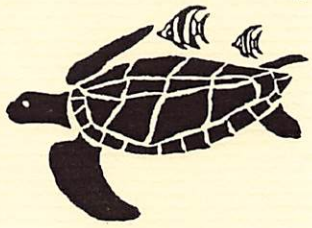
Bay Islands Expedition



1998

A joint British-Honduran expedition to the Bay Islands of Honduras with members from the Universities of Newcastle, Bangor, Heriot-Watt and the Universidad Nacional Autonoma de Honduras.

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Summary Objectives:

The aims of The Bay Islands Expedition is to survey the effectiveness of Marine Reserves on two of the Bay Islands of Honduras and to continue with a long-term monitoring programme set up in 1995 by Project Utila which is designed to assess spatial and temporal changes to the coral reefs of the Honduran island of Utila. Studies were also be carried out within areas designated as marine reserves or proposed marine reserves to provide data for the effective management of these areas. The Expedition hopes to promote the continued conservation of the marine ecosystems of Utila and the Bay Islands through education, training and community-based work.

HERIOT-WATT UNIVERSITY
EDINBURGH

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BANGOR

INTERNATIONAL YEAR of the REEF 97

Introduction.

Project Utila was established in 1995 as a joint British-Honduran scientific expedition. The Primary objectives encompass a continual monitoring surveys of the reefs around Utila, annual studies on particular areas of concern, such as Black Band Disease and work in the marine reserve at Turtle Harbour, whilst helping to educate those who use the reef on the dangers of continual pressure on this delicate ecosystem.

The 1998 expedition aims were:

- Re-surveying the five permanent baselines around Utila.
- Continuing the monitoring of the permanent Black Band Disease Quadrat in Turtle Harbour.
- Production of a Coral Reef Education Pack, specific to Utila and lecture notes, for use by the islands dive schools in conjunction with the PADI Naturalist Dive.
- A Dive School Survey, which has, and continues to allow us, to evaluate the diving pressure on different sites around the island.

In addition:

- Project Utila supported and helped organize a reef clean up with the dive schools as part of World Clean-up Day 1998
- Initial research was conducted, to implement a 'Study of Human Interactions with the Reef', during 1999.
- Communications were established, initial survey work and a methodology devised, with a view to setting up a concurrent Utila-Roatan continual monitoring programme in 1999.
- The expedition has supported BICA's new teaching campaign in schools and has begun preliminary work to expand our own teaching programme to the other schools on the island
- The expedition also held an Open Forum Discussion for all interested parties on the current state of the reefs and factors affecting it.

The aim of this preliminary report is to provide an account of the 1998 Expedition with some early findings, which will be superceded by an intermediate report with further analysis of this years results, and by a final report incorporating full analysis of the previous four years of data.

Permanent Monitoring Programme.

Before we commenced any diving work all team members were taught good buoyancy control so that they could survey effectively, with no coral damage caused by the survey divers. In addition, safety drills were carried out to practice safety procedures and throughout the expedition several rescue scenarios were run, unprepared for, to check the effectiveness of the procedures and divers.
In conjunction with this dive training, much of the early part of the expedition was occupied learning the forty species of corals and 140 species of fish in various life stages, necessary to survey. The team members had to pass an exam scoring over 85% and the survey technique was also practiced and checked before being allowed to survey. These steps were taken to ensure the accuracy of the surveys. In addition, one of the main aims of the expedition is to teach these techniques to the Honduran students and to expand all the divers knowledge to allow them to carry out work underwater safely and effectively. The level of the divers was very varied at the start of the expedition, with some only 7 to 8 dives previous experience, but within a reasonably short amount of time all the divers had developed into an effective and efficient scientific working team, and towards the end many of the team members diving skills were greatly improved.

Methodology
The reef monitoring methodology consists of five permanent baselines marked by the 1995 expedition. Unfortunately the passage of time has caused the loss of many of the ties and stakes that mark these sites. During this years expedition stakes were replaced on the baselines. The position of these was pinpointed using co-ordinates, depth, and site descriptions by the 1995 expedition.
The baselines are situated at Silver Gardens Buoy, Cabaños and Turtle Harbour. There is a second base line 100m from the buoy at Silver Gardens and Cabaños to allow the assessment of diver impact upon the reef.
The 100m baselines are separated into three depth zones <10m; 10-20m and 20-30m.
For safety reasons, due to the intense nature of the diving carried out, no dives over 30m are permitted and all dives are carried out in accordance with PADI tables and within the no-stop limits of BSAC tables with a 3 min. safety stop added to every dive deeper than the shallow zone.
50m transects running perpendicular to these baselines were carried out by teams of 4 divers each responsible for monitoring a different aspect of the reef community.

Diver 1: surveyed fish species numbers on a 50m x 4m transect. The speed of the transect was regulated to 15 mins.

Diver 2: surveyed the substrate type using a line point intercept method along the 50m transect recording every metre.

Diver 3: surveyed the hard coral using a 10m line intercept transect.

Diver 4: surveyed the soft corals and sponges using a 10m x 1m belt transect.

Full analysis of the reef monitoring programme from this and previous years will be available in the final report, to be completed in 1999. 1995-1996 Final Report and 1997 Preliminary Report are available. They can be seen at BICA Office on Utila, Newcastle University Library in the UK or by writing to a Project Utila or Bay Islands Expedition representative (see back). Copies are presented to BICA, UNAH and COHDEFOR.

Black Band Disease Permanent Quadrat.

The Black Band Disease Quadrat is a 20m x 20m area in Turtle Harbour in which all the coral heads have been mapped with a central colony that was infected when the quadrat was set up. The continual monitoring programme tags colonies that are affected by the disease and plots its course within the quadrat. It also records the degree to which the corals are killed by the disease and plots any potential recovery or re-infection. This year no new colonies of black band disease were found in the quadrat, and no evidence of black band was present in previously affected colonies.
The 1997 research into black band disease showed sites on Utila have a 0.1% to 0,05% occurrence of black band whereas sites in Florida Keys and others have around 0.7% infection. However, black band disease was found in groups of colonies within a small radius (up to 10 colonies within 2m). It is therefore still considered a potential threat to coral reef degradation.

Diver Education Pack.

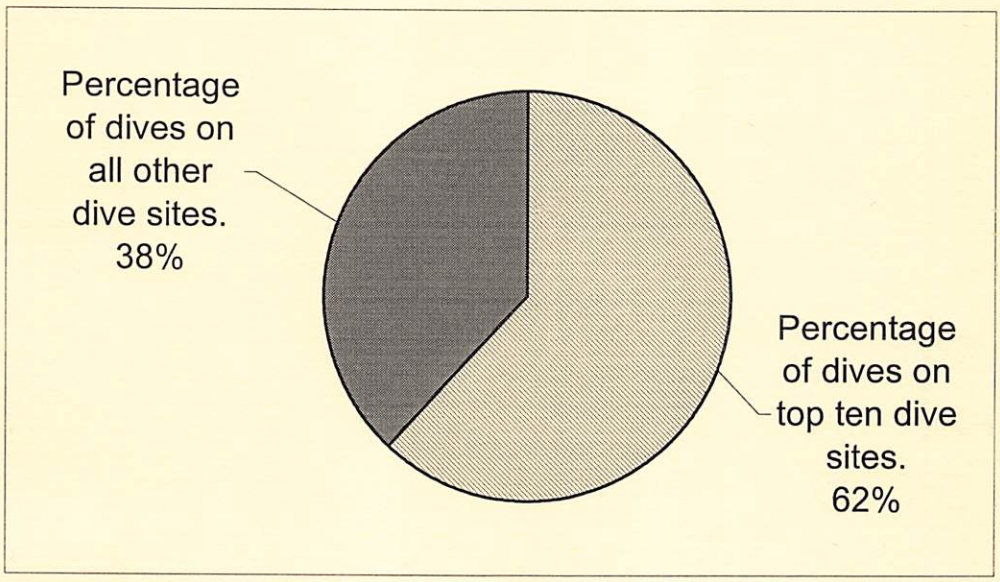
The diver education pack was an idea suggested by dive instructors in 1997. The problem is that many of the instructors on Utila are only there for a short period of time and don't necessarily have any prior knowledge of the reefs. This, therefore, makes teaching the PADI Naturalist Dive and providing information on the reef to students difficult. The pack was designed by conferring with several instructors on what format would be most helpful and the level at which it was to be taught. This would ensure that the pack would be practical and easy to use, and therefore used within the dive schools. The pack consists of two parts, a 45 min. lecture with overheads or posters, which can be given as the PADI Naturalist dive course. In addition the student book associated with the course would include more information with specific topics, areas of Utila or species of interest, to provide extra reading for those interested. It was not designed as an identification book. The contents of the lectures consist of the nature and behavior of coral and the coral reef ecosystem including the mangrove and seagrass habitats. It also outlines the dangers coral reefs face and the laws and guidelines for divers in the Bay Islands.
The first draft of the outline of the teachers pack was presented to the dive schools in September for comment, and the pack should be available by the end of 1998 for distribution. Should the pack be a success there is a further plan to convert the teaching portion of the course into a video.

Dive School Surveys

As in previous years, surveys of Utila's dive schools were carried out to ascertain the intensity of diving on the reefs surrounding Utila in 1998. There are currently 11 dive schools on the island. Although there are 2 less dive schools than in 1996, the level of diving intensity appears to be the same. Of the 11 dive schools in Utila only 9 participated in the survey, and unfortunately only 3 returned enough information to be analyzed. Due to the poor response of the survey it was not possible to calculate the number of divers using the reef or the total number using each site. Therefore, it is difficult to make a direct comparison with previous years' results. From the information we have we can ascertain the most popular dive sites. These have not changed significantly in the last four years due to the heavy use of the training sites on the south side of the island. However, the increase in diving sites, e.g. Ron's wreck, has slightly diversified the number of dives on all other sites but the greater proportion still occur on the top 10 sites.

Top ten dive sites 1997	**Top ten dive sites 1998**
1. Moon Hole	1. Moon Hole
2. Black Coral Wall	2. Airport Caves
3. Silver Gardens	3. Silver Gardens
4. Airport Caves	4. Jack Neil
5. Pretty Bush	5. Black Hills
6. Jack Neil Point	6. Lighthouse Reef
7. Pinnacles	7. Big Rock
8. Jack Neil Cove	8. Ted's Point
9. Little Bight Wall	9. Pretty Bush
10. Lighthouse Reef	10. Black Coral Wall

In 1998, these ten sites accounted for 62% of the dives around the island, while all other dive sites accounted for the remaining 38%. From last years' results this shows a small increase in the percentage use of the top ten sites. The remaining 38% show a greater spread of dive sites than last year. This would lead to believe that while the rest of the sites on the island may be seeing a better spread of diving pressure due to an increased number of dive sites. The most used sites have seen a further increase in diver pressure.



Graph showing percentage use of top ten sites in 1998 and percentage use of all other 36 dive sites.

There has been an increase in the use of sites around the wrecks as would be expected, however, the apparent drop in the use of Black Coral Wall and Pretty Bush may be due to the reduced visibility during the time of the surveying.
Due to the lack of response to the survey, any conclusions are difficult to draw and had to be supported by questioning various diving instructors who were willing to help.

Reef Clean-Up

This year the International Clean Up The World Day coincided with our visit to Utila. As each year, BICA organizes community clean ups around the island, especially the beaches, this year Project Utila undertook the task of organizing a reef clean up.
Collection bags were distributed to all the dive schools who were encouraged to collect as many bags as they could with a prize to the one that collected the most. Despite all the dive schools agreeing to take part, and posters and reminders given, the turn out was extremely poor. Although PADI also supports the reef clean up not a single dive school participated. Though a few excuses were given, with a few exceptions, this seems typical of the disinterested approach many have to the reef, due to either their short stay on the island or general apathy to reef issues.

Appraisal of the potential for Social Studies.

Since 1995 Project Utila has been mainly concerned with the scientific monitoring of Utila's reefs. The original plan for the project set up by Mark Smith and Jeremy Milne was for the project to expand to study all aspects of Utila and the Bay Islands.
Utila has a diverse population reliant on a variety of livelihoods, which are predominantly dependent on the marine environment. Conservation efforts to date have had to contend with the serious conflicts of interests arising from the current state of the cultural, economic and social situation. The challenge for environmental management on Utila is to accommodate these conflicts because the support and co-operation of different resource users is key to the effective conservation of the marine environments. Therefore, there is a particular need for a social study to investigate the human dimension of coral reef dynamics to enable the issues and problems identified to be addressed effectively and efficiently. This year the aim was to provide an initial outline of the proposed social research.

Issues for investigation:

1. An appraisal of local knowledge relating to environmental change on Utila:
   a) The degree of ecological understanding of the changes, processes and causal factors.
   b) Evaluate local opinions, attitudes, perceptions and values associated with the changes.
   c) Supplementary information on rates of change and trends.
2. Mapping of resource uses of the marine areas i.e. subsistence fishing, commercial fishing, diving intensity. Use this information to identify sensitive areas, areas under stress/pressure.
3. Identify needs, priority, problems of differing interest groups i.e.:
   Cay fishermen & Utilian fishermen
   Local businesses, shops and restaurants.
   Dive schools - owners, instructors, divers.
   Schools - students and teachers.
   Elderly citizens.

Aims of study:

⇒ Evaluate the need and potential for environmental education.
   Highlight specific areas that need emphasis
⇒ Identify the challenges facing legislation
⇒ Supplement scientific data
   Compare and contrast scientific and local perceptions of the situation.

Continual monitoring programme in Roatan beginning 1999.

Project Utila traveled to Roatan in the attempt to provide a comparative study of the Sandy Bay Marine Reserve and Turtle Harbour Marine Reserve, Utila. The study was designed to evaluate the effectiveness of the Turtle Harbour Marine Reserve with a longer established, better policed reserve, which had been praised in scientific papers for its effectiveness. Due to an unforeseen administrative error this study was not possible. However BICA Roatan consulted Project Utila on their planned introduction of a continual monitoring strategy in the near future. After discussing the available data and allocation of base lines Project Utila were asked to formulate the methodology for the study and if possible to carry out the study next year.
The situation, demands, and constraints of the work in Roatan, as well as the sheer size of the area to be covered means that the same methodology cannot be used, so a direct comparative study could unfortunately not be evaluated in the future. The methodology devised will allow a team of the same size as Project Utila to cover the 13 baselines proposed next year, and there will be scope for interchangeability between teams so Honduran and UK students could experience both survey methods, and still work effectively.
Though the details are still to be formalized the methodology has been suggested to BICA and a formal presentation will be completed shortly.
Sites were also found for a comparative study of the seagrass in the marine reserves of Utila and Roatan to be carried out in the future, with special attention to the possible conch population recovery due to the new patrols in Turtle Harbour.
Project Utila were also consulted on BICA's new teaching programme in schools around the Bay Islands, we are happy to give our support to this new programme and hope that it continues to be a success

Open Forum Discussion. Held 17th Sept. 1998

The meeting was held on the request of various parties, not only to explain the role of Project Utila, but also to answer and discuss various issues and questions on the reef.
Many people from a wide variety of areas were personally invited, and posters advertising the meeting were placed around the island. Present at the meeting were a mix of divers and dive instructors, some of which have been resident in Utila for some time. There were a few locals, less then hoped for, and representatives from BICA, Project Utila and a few other interested people.
The meeting commenced with a short introduction by Project Utila on our role, and what we have achieved. We then outlined our concern on areas affecting the reef, including dredging on the south side of the island, increasing diving pressure, and the outbreak of Staphylococcus infection in divers and the team. The discussion was then thrown open to the floor.

First it was suggested that if the conditions did not get better, then a dramatic drop off of the diving industry related to reef health and aesthetics could occur. This would give the

tourist industry a life of only 3 to 5 years, if it became poorly represented in the diving press.
Black band disease concerns were the first points raised. Project Utila outlined the work done last year showing the low occurrence in Utila and the results of the permanent quadrats. It was concluded that though this was a potential serious problem possibly related to diving pressure, as all the dive schools taught with a no touching policy and much of the training occurs on sand flats, it would only be a future concern if a rise in its occurrence was detected.

The second topic was one that was returned to at several times during the meeting. There was a lot of concern about the coral bleaching that can be seen in September this year. BICA and several longer residents commented that this was an annual occurrence thought to be related to increasing water temperature around September. This year we recorded water temperatures in the shallows at Turtle Harbour of up to 32°C, though there were differences of opinion on the severity of this years bleaching event compared with other years.
There was further concern that the dredging at the Laguna Beach Resort, which has reduced visibility along the south side of the island, may provide unfavorable conditions for the return of the zooxanthellae (following the bleaching), leading to coral deaths.
A short debate then suggested that an increase in dead coral seen along that coast may not only be due to the dredging, but a cumulative increase in sediment caused by extensive mangrove clearing around that lagoon area prior to 1993. It was also suggested that increased sedimentation in the water might be compounded from sediments in mainland river run-off.

The subject of the lack of evidence for diver impact by Project Utila brought up the point that the mooring buoy programme was limited to where the buoys could be placed on the reef not for the potential of the dive site beneath. The sites for the buoys are often on large outcrops of Mountainous Star Coral, however, and these often occur in areas of more dramatic reef, which appeals to divers.
There was a call for new buoys to be positioned on the sea mounts especially Black Hills dive site where continual anchoring by dive boats has destroyed much of the coral on top of it.

The problem of the Staphylococcus infection was one obviously at the forefront of many of the divers and instructors minds. The infection causes blisters that burst leaving open sores, and the fluid in the blisters further infects the immediate area or others by direct contact. The infection although more common in divers was also reported by some others such as boatmen that come in contact with the water. A few cases seem to have occurred in people not connected with the sea, but in contact with other infected. The causes were unknown, but increased nutrients due to sedimentation could be responsible for higher concentrations in the water. The problem is not limited to Utila however; several people who had dived in other areas along the Belizian Barrier reef had contracted or seen the infection. The Staphylococcus bacteria affect on fish or other reef species was unknown, but it is responsible for a similar blistering condition on dolphin's skin.

There were a variety of opinions on this, and unfortunately the doctor was not able to attend. He had previous commented on an increase in 1998. There were a few who believed that the infection was due to the poor levels of hygiene amongst divers and travelers, and the frequency that the wetsuits in the dive schools were washed. The problem does appear to be a clinical infection, and though this may be a valid point on controlling its spread it is not the cause.
There was further concern that because this species is known to have drug resistant strains, the treatment of so many people with antibiotics could lead to an outbreak of an untreatable infection on the island.

The treatment of human refuse and waste was another issue raised. BICA outlined the problems they had establishing a refuse collection service to prevent the dumping in the sea, and that this system was now run by the municipality. The rubbish is still dumped in a fill, with no treatment, and though this is an improvement it is merely a step in dealing with the problem. Some rubbish is still dumped in areas of mangrove around the island and in seagrass beds; this is found in the sea when the tide flows from the lagoons. Although the problem is as yet a small one there were reports of plastics around corals and fish from some divers.

The lack of treatment of fecal waste was also an issue of concern for those using the reef. Much of the island waste carried through a sewage system; there is concern to the untreated sewage deposited on the reef. Although it was pointed out that nearly all of the worlds sewage is dumped in the sea, the lack of treatment in Utila, and its possible direct impact on the reef and connected health risk, was clearly voiced be an number of people.
Although past *Escherichia coli* testing in the Bay Islands showed negligible levels, Project Utila were asked to try and test water samples next year, for Enterococcus sp. and nutrient levels to establish human waste levels.

Divers and islanders alike have noticed fish population decline in numbers over the last few years. Principally size and numbers of groupers, hogfish and several other species, especially high level predators, with commercial value. Although only hand line fishing is allowed on Utila, which is deemed to be one of the most conservationally acceptable methods, it may be related to the recent banning of indiscriminate fishing methods such as gillnets, fish traps and lobster pots. It was also observed that last year there was a discernible increase in parrotfish and some other herbivores, but whether this was a result of removal of predators or increase in algae due to increase in dead coral is difficult to establish.
The problems of studying these changes were highlighted in the difficulties of fisheries studies. Project Utila explained that the methods used make the observation of absence of infrequent species is difficult to establish. i.e. the apparent decline of queen triggerfish in certain areas, (an observation raised by several regular divers), would probably not be shown by our data due to the infrequency with which they are generally seen.
Though this is unfortunate, it is a problem common to all methods of underwater fish survey. In addition a fishery study is difficult to perform, unless a government order requires the declaration of all catch, and even then, estimating exact figures of species and numbers caught is still tricky. Related to fisheries was a concern that the numbers of

conch had markedly declined since Project Utila's first surveys in 1996, but it was hoped that the new patrols in Turtle Harbour would help allow numbers to recover.

Fish feeding was also aired to its benefit to fish numbers. It was explained that any action that alters behavior or the reefs balanced ecosystem was detrimental, and it was pointed out that in other areas where fish had been and then suspended the fish had become aggressive. However, it was conceded that if fish feeding was occurring, then it may be better to appoint one or two fish feeding stations as opposed to indiscriminate feeding across the reef. Sites at the two wrecks were suggested as possible feeding stations.

End of the meeting was closed by Shelby from BICA, outlining some of the projects they have done that were relevant to points raised, including an outline of the 1992-3 Turtle Campaign and the introduction of the refuse collection system.

The meeting closed with a reminder of the World Clean-Up Day and BICA's thanks to Project Utila and that our reports were available to all on the island to read at their new office.

Treasurers Report.

Overall the cost of the expedition has been reduced from the estimate in the proposal, due to a number of factors. These factors will be outlined in the context of a summary of individual expenditures and price changes.

Breakdown of costs.

- UK travel has been included due to the large number of meetings necessary due to late changes in personnel.
- Flight costs increased due to two factors, firstly the annual price increases, and secondly the loss of booking fees and increase of cost due to late booking due to late changes in personnel.
- Communication cost increases were also due to changes in personnel, but also the increase in internet communications to Honduras has allowed much better cooperation between the Honduran and UK students prior to the expeditions departure. Subjects such as the scientific objectives and logistical problems could be readily discussed on the email, allowing much better team work and team integration.
- A larger number of proposals were sent out this year due to the poor response for funding from grant and trust applications.
- Boat prices and air fill costs also increased this year, corresponding to the increase in the general cost of living on Utila. Some articles of food and household necessity had doubled in price, and some items were the same cost, or more expensive than in the UK.
- Diving equipment costs were reduced, as there were few hire charges as the expedition members donated their kit for general use. In addition we were aided by kit lent from Heriot-Watt Sub Aqua Club, Newcastle University Sub Aqua Club and Durham University Sub Aqua Club.
- Field Equipment costs were also kept to a minimum by utilizing and repairing last years equipment instead of replacing it. Replacement stakes for the baselines were manufactured on the island. The equipment will, however, need replacing next year.
- Film/processing costs were reduced partly for economic reasons and because the photographic equipment we possessed was limited to 5m.
- Final report costs are expected to remain comparable to the estimated costs.
  Meetings with the dive instructors on the island and the donation of funds from BSAC has enabled the Diver Education pack to be produced this year, and allowing a more in depth and illustrated pack than would have previously been possible.
- Equipment servicing costs are expected to be high this year, due to the cost of servicing kit lent by universities and the expedition members. The costs are also high as there were a number of kit malfunctions due to the intense nature of the diving that will have to be repaired in the UK>

Expenditure

Pre-expedition costs			
	(calculations in pounds)	Pounds Sterling	US Dollars
UK travel		400	664
Flights and airport tax	(840x9)	7560	12,550
Communications		235	390
Proposals		230	382
Expedition costs			
Internal Travel:			
To and from Utila	(54x9)	482	800
To and from Roatan	(22.60x5)	113	188
Honduran student travel		362	600
Boat Hire	(18x32)	576	956
Air Fills	(1.20x328)	395	656
Accommodation:			
Utila	(362.50x2)	723	1200
Roatan	(15x3)	45	75
Subsistence		697	1158
Domestic costs		58	95
Miscellaneous		38	63
Field Equipment		30	50
Medical Supplies		250	415
Film		25	42
Post Expedition costs			
Reports (Preliminary and Final)		200	332
Diver Education Pack		500	830
Film Processing		25	42
Equipment servicing		495	822
TOTAL		**14,204**	**23,578**

Cash received:

Grants and funding:		
Newcastle Expedition Council	900	1494
Bangor University	500	830
BSAC Jubilee Trust Fund	500	830
Fund-raising in Edinburgh	157	261
Total	**2057**	**3415**
Contributions from Volunteers	236	392
Total	**2293**	**3806**
Personal contributions from 9 team members	**11,549**	**19,174**

Summary

The overall cost of the expedition was less than had been anticipated. This was on the whole due to economic measures being taken to reduce costs in all areas whilst continuing to maintain high levels of health, safety and scientific accuracy.
The individual team members, due to the lack of financial support principally donated funding in 1998.
The personal donations by team members are in part in the form of a loan that the UK team members have agreed to be jointly responsible for.

Medical Officers Report.

Thought the expedition did have more than the expected amount of illness this year, much of it was from problems expected when traveling or diving and there were no serious illnesses.
General good bodily care helped to avoid many of the problems, but due to the intense nature of the work and running down of stamina and the immune system, some people did have some unpleasant time in Utila.

Encountered Problems	Causes	Treatment
Headaches	Dehydration Heat exhaustion No hat Poor quality air fills Congested sinuses	Rehydration salts, remove from sun, monitor for signs of heat stroke. Abort dive, remove from source Time off, Decongestants
Ear ache	Congestion of ears & sinuses Ear infection Forcing ear clearing	Time off, Decongestants Keep dry, Amoxycillin Time off, & tell off
Back pain	Overwork Lack of sleep	Rest, Muscle relief, Ibuprofen
Chest Infection	Bacterial infection.	Antibiotics and time off
Upset stomach: Travelers diarrhea Amoebic dysentery Bacterial dysentery	 Change of food/local enterobacteria Amoebic gastric infection Bacterial gastric infection	 Rehydration salts Cephelaxin, rehydration Ciprofloxacin, rehydration Imodium was used to continue work only in less sever cases
Sweat rash	Wet clothing for extended periods Fungal infection	Talc/medicated talc, keep dry, better bodily hygiene. Daktarin cream/medicated talc, keep dry.
Staphylococcus infection	Bacterial skin infection due to exposure from water, or other infected people	Clean blisters and sores with sterile alcohol. Medicated soap. Severe cases: Amoxycillin
Swollen elbow	unknown	Hydrocortisone injection painkillers.

In addition there were many general problems, normally encountered in these conditions, such as: Sunburn, heat exhaustion, insect bites, cuts, bruises, athletes foot, fire coral and jellyfish stings, and seasickness.
All team members took chloroquine prophylactic to protect from malaria, and many took antihistamine to reduce the redness and irritation of bites and stings. Vinegar was carried on the boat to help treat stings. Also on the boat was an Oxygen kit and first aid kit.
Although illnesses were not severe, they were frequent enough to limit the diving and surveying capacity of the team.

Expedition Leaders Report.

When preparing for an expedition, a worst case contingency plan is always at the back of the mind in case you encounter a few problems on the way.
This year we haven't had a few problems, so much as been beaten to near submission by Murphy's Law. Within two months of the preparatory phase we had one team member pull out, and with a week before we left the UK we were to loose another two and the funds they were to raise, and a local government grant, up to a potential $8500
In spite of this a team of six from the UK joined a team of six Honduran students on Utila. We were also fortunate to be supported by three students from Durham University whose own expedition met an unfortunate political end.
The problem of running a continual monitoring project is that it does not seem to have the same fund-raising appeal as certain one off projects. Last year we were lucky to have the International Year of the Reef, which highlighted the plight of the world's coral reefs.
This year we received very little support, and unfortunately the funding the Honduran students received from their government was withdrawn at the last minute.
Funding was not the only problems we encountered on the expedition, illness often meant we had trouble finding ten fit divers for the surveys, and problems with the administration in a Central American country set us back even further.
In spite of this we set a goal of finishing the continual monitoring programme to provide another years data for management planning at BICA, COHDEFOR and UNAH.
In addition we were able to do a great deal of work toward the future of the expedition, and allow for other activities such as the Open Forum Discussion, which seems to have been a good success, and help BICA with a reef clean-up, for World Clean-up Day.
Though it was disappointing to see a lot less enthusiasm and help with our work from some of the dive schools, in general the response was good. There was much more help and acceptance from the islanders, which helped not only in our work, but also to make our stay a much more pleasant one.
We also spent a good deal of time in discussion with BICA and other interested parties which will help develop the project in the future to fill the needs of the Bay Islanders, such as the ground work for a social study and the plan to implement a continual monitoring programme on Roatan.
From amongst these obvious disappointments we have succeeded in completing a full and successful year of the project, completing far more than anticipated.
My thanks to all the volunteers involved, past and present that helped to make this year a success and to all those on the islands that have helped us in this trying years work.

1999 update.

Since the production of this report there have been several developments for Project Utila.

Firstly I am happy to report that despite the damage to Honduras by the two hurricanes last year, Utila received very little damage, though several buildings were lost, there were no serious injuries. All the Honduran students and their families with whom many expedition members have become such firm friends are also all safe and well.

Due to the problems with funding this year and the damage to the Honduran infrastructure by the two hurricanes this autumn, the future of Project Utila as a student expedition looked very uncertain. The limit of a two-month expedition and the amount we could accomplish was limited though extremely valuable. Whilst the 1998 expedition was in Honduras talks began with Coral Cay Conservation. Coral Cay is an expedition company with a good track record for producing management plans and mapping of large marine areas. They have just completed their work in Belize where they built a marine research centre and provided data for the management of Turneffe Atoll, and were instrumental in the setting up of several marine reserves. Their larger resources and year round commitment means that they can fill the developing role of a scientific data and resource provider in not only Utila, but in time the whole of the Bay Islands. Most of the previous Project Utila leaders and members received the majority of their tropical survey experience from Coral Cay. In December 1998 Coral Cay moved some of their equipment to Utila with the intention of beginning work in May 1999. Though their work will be taking place in Rock Harbour away from the town of Utila, their work will be run closely with the UNAH and field courses and training for a much greater number of students than we could hope to involve is currently being organized.
Though the expedition members of Project Utila are keeping in contact with the project and several are considering returning as Coral Cay Science Officers in the future, we wish Coral Cay the very best in tackling the problems in the region. Lorraine will be going out to the island during the setting up period and first years surveying to help. In addition she is also going to work in Roatan with another scientific expedition during the summer of 1999.

Currently work is being carried out on producing a round up of the last 4 years of Project Utila data. This work will be continuing over the next year and we hope that the report will be ready for the year 2000. In the mean time the work done in Turtle Harbour on the seagrass and the work carried out by University of Plymouth students last summer is being coupled into some papers produced by Plymouth in the near future.

The methodologies devised for Roatan are to be used by a French team employing Chantal and Pedro. The work is funded by the World Bank loan for coastline preservation. In addition we are advising a second company involved in studies around Roatan

The social study will be carried out next year across the whole of Honduras by a team from Durham headed by Natasha, to investigate the social impact of the hurricanes on Honduras.

The diver education pack has received some good feedback, and after some redesign and slide and chart production we hope to have it ready for Coral Cay to deliver to the dive schools. Coral Cay have also used the pack as the basis for their lectures to educate volunteers. There is also some negotiation with Salty Dog Productions, an underwater video company to create an educational video with footage from around the island highlighting the points in the lectures.

James Guest is currently continuing the research into coral disease in Singapore. With his help the final report with analysis of all five years work should be finished next year.
Thanks to all past volunteers and sponsors. We hope that the work begun by Project Utila in the Bay Islands will continue to be the basis of the expansion of these programmes by Coral Cay and other organisations and the Honduras students.

Project Utila 1998 Personnel.

UK

Expedition Leader & Science Officer.
James Massey, B.Sc. Hons. Marine Biology, Heriot-Watt University
Underwater survey experience on Project Utila '97(Equipment Officer) and Coral Cay Conservation 1995(Diving Officer)
BSAC Advanced Diver and Assistant Club Instructor, HSE Part IV Commercial Diver with Diver First Aid, O_2 Administrator, Recreational SCUBA Technician, Red Cross First Aider.

Medical Officer:
Owain Turner, B.Sc. Hons. Marine Biology, Heriot-Watt University.
Experience working at environmental consultants and scientific diving in UK.
BSAC Dive Leader, HSE Part IV Commercial Diver with Diver First Aid, BSAC First Aid for Divers, O_2 Administrator.

Communications Officer and Dive School Surveys
Adriana Tobio, B.Sc. Hons Oceanography & Marine Biology, Bangor University
Native Spanish speaker.
PADI Rescue Diver, Spanish Federation of First Aiders.

Diving Officer and Treasurer
Dave Ashcroft, Final Year Marine Biology student, Heriot-Watt University
Chairman of Heriot-Watt Sub-Aqua Club
BSAC Dive Leader, Assistant Club Instructor, HSE Part IV Commercial Diver with Diver First Aid, O_2 Administrator

Education Officer & Ass.Science Officer
Clare Sixsmith, B.Sc. Hons. Marine Biology Heriot-Watt University
Scientific diving experience in the UK
BSAC Dive Leader, Assistant Club Instructor, HSE Part IV Commercial Diver with Diver First Aid, BSAC First Aid for Divers, O_2 Administrator

Equipment Officer
Dan Mayor, Final Year Marine Biology Student, Newcastle University.
Previous survey experience in Mozambique 1997
BSAC Sports Diver, St. John's Ambulance First Aid.

Honduran

Coordinator:
Lorraine Hodges, Final Year Biologist, UNAH
Previous experience Project Utila 1997 and fieldwork.
PADI Advanced Diver.

Scientific Coordinator
Miriam Chantal Rodriguez, Graduate Biologist, UNAH
Previous experience on Project Utila 1996 and 1997.
PADI Advanced Diver, trained with Honduran Navy.

Maria Raquel Flores, 3rd Year Biologist, UNAH
PADI Open Water Diver.

Nina Polo, 3rd Year Biologist, UNAH
PADI Open Water Diver.

Volunteer members

Social Study Report:
Tom Slaymaker, BA Geography & Social Studies, Durham University.
PADI Open Water Diver
Len Tedd, 3rd Year Engineering, Durham University
PADI Open Water Diver
Natasha Horn, 2nd Year Geography Student, Durham University
PADI Rescue Diver

Gilda Ordonez, Final Year Biologist, UNAH
Previous team member Project Utila 1996 and 1997
Helped with background for Social Study.
PADI Open Water Diver

Calina Zepeda, 3rd Year Biologist, UNAH
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Appendix: Diver Education Pack

Coral Reef Physiology

Coral reefs are one of the most complex ecosystems on the planet, comparable in diversity to tropical rainforests. The term coral refers to reef building corals which have limestone skeletons, i.e. stony corals. Coral organisms are simple animals related to sea anemones called polyps.

Each polyp is a thin membraned invertebrate which compensates for its flimsy body by extracting calcium carbonate from the water and converting it to a limestone skeleton. It is through this continual process that coral reefs are created at the rate of approximately 1cm per year. Coral polyps sit in a cup in it's skeleton, and like tiny sea anemones have a ring of tentacles around a central mouth. The Cup has a ridge rising from the centre of the bottom called the columnella and a number of flat vertical plates, the septa, which originate at the outside wall and terminate in the centre of the cup.

Corals feed by capturing tiny plants and animals that float in the sea. The animals are caught by the tentacles which are armed with stinging cells termed nematocysts. The nematocysts can be discharged explosively, throwing out threads which simultaneously harpoon and poison the prey. (Fire Coral has unusually powerful nematocysts which can produce a painful burning sensation when touched by bare skin.) The corals prey is then transferred to the central mouth by the movement of the tentacles or by being swept over the surface of the polyp trapped in a layer of mucus.

The mucus covers the whole coral and is constantly being swept towards the polyps mouth by the action of microscopic hairs on the surface of the living tissue. The mucus layer also acts as a trap for tiny floating plants which are passed to the mouth and digested. In addition the mucus layer acts as a protective barrier, against the settling of larvae of other animals on the coral, preventing clogging by sand and silt particles, and protecting the coral from infection.

Large pieces of organic matter that may fall onto a coral colony may be too large to be taken into the polyp mouth. In this instance digestive threads are passed out from the body cavity and surround the object which is slowly digested.

This type of feeding activity, where any floating particles are indiscriminately caught, is called suspension feeding, i.e. they are feeding on the suspended material in the water.

Living in coral polyp tissues are thousands of single-celled algae, or zooxanthellae, which obtain nutrients from the waste products of the coral polyps. The algal cells capture energy from sunlight and use it to make sugars via a process called photosynthesis. Some of these sugars leak into the surrounding coral cells where they can be used as food. This symbiotic relationship is essential for the survival of the reef, as it is the zooxanthellae which have the ability to extract the calcium carbonate from the water and convert it to the limestone skeleton which is characteristic of the stony corals.

Corals breed or spawn on a single night of the year. Here in Utila, it is usually about 3 days after the full moon near the end of August to early September. Each polyp releases a package of sperm into the water column or an egg. These meet in the water and the spawning of one section of reef is often responsible for seeding a reef some distance away, sometimes may miles along the current. Due to this action, many reef systems previously thought to be unconnected have been shown to be dependent of each other. After the corals spawn the water is often very murky due to the sheer volume of coral spawn in the water

Other major structures found on coral reefs are the soft corals and sponges.
Sponges found in the Caribbean are not the household variety, and have no commercial value. They are soft creatures which is in fact a colony of single cells. Experiments have shown that a single cell from a sponge is capable of growing a new colony, but it takes a long time. The sponge feeds by acting as a huge microscopic filter, creating its own currents by hairs on the cells of the internal walls, the water is filtered through millions of microscopic chambers. The filtered water is expelled from the large holes seen in the middle of the sponge, called oscula.

The structure of the sponge is supported by a skeleton of splinters of protein, silica or calcium carbonate, called spicules and can form microscopic complex geometric shapes.
Sponges not only filter the water on the reef to help keep it clean, they also provide a habitat for small fish, shrimp, brittle stars and even small moray eels. They are also part of the staple diet of turtles.

Some sponges are capable of delivering a painful sting. The fire or 'touch-me-not' sponge. These not only have poison laden spicules, but also are often home to the 'touch-me-not' fan worm, another stinging animal.
The largest sponges on the reef are the barrel sponges that can sometimes grow big enough for two divers to fit inside. Large barrel sponges can be seen on many dives especially those sites on the North side of the island around the Turtle Harbour Marine Reserve.

Major groups of soft corals are the sea whips, sea fans and sea plumes. These corals have a skeleton containing little or no calcium carbonate, therefore they are soft and pliant and are able to bend with the currents and waves.

Soft corals have a central core made up of spicules or a wood-like substance. This supporting, but flexible skeleton is surrounded by an outer gelatinous layer, called the rind. Within the rind the polyps are located, extending their tentacles through openings in the layer. They are attached by a single point, called a holdfast. These colonies can grow upto 4 ½ ft. tall or form complex interlaced structures such as sea fans. Soft corals can be found all around the island, especially on the south side of the island.

Black corals also have no calcium carbonate in their skeleton, instead the polyps secrete a protein usually black in colour, which becomes extremely hard and strong by a tanning

process. It is laid down in concentric layers, forming branched or wire-like structures, i.e. if you were to look at a cross-section it would appear like the growth rings of a tree. Black coral polyps do not form cups like stony corals but live on the surface of the protein skeleton. Each polyp has 6 non-retractable tentacles which are normally visible to the naked eye. The polyp tissue is generally translucent, and the colour pigments merely tint the colony gray, brown, rust-red, or green. Occasionally the pigments may be intense and dramatic, especially in wire corals which are bright yellow-green or red. Black corals will often appear silvery in the water, and only turning black when exposed to the air. Some species attain considerable size and their branches are collected, cut and polished for use as jewelry. This practice has resulted in black corals becoming relatively rare, and it is illegal to take any black coral into the United States. In Utila, black coral can be found on the Black Coral Wall east of Silver Gardens.

The conditions required by coral reefs to survive

Reef building or hermatypic corals require ample sunlight, warm temperatures, fully marine salinity, relatively sediment free water, and stable hard substrate for attachment. Coral reefs are best formed in shallow tropical seas where there is ample sunlight and warm waters. Sunlight is required for the zooxanthellae to photosynthesize, corals placed in the dark or whose zooxanthellae are destroyed do not grow. Sea water absorbs sunlight so as depth increases less coral is found. In the clearest seas, hermatypic corals become sparse below 60m, and reach their lower limit at around 120m.

Water clarity can influence the penetration of sunlight to the corals, and is dependent on coastal processes and the degree of circulation in the open sea. Rivers can bring sediments to reefs, especially when flooded, as can erosion from deforestation, agriculture and construction. Pollution can also reduce the water clarity. Visibility is greatest on seaward reef slopes, typically ranging between 25-40m.

The flow of fresh water from rivers can also affect the salinity and temperature of the coastal waters, as can the effects of upwelling of cold deep sea water on some coastal areas. Corals are very temperature specific, they cannot grow at temperatures below 20°C and die at temperatures below 16°C. Here in Utila an effect of too high a temperature can be seen in September when the algae that live in the coral leave the colony as the water is too warm, leaving the coral white coloured, or bleached, until the water temperature returns to a lower level. Though corals can survive whilst bleached for a short period of time they need the extra food from the algae cells to grow.

The Bay Islands Reef

The Bay Islands reef system is the southern most part of the Belizian Barrier reef, the second longest reef in the world after the Great Barrier Reef in Australia.
The Bay Islands reef is distinctive from the Belizian reef, separated by a 3000m deep sub sea canyon, and therefore they are two distinct reef types. The reefs around Utila are seaward facing reefs all round the island. This affects the layout of not only the reef, but the mangrove and seagrass habitats as well.
The Belizian reef has a lagoons system that separates the reef crest from the shore by over a mile creating the characteristic 'barrier effect'.
Utila's fringing reefs begins very close to the shore line and quickly drops away often into a deep wall or drop-off.
At the shore line of the reef are the mangrove and seagrass areas.

Mangrove and Seagrass.

Mangrove is a word used to describe not only the mangrove tree, but often all the plants associated with these trees, found at the edge of the sea or lagoons. The Mangrove most people recognize is the red mangrove, this tree is found right at the waters edge and supports itself with aerial roots that spread, spider-like from the trunk. It does this to hold most of the tree out of the salt water which is hard to live in and to keep out of the thick mud that stops oxygen getting to the roots. The other most common mangrove tree is the white mangrove, found behind the red mangrove in the higher muddy area. This tree has many small spikes along its shallow roots that act as breathing tubes so that oxygen can reach the roots under the mud. In addition to providing a habitat for birds, such as pelicans and ospreys, animals such as crabs, spiders, iguanas, mudskippers, and many juvenile fish and sponges hiding in the red mangrove roots. These trees also act as the first stage of a large filter, that keeps the water clear of mud and silt for the corals to thrive. Mangrove can be seen in many place around the island especially at the Turtle Harbour Marine Reserve, and several groups offer tours to show the wide variety of animal life that live in this habitat.

The second stage of the filter is the seagrass bed. Seagrass is a group of algae that grow in shallow muddy tropical waters behind coral reefs. Different species can actually be found in shallow waters around the world, including the Arctic Circle.
Seagrass has a tough complex root system that holds the mud silt and sand behind the coral reef to keep the water clear. They not only provide food for turtles and some fish, but provide a refuge for juveniles fish and some reef fish, but large night predators such as Barracuda, Nurse and Bull Sharks can often be seen sunning themselves in the warm shallow and relatively safe waters of the seagrass beds. Seagrass beds can be seen at Blue Bayou and Turtle Harbour, they are especially good places to spot sleeping sharks and small rays, and often needlefish and houndfish can be seen hunting near the surface.
Another inhabitant of the seagrass is the upside-down jellyfish. This animal looks like a normal jellyfish with cauliflower like tentacles when swimming but it sits upside down in areas of sand pretending to look like some plant cover, in an attempt to trick small fish and shrimp into its tentacles.

Threats to the Coral Reef Ecosystem

By far the biggest threat to coral reefs is change to environmental factors.
Coral polyps and their symbiotic algae are highly sensitive to a large range of changes to their ecosystem, especially factors such as light, turbidity, temperature changes, and salinity.
One of the most dangerous factors is an increase in turbidity. This is caused by the destruction of the mangrove by cutting and burning and the dredging or land reclamation of seagrass beds. Not only is the reef's natural nursery destroyed but the complex biological filter that keeps the water clean is removed. This causes increased sediment in the water, more than the mucus of the polyps can cope with, and the coral becomes choked and dies. The lack of light due to the sediment in the water also affects the algae in the coral polyps which either die due to lack of light and therefore food, or leave the corals, accelerating the death of the reef.
The cleared areas can also become quickly eroded, as the reef ecosystem with the seagrass and mangroves protects the shoreline from the sea, and if it is left bear is can quickly become suspended in the seawater and be washed further down the reef.
A similar effect can occur from large rain run off or flooding especially if the area upstream has suffered deforestation, as forests create the same filtering effect to prevent topsoil from being eroded as mangroves do at sea level.
These waters may also contain pesticides or weedkiller that can harm not only the corals but also cause long term problems for the fish and eventually those that eat them also.
Sewage can also cause not only high turbidity in the water but increase the chances of diseases to corals, fish and divers, especially if it is untreated before being dumped in the sea In Utila much of the sewage is composted, but a significant proportion especially on the Cays is dropped straight in the sea. As yet the levels are still considered low, but if the tourist industry and population rapidly increase it could become a problem.
Flooding and increased fresh water run-off can also upset the salinity in the coastal sea waters, which can also have a detrimental effect on the corals.
Increase in temperature can also cause the coral to bleach, which it can only survive for short periods. On Utila this is an annual occurrence that seem to be part of a natural process, but if heated discharges are placed in the water, they can have a localized bleaching effect that can kill the coral.
Here on Utila many of these problems are still in their relative infancy, but dredging and mangrove deforestation are already having a deleterious effect on the reef and the creatures that live on it. As the tourist industry and population increase on the island more land will be cleared and reclaimed to accommodate them. This means that these problems are likely to become increasingly worse unless a careful land management plan can be introduced.

Rubbish dropped into the sea is a problem everywhere, but here on Utila the use of the mangrove swamp as a garbage dump, means some of this rubbish finds its way into the sea. There has been a decrease in the amount of garbage in the sea since the setting up of a proper bin collection service, but plastics and other non-biodegradable still can be found on the reef and in the surface waters. This harmful flotsam that can wrap around corals

and fish can helped to be reduced if it is collected when seen, to help not only increase the enjoyment of your dives, but others as well.

Corals are also at risk from careless divers. Removal of corals is banned in Honduras and the penalties for removing any coral alive or dead are strict. It is also illegal to spearfish or remove conch, lobster or other sea creatures whilst diving.
In addition coral is also at risk from a simple touch. Finning hard near corals, or kicking or touching them, removes the polyps protective mucus layer making it hard for them to feed and increasing the chances of choking with sediment or becoming infected.
Try to maintain neutral buoyancy and check your correct weight in a sand patch if necessary. If you are unsure of your buoyancy, ask your dive instructor for help.
Anchors from dive boats also cause great damage to corals. In Utila there is a mooring buoy scheme that allows boats to moor to a buoy with minimal impact on the reef.

Diving Etiquette

To reduce not only the harm to the coral and help protect it for divers in the future, but also diver safety, BICA have set up rules and guidelines for diving in the Bay Islands Marine reserve.

Regulations

NO SPEARFISHING, it is illegal in the Bay Island

NO USE OF GLOVES WHEN DIVING

NO TOUCHING, STANDING ON, REMOVING OF SOFT OR HARD CORALS, SHELLS, AQUARIUM FISH OR ANY OTHER FORM OF MARINE LIFE.

NO GARBAGE DISPOSAL ON BEACHES OR IN THE SEA

NO ANCHORAGE ON THE REEF.

NO BOAT SPEEDING

NO FISH FEEDING.

TAKE ONLY PHOTOS AND MEMORIES, LEAVE ONLY BUBBLES.