushi suggested that a better option may be to hire a cargo boat (60 feet) on contract basis to collect waste from all the islands in Baa atoll each month. Their job would be to visit each island in Baa atoll to collect the non-biodegradable waste accumulated over the month and take it to the RWMC. They estimated that such a boat could be hired for Rf60,000 per month. Compared to the option of taking the waste to a RWMC, the costs associated with transporting the same waste to Thilafushi appears to be considerably much higher. Estimated costs for such transportation ranged between Rf5000 and Rf18,000 for each trip, with majority of islands quoting towards the higher end (Table 4).

The focus groups of all the islands felt that the government should take sole responsibility for transporting the waste from the islands to a RWMC or Thilafushi with the exception of Eydhafushi who expressed that there should be input from the public. A complaint that was raised by all the islands was that they should not be expected to pay for waste management as is the case in Male'. Majority of the

households and sectors in Male' do not even pay for collection and transfer of waste (MEC, 2004). It was pointed out by the consultant that higher government revenue was derived from the Male' inhabitants through registration fees etc and therefore basic services such as waste management would be highly expected by the people.

A range of Rf0 to Rf20 was quoted as amounts that could be contributed by each household per month without financial inconvenience, towards transport of waste from the island to a RWMC (Table 4). The mode was Rf0.

Next they were inquired about the possibility of finding local groups who would carry out the waste management services of the island for a monthly fee on contract basis. All the focus groups agreed that it would not be difficult to find such people on their island, and they expected that the groups would carry out such activities for a fee ranging from Rf12000 to Rf50000 per month (Table 4).

**Table 4. Summary of responses from Focus group interviews**

<b>Island</b>	<b>No. of labourers</b>	<b>Working hours</b>	<b>Salary/ person</b>	<b>Amount/ trip to RWMC</b>	<b>Amount/ trip to Thilafushi</b>	<b>WTP for disposal to RWMC</b>	<b>Contractor fee</b>
Fulhadhoo	2	7	2000	1500	5000	0	No idea
Fehendhoo	3	6	2000	No large boats	No large boats	0	50000
Goidhoo	4	6	2000	No idea	No idea	0	No idea
Thulhadhoo	4-6	7	2500	5000	10000	0	25 -30,000
Hithaadhoo	3	7	2500	2000	8000	0	21000
Eydhafushi	4	7	2500	5,000	10000	20	50000
Maalhos	4	6	1500	2000	10000	7.50	25000
Dharavandhoo	3	7	2000	No large boats	No large boats	0	No idea
Dhonfanu	3	7	1800	No large boats	No large boats	0	15000
Kihaadhoo	5	7	2000	2000	12000	0	18000
Kamadhoo	2	5	1800	2000	15000	5	10000
Kudarikilu	4	6	2000	2000	15 to 18000	20	16000
Kendhoo	3	7	1800	5,000	15000	10	18000

### **4.3. Discussions with Resort Management**

Out of the 5 resorts operating in the Atoll, the consultants were able to meet with the management of four resorts, with the exception of Sonevafushi Resort who did could not spare the time due to their busy beginning of the year activities. A sixth resort, Four Seasons at Landaa Giraavaru is planned to open this year. The consultants visited the island but unfortunately, the personnel who could provide the required information were not on the island at the time of the field visit.

All four resorts expressed their interest in being involved in developing a waste management strategy for Baa atoll and were very willing to contribute in some way towards implementing such a system. All of them offered to transport the non-biodegradable waste from 1 or 2 inhabited islands to Thilafushi or a RWMC but were not willing to commit to a fixed date. At present some of the resorts are already carrying out waste transportation activities from the islands. For example, Kihaadhuffaru Resort picks up the waste from Dharavandhoo on request basis and takes the waste to Thilafushi on their supply boat when it comes for supplies in Male'. The same arrangement exists between Reethi Beach Resort and Dhonfanu.

Royal Island offered to provide assistance in transportation of waste, training people in proper waste management skills and running awareness programs on the islands. They have a very good record of waste management and therefore have a lot of experience that could be shared with the local people. Reethi Beach also provides assistance to the island communities regularly and they suggested taking a voluntary contribution from the guests towards a fund to manage waste in the atoll. They also suggested taking a recycling fee on imports that comprise of recyclable materials.

When asked whether they could contribute towards an annual fund for operating the IWMCs on the islands, the managers stated that they would have to refer to their Directors as the decision would have be made at a higher level.

## **5. Conclusion**

Overall, the attitude of the Baa Atoll locals was quite positive towards waste management. It was evident that the younger generation was more enthusiastic about implementing a proper waste management system for the atoll. Many from the older generation were more cynical on the issue, probably due to some bad experiences in the past. The household surveys proved to be a good method to understand the perceptions of the islanders, at the same time increasing awareness on the subject.

From the results of the survey, it is apparent that the most appropriate way to collect solid waste at the IWMC is for each household to take the responsibility to segregate their waste at home and dispose of it on their own to the IWMC. Few were willing to pay for a contractor to collect their waste on a regular basis. However, it should be noted that once the IWMCs are constructed, each island would have only one waste management centre as opposed to a 2 or 3 designated areas for disposal, which is the present situation. Therefore some friction may arise initially but it is felt that over time, these problems would subside with an increase in awareness and a proper system.

Majority of the focus groups strongly believed that it was solely the government who should pay for operating the IWMCs. From this, the consultants concluded that public education on the importance of waste management is essential, since if those who were unwilling to pay were more aware of the project's importance, they might then support it and even be willing to pay the necessary fee to keep it operational. In contrast, the results from the household surveys demonstrated that a significant percentage had the opinion that they also had a responsibility to cover some of the costs.

The idea of developing a RWMC was received with enthusiasm and most felt that it was important to have such a centre in the atoll or in one of the nearby atolls. Most felt that it was best to develop the RWMC through foreign funding from a



project and were willing to pay something to transport the waste from their respective island to the RWMC. It is probably best to hire a cargo boat exclusively for transport of waste from the islands of Baa atoll, as such a boat was estimated to charge Rf 60,000 per month.

The resorts in the atoll were also very enthusiastic to be involved in waste management. They expressed that they would be able to help in transportation of waste, increasing awareness and also training the islanders to carry out proper waste management.

## 6. References

Anon. (2005). *Concept design of a Waste Management Disposal and Storage Facility (WMDSF)*. Report prepared by MEEW, UNDP, CRC and ARC.

Asian Development Bank (ADB). (2001). *Addu Atoll (SDR) and Kulhudhuffushi (NDR) Solid Waste Management, Strategy*. Report prepared for the Government of Maldives.

Halliburton KBR Pty Ltd. (2002). *Conservation and sustainable use of biodiversity of associated with coral reefs of Maldives (Pdf-B). Strategy for solid waste management in Vaavu and Baa Atolls, Maldives*. Male': UNDP, (EEN201-G-DO-001 Rev B).

Ministry of Atolls Development Website: [http://www.atolls.gov.mv/atolls.asp?atoll\\_letter=F](http://www.atolls.gov.mv/atolls.asp?atoll_letter=F)

Ministry of Home Affairs and Environment (MHAEE). (2004). *Identification of Existing Barriers to the Provision of Effective Solid Waste Management Services within the Maldives and Recommendations for their removal*. Male': MHAEE.

Ministry of Environment and Construction (MEC). (2004). *State of the Environment- 2004*. Male' Maldives: MEC.

Ministry of Environment, Energy and Water (MEEW). (2005). *Workshop on the National Waste Management Strategy: Strengthening the links and bridging the gaps*. Hulhule Island Hotel. Workshop Proceedings.

Website<sup>1</sup>: [http://www.ecosystemvaluation.org/contingent\\_valuation.htm](http://www.ecosystemvaluation.org/contingent_valuation.htm)

Website<sup>2</sup>: [http://www.idrc.ca/en/ev-8263-201-1-DO\\_TOPIC.html](http://www.idrc.ca/en/ev-8263-201-1-DO_TOPIC.html)

World Bank, ADB, UN System. (2005). *Tsunami Impact and Recovery: Joint Needs Assessment*.

## **Appendix**



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\_\_\_\_\_ עָרַבְתִּי  
\_\_\_\_\_ עִיבַרְתִּי

שָׁלוֹם אֲשֶׁר בְּתוֹכְךָ לֹא יִשָּׁרְרָה בְּעַדְּךָ לְיָדוֹ לְעַדְּךָ שָׁלוֹם -- זֶה הוּא הַשְּׂמֵחַ שֶׁבְּתוֹכְךָ

לִשְׂמֵחַתְּךָ יִשָּׁרְרָה לְךָ חַדְשׁ לְעַדְּךָ

1. לִשְׂמֵחַתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ חַדְשׁ לְעַדְּךָ לְעַדְּךָ יִשָּׁרְרָה בְּעַדְּךָ?  
 לֹא יִשָּׁרְרָה יִשָּׁרְרָה לְעַדְּךָ חַדְשׁ לְעַדְּךָ  
 לֹא יִשָּׁרְרָה יִשָּׁרְרָה לְעַדְּךָ חַדְשׁ לְעַדְּךָ לְעַדְּךָ יִשָּׁרְרָה  
a. לִשְׂמֵחַתְּךָ לֹא יִשָּׁרְרָה חַדְשׁ לְעַדְּךָ לְעַדְּךָ יִשָּׁרְרָה בְּעַדְּךָ?  
\_\_\_\_\_ חַדְשׁ

לִשְׂמֵחַתְּךָ וְלִשְׂמֵחַתְּךָ

2. לִשְׂמֵחַתְּךָ וְלִשְׂמֵחַתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ?  כִּי  
 לִשְׂמֵחַתְּךָ  
3. וְלִשְׂמֵחַתְּךָ  
שָׁלוֹם לְעַדְּךָ?  
\_\_\_\_\_

4. לִשְׂמֵחַתְּךָ וְלִשְׂמֵחַתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ לְעַדְּךָ?  
\_\_\_\_\_  
\_\_\_\_\_

לִשְׂמֵחַתְּךָ רִשְׁתְּךָ

5. לִשְׂמֵחַתְּךָ רִשְׁתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ?   
6. לִשְׂמֵחַתְּךָ רִשְׁתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ?  
\_\_\_\_\_  
7. לִשְׂמֵחַתְּךָ רִשְׁתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ? חַדְשׁ לְעַדְּךָ \_\_\_\_\_  
8. לִשְׂמֵחַתְּךָ רִשְׁתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ? חַדְשׁ לְעַדְּךָ \_\_\_\_\_  
9. לִשְׂמֵחַתְּךָ רִשְׁתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ? חַדְשׁ לְעַדְּךָ \_\_\_\_\_  
10. לִשְׂמֵחַתְּךָ רִשְׁתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ?  
\_\_\_\_\_

11. לִשְׂמֵחַתְּךָ רִשְׁתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ? חַדְשׁ לְעַדְּךָ \_\_\_\_\_  
\_\_\_\_\_

12. לִשְׂמֵחַתְּךָ רִשְׁתְּךָ לֹא יִשָּׁרְרָה לְעַדְּךָ? חַדְשׁ לְעַדְּךָ \_\_\_\_\_  
\_\_\_\_\_

עִיבַרְתִּי לִשְׂמֵחַתְּךָ

13. אֲפֹסֶיךָ שָׂוִי וְשִׁמְרֹתֶיךָ לֹא יִשְׁלַחֲךָ וְרִגְזֶיךָ דָּרִיבֶךָ.  א  ב

14. דִּבְרֵיךָ עֹשֶׂה רָקִיעַ כְּסִיף בַּרְבַּעֲךָ?  א  ב

15. דִּבְרֵיךָ רָקִיעַ

לְשִׁמְרֹתֶיךָ?

16. אֲפֹסֶיךָ שָׂוִי וְשִׁמְרֹתֶיךָ לֹא יִשְׁלַחֲךָ וְרִגְזֶיךָ דָּרִיבֶךָ.  א  ב

17. בְּדִבְרֵיךָ עֹשֶׂה רָקִיעַ לְשִׁמְרֹתֶיךָ בַּרְבַּעֲךָ.

כִּי?

18. דִּבְרֵיךָ רָקִיעַ

לְשִׁמְרֹתֶיךָ?

19. כִּי שָׂוִי וְשִׁמְרֹתֶיךָ לֹא יִשְׁלַחֲךָ וְרִגְזֶיךָ דָּרִיבֶךָ.  א  ב

לְשִׁמְרֹתֶיךָ וְשִׁמְרֹתֶיךָ לֹא יִשְׁלַחֲךָ וְרִגְזֶיךָ דָּרִיבֶךָ

20. לְשִׁמְרֹתֶיךָ לֹא יִשְׁלַחֲךָ וְרִגְזֶיךָ דָּרִיבֶךָ.  א  ב

21. בְּדִבְרֵיךָ דָּרִיבֶךָ לְשִׁמְרֹתֶיךָ בַּרְבַּעֲךָ?  א  ב

בְּדִבְרֵיךָ דָּרִיבֶךָ

22. דִּבְרֵיךָ שִׁמְרֹתֶיךָ לֹא יִשְׁלַחֲךָ וְרִגְזֶיךָ דָּרִיבֶךָ.  א  ב

23. דָּרִיבֶךָ עֹשֶׂה רָקִיעַ כְּסִיף בַּרְבַּעֲךָ.  א  ב

**Questionnaire on the Development of a Waste Management System  
in Baa Atoll – Household survey**

**Disposal of Waste to the Island Waste Management Centre (IWMC)**

1. What is the most appropriate way of disposing waste at the IWMC for this island?

Individually by households

Every household to pay a fee to a contractor for regular disposal

a. How much can each household pay for disposal of waste without financial inconvenience? Rf \_\_\_\_\_

**Segregation of Waste**

2. Is it possible to segregate waste at the household level? Yes  No

3. Into which categories? \_\_\_\_\_

4. What kinds of containers would you require to segregate waste? \_\_\_\_\_

**Operation of IWMC**

There are some costs associated with running an IWMC. E.g.: Salaries of labourers.

5. Who should pay for these costs? \_\_\_\_\_

6. How much can each household pay for the operation of the IWMC without financial inconvenience? Rf \_\_\_\_\_

**Disposal of non-biodegradable waste from the island**

7. Is it important to develop a Regional Waste Management Centre?

Very important     Important     Not important

8. How much can each household pay for the disposal of waste to a RWMC, without financial inconvenience? Rf \_\_\_\_\_



**Questionnaire on the Development of a Waste Management System  
in Baa Atoll – Focus Group Survey**

**Disposal of Waste to the Island Waste Management Centre (IWMC)**

1. What is the most appropriate way of disposing waste at the IWMC for this island?

Individually by households

Every household to pay a fee to a contractor for regular disposal

a. How much can each household pay for disposal of waste without financial inconvenience? Rf \_\_\_\_\_

**Segregation of Waste**

2. At which level should segregation of waste be undertaken?  At home  At IWMC

3. Into which categories? \_\_\_\_\_

4. What kinds of containers would you require to segregate waste? \_\_\_\_\_

**Operation of IWMC**

5. How many labourers do you require to work at the IWMC?

6. What activities would they carry out at the IWMC? \_\_\_\_\_

7. How many hours would they work at the IWMC? \_\_\_\_\_ per day

8. What should be the salary per worker? Rf \_\_\_\_\_

9. What are the costs associated with operating an IWMC? Rf \_\_\_\_\_

10. For which activities?

11. Who should pay for these costs/ how would you obtain this amount? \_\_\_\_\_

12. How much can each household pay for the operation of the IWMC without financial inconvenience? Rf \_\_\_\_\_

**Disposal of non-biodegradable waste from the island**

13. Is it important to develop a Regional Waste Management Centre? Yes  No

14. What are the costs associated with operating a Regional Waste Management Centre?  
Rf \_\_\_\_\_

15. Who should pay for these costs/ how would you obtain this amount? \_\_\_\_\_

16. What are the costs associated with transporting waste from the island to a RWMC? Rf \_\_

17. What are the costs associated with transporting waste from the island to Thilafushi? Rf \_\_

18. Who should pay for these costs/ how would you obtain this amount? \_\_\_\_\_

19. How much can each household pay for the disposal of waste to a RWMC, without financial inconvenience? Rf \_\_\_\_\_

**Waste Management on Contract Basis**

20. Are there people on this island who would be interested in solid waste collection and operation of IWMC on contract basis? \_\_\_\_\_
21. If so, how much would they be willing to carry out the activities for? Rf \_\_\_\_\_

**Miscellaneous Questions**

22. How many cargo boats are there on the island? \_\_\_\_\_
23. How many times do they travel to Male' for supplies in a month? \_\_\_\_\_