

ECOLOGICAL ENGINEERING

The second technique called "ecological engineering" is new and innovative and can be designed to deal with both the septic tank waste and the septic tank overflow. In this situation a complex brew of plants and animals simulate the natural processes of sewage treatment. Whilst this system appears ideal it may be relatively high tech.

MORE INFORMATION

One expert on "wetland plant treatment" tells us that it should cost no more than \$US50,000 to both research and install the basic system needed to produce water for ground water recharge and toilet flushing. Research costs (to find suitable vegetation and draw up plans) could be shared between several Resorts. We have no idea of the cost of an 'ecologically engineered' treatment plant at this time.

STOP PRESS

MORE TROUBLE WITH TURTLES

When we visited Kuredhdhu Resort in Lhaviyani Atoll on the 20th of October they were busy collecting sand from one section of

beach to build additional rooms. Unfortunately this section of beach was also being used by nesting turtles. If this wasn't bad enough there were lights and a cement mixer operating immediately behind the beach. In the long-term the disturbance could have proved disastrous. Fortunately the resort responded very rapidly to our request that they do something about the problem. They say that they have stopped taking sand from this beach and re-located the cement mixer and lights elsewhere.

Rannalhi Resort phoned us up in early December to report that a turtle without a shell had been collected in the Resort lagoon. There is a local belief that a turtle will grow its shell back if it is removed. Sometimes it is removed by pouring boiling water on! We had to advise the resort that the best thing they could do was to kill the turtle and put it out of its misery.

We found an undersize turtle tied to a pole in the water off Ugoofaru Island in Raa Atoll. We asked the locals about it. They said that they were waiting for it to grow to the legal size. Unfortunately this would have taken a long time. The turtle had died tied to the pole. The Government is considering a proposal for a 15 year moratorium on all turtle collecting. The problem is that it could mean the loss of the livelihood of those selling turtle products to the Tourists!

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Please give a Copy to
your Diving School!

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COT NEWS LETTER



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EDITORIAL

THE MALE' CRACK

Windows rattled, and cracks were reported to appear in buildings, during blasting operations on Male' house reef on the morning of the 14th November. The purpose of the blasting was to create a trench in the reef for a pipe to take saltwater from the open ocean to a planned desalination plant. A good supply of desalinated water is vital to the continued wellbeing of the capital island.

Something had gone wrong. The public were concerned that their houses might have been damaged, that the reef might have been killed and, perhaps most importantly, that the very coral foundations of the island might have been cracked leading to eventual breakup. Consultants visited the site. Damage was limited. All appeared well.

However, one concerned citizen was not satisfied with the situation. He checked the reef and found some small cracks. He brought the matter to the attention of the authorities and persevered. Experts revisited the site and cracks, among other damage, were confirmed but were still considered to be of little significance.

There are many lessons to be learnt from this tale. The first is that it took the perseverance of one individual to bring the matter to the attention of the authorities. His efforts eventually paid off and the cracks were given prominence in the local media. This has led to a re-examination of whether blasting a channel through the reef is the best way to supply Male' with urgently needed desalinated water. Hopefully this re-evaluation will provide a consensus about what should be done and an acceptance of any inherent risks.

Another lesson to be learnt is that it is best to develop cautiously when the consequences of any errors may be serious (the precautionary approach). It may not be so easy to solve a problem once it arises (the reactionary approach). Precaution is particularly necessary when the local expertise needed to evaluate development programs is limited and the im-

ported experts may lack a full understanding of the local situation.

Ultimately the battle for the environment will be won through the responsible actions of individuals. These people set the example that others follow. It may be a big example - chasing a large corporation for an environmental abuse; but it can also be a small one - picking-up a piece of litter off the street. All add up and make a positive contribution to maintaining the environment for future generations.

So next time don't say it isn't your responsibility. It is!

NEWS FROM LOCAL ISLANDS

A total of 40 islands were visited in atolls to the north of Male' between the 20th of October and the 07th November 1990 (see fig. 1, table 1). The trip was made for the same reasons as the trip to the southern atolls in August; namely to determine the status of the reefs, check them for COT, and examine the islands for problems of beach erosion.

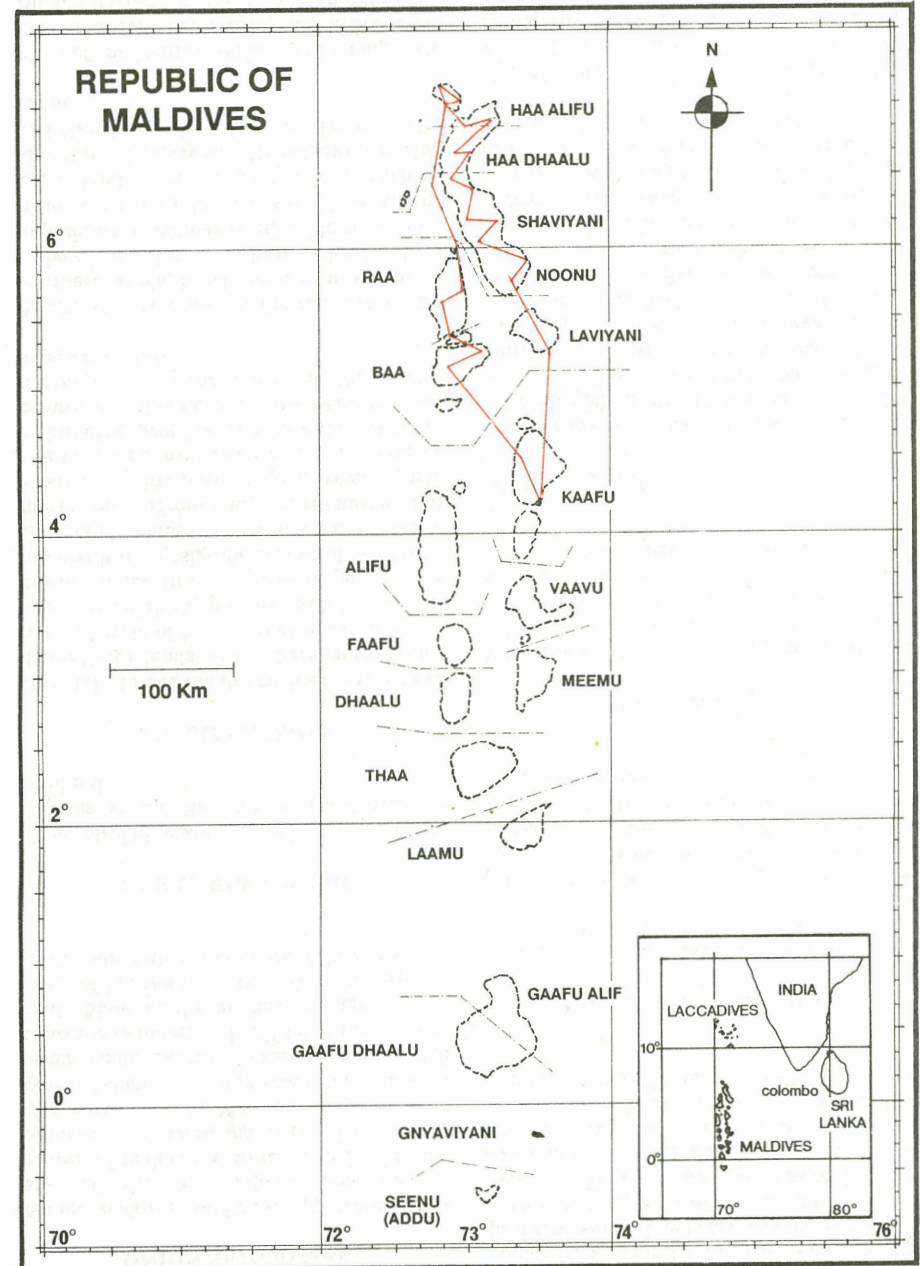
TABLE 1. SUMMARY, BY ATOLL, OF ISLANDS VISITED BETWEEN THE 20TH OF OCTOBER AND THE 07TH OF NOVEMBER 1990.

ATOLL	INHABITED	UNINHABITED	RESORT	TOTAL
Haa Alif	7	5		12
Haa Dhaal	3	1		4
Shaviyani	4	1		5
Noon	3			3
Raa	6	2	1	8
Lhaviyani		1		2
Baa	2	4		6
Total	25	14	1	40

REEF CONDITION

Of the 32 reefs that were examined only 7 were of good quality. 14 were of moderate quality and 11 were of poor quality. There are a number of possible stresses that might

Fig. 1 ATOLLS VISITED AND ROUTE FOLLOWED ON NORTHERN REEFS AND ISLANDS SURVEY BETWEEN 20th OCTOBER AND 07th NOVEMBER 1990.



cause deterioration. The stresses include coral mining which appears to have occurred on at least 9 of the reefs. Crown of thorns were reported to have caused widespread deterioration in Haa Alif atoll in the recent past. However, COT were only seen at one of the twelve reefs examined in this atoll. Large areas of 5 reefs were carpeted and smothered by colonies of "killer anemones" (see below). Finally it was evident that some reefs had been damaged by storms and supported little or no coral cover.

All these possible stresses make it very difficult to explain the reasons why a particular reef has deteriorated and, therefore, what can be done to prevent it from happening in the future.

Three conclusions can be drawn from our observations. The first is that reefs can be of poor quality without any evidence for human impact. Secondly any reef deterioration in the atolls designated for tourism may be part of the natural cycle of events and not solely due to human interference. Strange as it may seem this provides justification for looking after deteriorated reefs and giving them a chance to recover naturally rather than giving up and abusing them even more - a common strategy in the tourism industry.

Thirdly reefs may be robust and survive COT plagues and recover from storm events but may not do so if they are subject to additional impacts from human activities. It follows that it is wise to minimise these human impacts.

The lack of understanding of how reefs work justifies a precautionary approach to human use of the reef. This normally means doing as little as possible to change the reef environment when new human activities are introduced.

COT

No COT plagues were identified on the trip (table 2). Indeed COT were only seen at one of the thirty-two reef sites visited. Two COT were seen in an hour's swim on this reef around Gofarfushi island in Haa Alif.

TABLE 2. INCIDENCE OF COT AT 32 SITES IN 7 ATOLLS VISITED DURING OCTOBER AND NOVEMBER 1990

ATOLL	NUMBER OF SITES	SITES COT SEEN	NUMBER OF COT SEEN/HR
Haa Alif	9	1	2
Haa Dhaal	3	0	0
Shaviyani	5	0	0
Noon	3	0	0
Raa	6	0	0
Lhaviyani	1	0	0
Baa	5	0	0
Total	32	1	

"KILLER ANEMONES"

Dr Hoorst Moosleitner first pointed out the existence of coral devouring "killer anemones" in the Maldives. His report appeared in the June 1989 edition of the Coral Reef Newsletter produced by the Pacific Science Association. His observations were restricted to one small reef in South Male' Atoll. He describes the anemone-like creature as a corallimorpharian, *Rhodactis sp.*, 1.5cm in diameter when withdrawn, but 5cm across when fully expanded and the whole oral disc spread over the surface. He reports that these anemones were actively growing over living corals and Dr Moosleitner voiced his concern over the future of this reef.

We found 5 reefs in the north covered in colonies of these anemones. In some cases it was evident that the anemones were growing over healthy corals and smothering them. It is difficult to see how a reef would recover from such an event. Coral larvae cannot land on the carpet of anemones and survive. Nothing appears to eat the anemones, and the corals cannot outgrow them.

Fortunately reefs only a couple of kilometers from these anemone infested areas appeared to be clear of infestation. Hopefully, there is some natural control of the spread of these animals. Let us know if you have any observations of, and opinions about, the spread of these "killer anemones".

ONION SKIN ALGAE

No onion skin algae *Padina spp.* were seen at any of the 32 northern reef sites we examined in detail. It would appear that the outbreak of *Padina spp.* is restricted to certain parts of south Male' atoll and to similar types of sheltered-water coral community in other atolls. Marine Research Section will continue to monitor the 'ICOD'* reef sites in south Male' atoll that have a high percent cover of *Padina spp.* algae. We will keep you up-to-date with any changes if they arise.

CORAL BLEACHING

Coral bleaching was only observed at 8 of the 32 sites visited. Bleaching at the 8 sites was minimal.

BEACH EROSION

Our trip to the north provided further evidence that islands in Maldives go through a natural cycle of beach erosion and build-up associated with the monsoons and occasional storm events. In most cases these cycles do not result in any significant loss of sand from the island. Some of the sand on the beach is merely moved from one place to another. The existence of this natural cycle provides justification for not over-reacting to beach erosion by building groynes and seawalls but to accommodate this natural movement by building on piles near the shore (see the August newsletter - Ed).

Again, as was reported for the trip to the southern atolls, beach erosion only appears to be of significance to local islands where population densities are high. These communities eventually build a seawall to extend their land area or protect the existing shoreline. Shaviyani Dhashukomandoo and Raa Kadholhudhoo provide examples of this.

Most of the islands visited had no long-term erosion problems. An exception is Shaviyani Bilehfaahi where one section of shoreline has

*Canadian International Centre for Ocean Development.

eroded back by up to thirty meters over the past few years. The beach has not recovered with the changes in monsoon and there appears to be no obvious explanation for the phenomenon. One possibility is that the erosion was initiated by a large storm and that the beachlines are still reaching equilibrium following the disturbance.

POPULATION PRESSURE

Concerns over availability of building plots (perhaps the most obvious indicator of population pressure) were voiced on four of the 25 inhabited islands that were visited. There are serious population pressure problems on two of the forty islands visited. The islands are Shaviyani Dhashukomandoo and Raa Kadholhudhoo.

ADOPT A CORAL

We have continued to adopt corals around inhabited and uninhabited islands. 40 corals (19 tables and 21 *Porites*) were adopted at 21 sites on our trip to the northern atolls and at least two sites in each administrative atoll.

SEWAGE DISPOSAL

The problems caused by sewage were described briefly in the May issue of the COT newsletter. There is no doubt that the problem of sewage disposal from Resorts and local islands is a serious one and deserves greater attention. Indeed Graeme Kelleher, Chairman of the Great Barrier Reef Marine Park Authority in Australia, believes that 'protection of the Great Barrier Reef from increasing nutrient levels (sewage is a major source of nutrients - Ed) may be the greatest challenge facing the Great Barrier Reef Marine Park Authority in the next two decades'.

The 'Greenpeace' Pacific Campaign has responded to our request in the May 'COT' Newsletter to tell us 'if any reader knows of a small scale sewage treatment facility that might work on small islands'. The Greenpeace Pacific Campaign tells us that it 'Hopes to have the opportunity next year (1991) to

