

If mooring buoys were provided a significant 19 operators would be prepared to use them for night fishing. Night fishing trips that anchor on the reef would fall by 20% from 50%. The remaining operators would do well to decide whether their 19 colleagues are living in a dream world or should be followed in the good example they have set by drift fishing at night.

In any case, and especially with the difficulty of controlling anchoring during night fishing, it seems that anchoring for night fishing will continue to some extent. If anchoring does damage the reef then night fishing areas will need to be separated from snorkelling and scuba diving areas whether, or not, a mooring buoy scheme is introduced.

DOES ANCHORING DAMAGE THE REEF?

This leads us to the part of the questionnaire that asked operators (restricted to dive base leaders, or resort operators and owners who dive regularly) to list those places where they thought that anchoring had damaged, or was damaging, the reef.

DIVE OPERATORS	OWNERS/ MANAGERS	NUMBER OF SITES DAMAGED
13	2	0
9	1	1
7	1	2
3	1	3
2	0	4
34	5	-

Thirty four dive base operators and 5 owners/managers (with diving experience) responded

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to this question. The results are listed below.

Considering that 34 of the 39 operators regularly visit 10 or more sites during a typical 3 month period it would appear that anchor damage is not a problem. Operator were worried about anchor damage from a philosophical point of view and were prepared to accept that the situation might deteriorate but, at the bottom line, few felt that present levels of anchor damage would damage their livelihoods.

CONTRIBUTIONS

Against this background it is encouraging that anybody was prepared to pledge a donation towards installation of mooring buoys. Indeed 10 dive operators and 7 resort operators pledged a total of \$US7020. A list of donors and their recommendations for each mooring buoy location is enclosed with this newsletter. Pledges for Mushimasmigili would provide for at least 2 buoys and for at least one buoy at Mayathilla, and Potato reef (South Male') and Scipio and Trepranee reef (North Male'). One operator pledged \$US1,500 and another \$US1,000. A handful of Resort Operators have also offered (depending on availability) free food, accommodation and transfers to up to four people doing the installations.

There is no doubt that some operators want mooring buoys because it is easier and more convenient than anchoring. However, some of the motivation is a real desire to help prevent environmental deterioration. This is partly for philosophical reasons but also because it makes sound business sense to maintain the state, and associated asset value, of the reefs they use.

**Please give a Copy to
your Diving School!**

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COT NEWS LETTER

SPECIAL RUBBISH ISSUE



GREAT BARRIER REEF
 MARINE PARK AUTHORITY

- 3 APR 1992

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MARINE RESEARCH SECTION
 MINISTRY OF FISHERIES AND AGRICULTURE
 The Republic of Maldives

EDITORIAL

This issue of the COT newsletter addresses subjects that are even further from the "crown-of-thorns" starfish issue than usual. This may reflect the lack of recent outbreaks in those atolls where tourism is allowed. It can also be argued that little concern should be due to reefs that have been damaged recently by COT and that cannot deteriorate further in the short term.

In the meantime a number of other environmental pressures of equal, or greater, concern need to be aired and the COT newsletter is not the best means for achieving this. A number of other mechanisms for disseminating information on the Maldives environment are proposed. This will, therefore, be the last issue of this Newsletter.

Thanks are due to the Canadian International Centre for Ocean Development (ICOD) for funding production. Special thanks go to those people who have been prepared to put pen to paper and voice their concerns about the marine environment of the Maldives. A final thanks must go to those people who have sent us information on the marine environment.

This last issue of the COT newsletter looks at two indirect impacts on the marine environment. The impacts are those from solid waste disposal and from anchoring on coral reefs. Both impacts can be minimised by taking appropriate action.

SOLID WASTE DISPOSAL AND MALE'

It would appear that the Tourism Sector, excepting for those efforts by MATI (Maldives Association of Tourism Industries) to use incinerators expects Male' to get its' solid waste disposal act together before it upgrades its' own standards. To set the record straight we present excerpts from an interview with Mr Abdullah Saleem, Assistant Under-secretary, in the Male' Municipality.

Q. What is Male' Municipality doing about disposing of solid waste in an environmentally friendly manner?

A. Well it will probably help to start by telling you what the solid waste is. We examined the rubbish arriving at the Male' tip over a two week period. As you can see from the table most of the material is soil and other substances that are not poisonous.

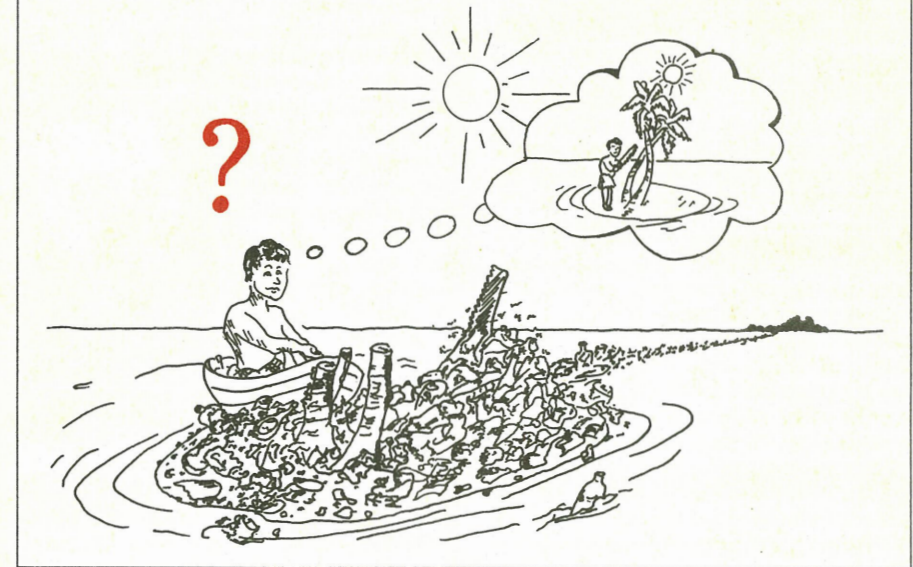
MATERIAL	%
Coarse grit	29
Fine grit	24
Kitchen waste	19
Textiles/plastics	11
Paper	4
Leaves/gardens waste	4
Wood/cartoons	3
Metal	3
Glass	2
Stone	1
Total	100

Q. Yes but these figures do not tell you if there are poisonous substances present in very small quantities.

A. Well compared to industrialised countries our solid waste is relatively harmless but I agree that no amount of analysis will be able to warn us of an accidental introduction of some poisonous material. We therefore have to develop a precautionary approach and assume that the material might be contaminated. For example we have been advised that it is not safe to make compost from garden and household waste because, once it has arrived at the rubbish tip, there is no way of guaranteeing that it is free from poisons.

In an ideal world, we would carefully sort, and recycle, nearly all the solid waste. We would destroy combustible materials and poisons by burning them in incinerators. We would use biogas converters to get energy from the organic waste. We would compost any left-over organic material that we found was free from poisons.

"RUBBISH, RUBBISH, EVERYWHERE AND NOWHERE TO GO!"



However, we have looked into the costs of carefully sorting and disposing of our solid waste and have found them to be prohibitively expensive at this time. Even if we had the money we would still need to find the land where sorting can take place and where we can dispose of the 10% of the waste that would be left after careful sorting, burning, and recycling.

On Male' we have a population density as great as that of a major City but our city is surrounded by sea and not land. Indeed land is in such short supply that we have been driven to create more of it by filling in the lagoon area on the south of Male' using waste material!

Despite these practical problems I am optimistic. Indeed we have just signed a contract with a private party who will sort, and recycle, scrap metal from the rubbish tip. Given time, and the backing of a good solid waste disposal system, we can start fine tuning the system. We will then encourage people to compost and recycle their own materials and arrange to recycle more and more of the solid waste once it gets to the tip.

I am sure that you are beginning to see that there is no easy way to get rid of waste from a small, densely populated, island like Male'. I have already said that we don't have huge areas of land to bury the material. Perhaps even more significantly the very future of our island state depends on the health of our coral reefs so we don't want to dump waste on them.

Q. So what are the options?

A. We have considered three possible options. Firstly we could continue to make a waste tip of the island we live on. We all know the results. The groundwater supply will take years to be fit for human use... and the problem of space is amply illustrated above. The man has to live in his boat because there is no land left!

Secondly we could create a special site away from any island or live coral reef and minimise the risk, by distance, and by special construction, of any leakage. Finally we could take the solid waste well-out into the open ocean and dump it.

Q. So what are you planning to do?

A. We are in the process of getting assistance from the United Nations Development Programme to introduce a container based system for waste collection. The containers will then be sealed, so no solid waste can blow onto the sea, and then taken by barge to a fill site.

Indeed the fill site has been identified in the last couple of months and we have already started to take waste there on a barge using our collector trucks as containers.

Q. So where is the fill site?

A. For various reasons, some of them given earlier, it has been decided not to situate this fill site on any island or near to any reef. Near to Male' this left us with the choice of one of the large sandy lagoon areas in North and South Male' atoll. We decided on a spot that is the furthest point from any island; that is within 8km (five miles) of Male'; and that can be reached in most weather conditions.

The site is on the sheltered side of a large reef almost midway between Vilingilli and Giraavaru, is at least four kilometres from both, and is separated from both islands by channels.

We have tried to reduce the potential environmental impact still further. The seawards edge of the tip will be over 100m from the reef edge and will be protected by a 5m thick wall of dredged material that extends about 1m above sea-level. Behind the protecting wall is a 6m deep hole that has been dredged to produce the material for the wall. This hole will also take the solid waste. As the hole is filled we will top it off with a 20cm layer of sand just as they do in any landfill site in the developed world.

We hope that this will minimise leakage of material to the sea and damage to the environment. In the long term we can even use this artificial island for sorting and recycling solid waste!

Q. How are you going to make sure that the wall around the fill site will not erode and expose the material in the tip?

A. Well the walls of the fill site are very thick

and will be over 100m from the edge of the reef. Under normal weather conditions the finer sediments will wash out of the walls with wave action and the wall that remains will be stronger because of this. If there is a big storm the walls should survive it. If the walls do erode and place the fill site at risk we will have good warning of it and have time to do something about it.

Q. Won't these fine sediments damage the living coral on the reef?

A. We hope not. We feel that the wall will be far enough from the reef edge and that sediments will only be released for a relatively short period.

If we are wrong the only way to stop the sediment from escaping is to build the retaining wall of imported material (which is prohibitively expensive) or to mine coral from the living reef. We certainly don't want to mine one area of living reef to protect another area of living reef!

Q. You haven't mentioned your third option; to dump solid waste well out into the open ocean away from the land and the reefs?

A. Well we are not experts in this matter and the experts have told us that it is better to make a fill site for the rubbish. It is difficult to persuade the experts that a special case needs to be made for small island states and particularly difficult when these experts come from countries with plenty of land!

Q. At a practical level there are many complaints about solid waste disposal on Male' and the way that people throw rubbish over the seawall into the sea or into the harbour. What are you doing about it?

A. Well there is a law 33/78 dated 30th May 1978 which prohibits the throwing of garbage on the north side of Male' between Henveiru boatyard and Maafanu boatyard. We also employ some people to keep the harbour in this area clean. There is a notification that you should not throw plastic waste over the seawall

and that expired food tins and other such items should be disposed away from the house reef.

Q. Well all these things don't seem to be having much of an effect!

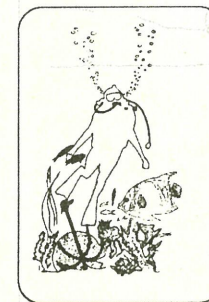
A. Unfortunately there is a poor attitude towards rubbish disposal amongst the general public but I feel that we can only try to improve this attitude once we have a good scheme for solid waste disposal going. Then we can encourage people to sort and compost because they will not see it as a wasted effort. I feel that our waste disposal system will give us the opportunity to do things properly.

In the meantime you will know how the air stinks when we burn the waste on Male' and how the flies infest the island during certain seasons. It is hardly a good example to set to those who are throwing their rubbish over the seawall!

Q. Thank you for your time and for giving us some information on this subject.

A. Well all I hope is that Male' Municipality doesn't continue to be labelled as the bad guy in all this. We want to do the best thing for the Capital and for the environment on which we depend so much. Thank you.

THE ANCHORING DEBATE



There is widespread concern in Maldives, and in other parts of the world, that anchoring damages coral reefs, makes them less beautiful, and may even discourage tourists. In many parts of the world the response has been to designate particular reef areas for particular activities so that there are no conflicts of interest. Mooring buoys have been provided in those reef areas where snorkelling and SCUBA diving is allowed.

SPECIAL THANKS

Special thanks are due to all those resorts and dive operators who assisted in the survey!

THE QUESTIONNAIRE

Anchoring questionnaires were sent to nearly all the Resort Islands after Ramazan last year. Safari dhonis were not included in the survey. Few people understood the questionnaire and the response was consequently poor. A modified approach was used and a total of 39 Resorts (there are about 60 Resorts in the Maldives) were visited or telephoned.

The questionnaire looked at the issue of anchoring for only three types of activity. The activities were SCUBA diving, snorkelling, and night fishing. The most appropriate person at the Resort was interviewed for each specific activity. In the case of SCUBA diving it was usually the dive base leader. For snorkelling and night fishing it was a staff member who said he/she could answer knowledgeably.

Each interviewee was asked to estimate how many trips were made by their Resort (or dive base) for the specified activity over a three month period. They were then asked to estimate how many trips involved anchoring.

A variety of anchoring methods were used (weighted sand bags being one of the less usual methods). Methods were broken down into five categories. The categories aimed to allow for analysis of the incidence of different anchoring methods according to how likely they were to damage the reef. The categories are listed below and in order of decreasing likelihood of reef damage.

METHOD	DESCRIPTION
Anchor on the reef	Anchor on the reef.
Anchor in deep water.....	20 or more metres.
Tie-On.....	Rope tied to a coral outcrop.
Anchor on a sand	Anchor on sand.
Moor	Rope tied to a mooring buoy.
Drift	No anchoring, engine kept running.

The interviewees were then asked how the pattern of anchoring would change if mooring buoys were available. This information was used to generate the results shown in table 1 for SCUBA diving, in table 2 for snorkelling, and in table 3 for night fishing.

SCUBA DIVING

Most Dive operators do not anchor. Just under 2% (173) of all the reported dive trips involve anchoring on the reef and almost 83% of all diving is done from drifting (on motor) boats. Only one of the 39 dive operators asked would continue to anchor on the reef if mooring buoys were available. There would only be four trips with anchoring on the reef during a three month period in this situation.

SNORKELLING

10 of the Resorts questioned do not have snorkelling trips by boat. Just over one quarter of the snorkelling trips that do occur in-

volve anchoring on sand and just under a third involve drifting. 15% of all trips involve anchoring on the reef. If mooring buoys were installed only one Resort would continue to anchor on the reef and then only on 6 occasions in a three month period.

Clearly boats that anchor on the reef during snorkel excursions should consider drifting (on motor) and follow the example set by other Resorts.

NIGHT FISHING

The returns on the night fishing questionnaire are very interesting. Perhaps most interesting is that about 25% of all operators, and 30% of all night fishing trips, do not presently anchor but drift. Those operators that drift for night fishing are listed below and are based in North Male' and Ari atoll.

Asdhu
Halaveli
Ihuru
Makunudu
Nika

Bandos
Hudhuveli
Madoogali
Nakatchafushi
Thulhaagiri

Table 1.

SCUBA DIVING						
METHOD OF ANCHORING (DECREASING ORDER OF IMPACT)	ESTIMATED TRIPS IN 3 MONTHS			OPERATORS (2)		
	AT PRESENT	IF BUOYS AVAILABLE	CHANGE	AT PRESENT	IF BUOYS AVAILABLE	CHANGE
ANCHOR ON REEF (CORAL)	173	4	-169	8	1	-7
ANCHOR IN DEEP WATER	0	0	0	0	0	0
TIE-ON (DO NOT ANCHOR) (1)	830	358	-472	21	7	-14
ANCHOR ON SAND	226	6	-220	4	1	-3
MOOR (DO NOT ANCHOR)	308	1345	+1037	10	29	+19
DRIFT (DO NOT ANCHOR)	7423	7247	-176	39	38	-1
DO NOT OPERATE	0	0	0	0	0	0
TOTAL	8960	8960	-	-	-	-

1. TIE-ON: Somebody swims down from the boat with a rope and ties it to a coral outcrop

2. OPERATORS: Operators were questioned at 39 resorts. There are about 60 resorts in Maldives. No safari boat operators were questioned.

Table 2.

SNORKELLING						
METHOD OF ANCHORING (DECREASING ORDER OF IMPACT)	ESTIMATED TRIPS IN 3 MONTHS			OPERATORS (2)		
	AT PRESENT	IF BUOYS AVAILABLE	CHANGE	AT PRESENT	IF BUOYS AVAILABLE	CHANGE
ANCHOR ON REEF (CORAL)	250	6	-244	12	1	-11
ANCHOR ON DEEP WATER	0	0	0	0	0	0
TIE-ON (DO NOT ANCHOR) (1)	346	100	-246	5	1	-4
ANCHOR ON SAND	455	455	0	13	13	0
MOOR (DO NOT ANCHOR)	60	696	+636	1	17	+16
DRIFT (DO NOT ANCHOR)	504	358	-146	14	9	-5
DO NOT OPERATE	10	10	0	10	10	0
TOTAL	1615	1615	-	-	-	-

1. TIE-ON: Somebody swims down from the boat with a rope and ties it to a coral outcrop

2. OPERATORS: Operators were questioned at 39 resorts. There are about 60 resorts in Maldives. No safari boat operators were questioned.

Table 3.

NIGHT FISHING						
METHOD OF ANCHORING (DECREASING ORDER OF IMPACT)	ESTIMATED TRIPS IN 3 MONTHS			OPERATORS (2)		
	AT PRESENT	IF BUOYS AVAILABLE	CHANGE	AT PRESENT	IF BUOYS AVAILABLE	CHANGE
ANCHOR ON REEF (CORAL)	1010	658	-352	30	17	-13
ANCHOR ON DEEP WATER	147	0	-147	2	0	-2
TIE-ON (DO NOT ANCHOR) (1)	20	0	-20	1	0	-1
ANCHOR ON SAND	260	24	-236	4	0	-4
MOOR (DO NOT ANCHOR)	0	814	+814	0	19	+9
DRIFT (DO NOT ANCHOR)	620	561	-59	10	9	-1
DO NOT OPERATE	0	0	0	1	1	0
TOTAL	2057	2057	-	-	-	-

1. TIE-ON: Somebody swims down from the boat with a rope and ties it to a coral outcrop

2. OPERATORS: Operators were questioned at 39 resorts. There are about 60 resorts in Maldives. No safari boat operators were questioned.