

REEF WALKING: A SHORT REVIEW

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INTRODUCTION

Whilst reef walking itself must have been an activity which extends into pre-history, it is only recently that reef walking has been offered as a holiday activity, especially in the island tourist resorts on the Great Barrier Reef and in the last 10 or 15 years there has been a major increase in our use of the reef resource in this manner. The effects of reef walking have been studied on the islands of the Great Barrier Reef but the information is likely to be applicable to fringing reefs, at least in a general sense. The reef walk is carried out on the inter-tidal flats of coral reefs at low tides, usually without any special physical skills or equipment, but often accompanied by a guide who has local knowledge of the area. These guided groups will usually follow a pre-determined route or visit an area on a regular basis and their pattern of movement is a fairly loose formation which periodically condenses to focal points when the guide finds something of particular interest. Visitors will also venture out singly or in small unguided groups and wonder freely over the different reef zones. Minor accidents, such as stepping through delicate live corals and thin reef surfaces (pie crust) are common and due to the visitors unfamiliarity with the terrain. Many reef resorts issue walking sticks and protective footwear so that their customers are damaged as little as possible. Most people will aim to walk on sand or smooth solid coral pavement and areas of fragile or luxurious coral growth are generally avoided, however in some circumstances visitors either accidentally tread on fragile areas, or find that their only way forward is by crossing one of these patches of luxuriant growth. When this happens the amount of damage becomes very obvious.

As Kay and Liddle (1985) remarked, the tourist or holiday-maker undertakes reef walking for pleasure and satisfaction. Interaction with the environment and appreciation of the aesthetic beauty of the coral community and its inhabitants is most important and a big draw card for the tourist industry. The tourists may have a number of expectatations when visiting the reef. Firstly they hope to see a variety of exotic features that are associated with and characterise the coral reef environment. Some favourite items are brightly coloured sea stars and fish, big molluscs, and hermit crabs, and architecturally ornate and delicate corals. Secondly most wish to feel that they are experiencing natural and unspoiled environment. Any obvious signs of environmental degradation interfere to some degree with the aesthetic naturalness of the habitat and produce feelings of irritation or disappointment. It is thus in the interest of the tourist operator to maintain the reef resource in as pristine a condition as possible.

THE ENVIRONMENT IMPACT OF REEF WALKING

Three studies have been made of the environmental impact of reef walking. One was undertaken by Woodland and Hooper (1977) on Wistari Reef and the other two by Kay and Liddle (1984a and b) on Heron Island Reef and Hardy Reef respectively (Figure 1). the first two studies were experimental and clearly demonstrated that trampling on reef flat corals can cause considerable damage. The third study was observational and dealt with the use patterns and damage associated with reef walking on a popular reef used for a variety of tourist activities.

Woodland and Hooper (1977)

The Wistari Reef work (Woodland and Hooper 1977) involved one short term trampling experiment which demonstrated that four people reduced the live coral cover on an area of reef flat 4 metres by 25 metres from 41% to 8% after walking back and forth along it 18 times. An average of 12 kg m⁻² of live coral was broken off, but most of the robust massive coral colonies, Acanthastrea and Goniastrea, survived.'

Kay and Liddle (1984a) and Liddle and Kay (in press)

The Heron Island investigation consisted of several different experiments involving both long and short term trampling trials, growth and survival experiments with damaged coral colonies and fragments , and laboratory tests of branch strength.

The major findings of the trampling trials concerned the susceptibility of different types of coral communities to relative damage from reef walking. There is considerable variation in the composition of the biotic communities and physical surfaces found on reef flats. They range from a partial or complete cover of flattened and encrusting coral colonies on a solid pavement of dead coral to a highly intricate mixture of taller three dimensional coral colonies, solid and honeycombed remains of dead coral colonies, and sand pools. Zones which are exposed to wave action and water turbulence such as those on edges of reefs, typically have the low compact coral communities while those in more sheltered situations further within the reef platform have the more upright complex coral communities.

Trampling caused much more extensive damage in a sheltered site on the outer reef flat at Heron Island than it did on an exposed reef edge site. The low compact forms of coral on the reef crest were relatively resistant to mechanical disturbances and trampling had little effect on the hard level surface. The percentage cover of corals was not reduced along pathways through this site which were regularly traversed 80 times every three months (equivalent to six or seven times a week) for a year and one half. In comparison trampling broke up many of the upright branching corals and most of the honeycombed, dead coral skeletons at the sheltered site. Ditches partially filled with dead coral rubble were formed along pathways which were traversed as infrequently as five times every three months (equivalent to once every two to two and a half weeks) for a year and

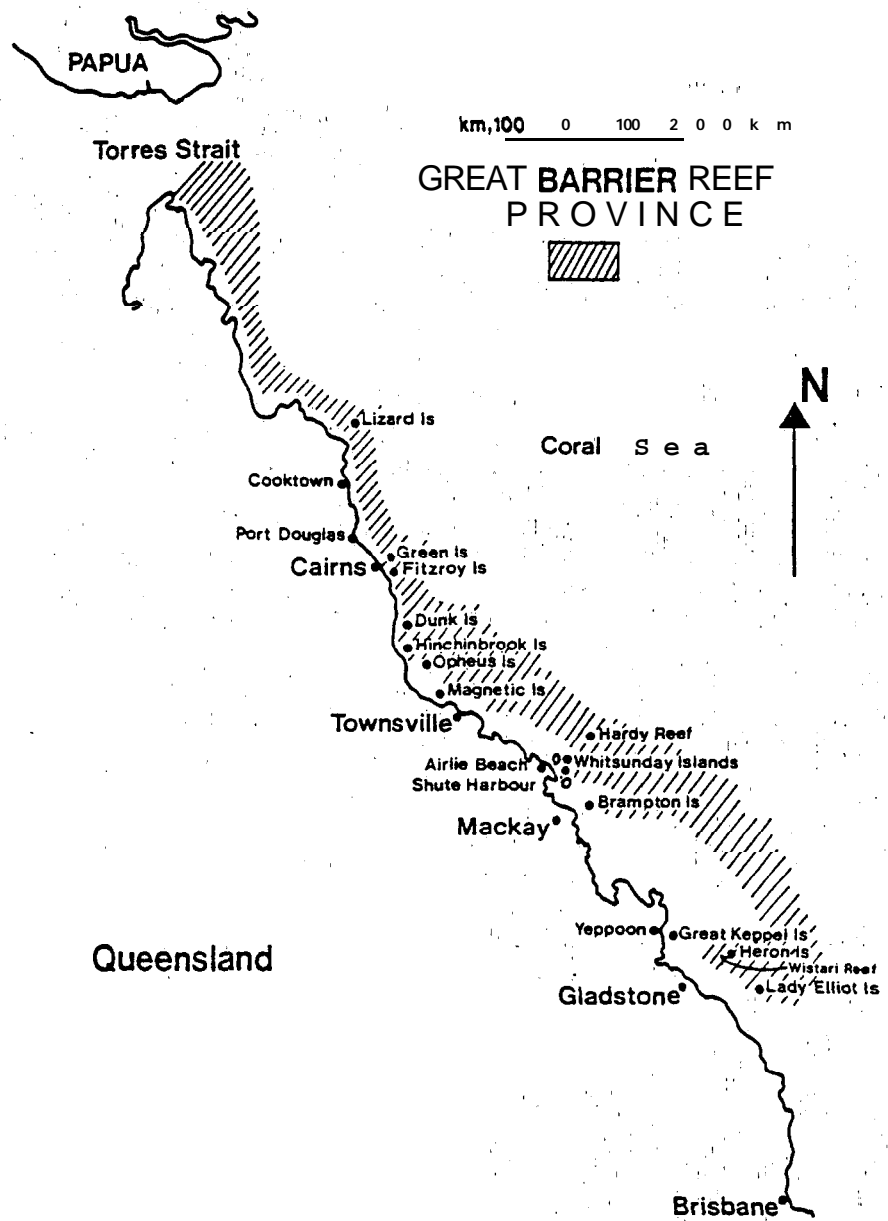


Figure 1 The Great Barrier Reef and major 'tourist centres

visitors are monitored on a regular basis to determine whether the management objectives are being met. If not the management objectives can be redefined and/or the methods used to implement them can be altered.

RBSOURCB EVALUATION

SURVEY OBJECTIVES

There are several basic questions which need to be asked when an area is considered for reef walking activities.

They are:

1. How accessible is the area?
2. How many people already use it?
3. How easy is it to walk around in it?
4. What attractions does it contain that will satisfy the reef walkers needs?
5. How vulnerable is the area to trampling damage?
6. What is its present level of damage?

The scope of this paper does not allow a detailed account of methodologies which may be utilised to answer these particular questions. A description of these methods is given in Kay and Liddle (1985) and they have provided techniques suitable to various levels of input of both time and money.

MANAGEMENT OBJECTIVES

ACCEPTIBLE ENVIRONMENTAL CHANGES

There are two main factors to consider when determining what will be acceptable environmental changes in a reef walking site. They are:

(a) The expectations and objectives of the users

As mentioned above tourists, and scientists, prefer to see an unspoilt natural environment. Additionally tourists expect to see a variety of exotic features such as brightly coloured fish and ornate corals which characterize the coral reef environment.

(b) The ability of an area to recover after damage.

The growth rates of different forms of coral vary enormously therefore reef walking sites of different composition are unlikely to regenerate at the same rate after a given amount of reef walking damage.

These considerations suggest three general criteria for the determination of acceptable environmental change.'

- i Visual evidence of physical damage should be minimal.
- ii Reduction in the numbers and variety of the exotic features which attract tourists should be prevented or minimized.
- iii Reduction in the cover of live coral should not be permitted to exceed that amount which could be regrown during an off peak season or reasonable period of closure.

IMPLEMENTATION OF OBJECTIVES

GENERAL APPROACH

Broadly speaking there are two approaches which can be used in the formulation of management techniques.

They are:

- (a) Control visitor numbers and/or guide or influence visitor behaviour
- (b) Alter the environment so it is less susceptible to damage.

These two approaches are not mutually exclusive and often underlie the same management technique as shown in Table 1 which lists the management procedures we have described in this manual. Some of these techniques may also function as interpretive services where information is provided to enhance visitor enjoyment and safety (Table 1).

RESOURCE MONITORING

Ideally all monitoring schemes should begin before the site is opened to reef walking. One or more "before" surveys establish what the undisturbed or natural state of the site is like and provide a standard to which the results of subsequent surveys can be compared.

The intervals between the surveys of a monitoring scheme will depend on the time and resources available, however, we suggest an optimum of six months until it has been confidently established that management objectives are being met. After this the intervals can be extended to a year or more unless use patterns change dramatically and more frequent monitoring is needed to detect rapid degradation before it goes too far.

The elements that may be recorded are: Mechanical change; coral composition; level of use. A full account of these techniques is also given in Kay and Liddle (1985), and they conclude with a comment on carrying capacity.

Table 1. Management techniques and their requirements

Technique	V i s i t o r Control	Alter Environment	Interpretive Service
Guided tours	X		X
Information leaflets	X		X
Films and videos	X		X
Pathways	X	X	
Elevated walkways	X	X	
Transplantation of corals		X	
Limiting access	X		
Closed seasons and rotational use	X		

CONCLUSION

In presenting this paper the authors have in mind the sequence of attitudes that usually prevail with respect to any natural resource. Initially the resource is seen as unlimited and any change that may be made as a result of its use by man, tend to be regarded as beneficial. Then there is a phase of declining availability and quality of the natural resource which provokes a reaction to conserve and finally to manage that resource both for the greatest advantage to its users, and its own intrinsic qualities. In the case of the tourists utilisation of fringing and barrier reefs, we have a situation where the resource has hardly been changed by use, except in one or two local instances, and our society has already moved to the position where the conservation of that environment is in everybody's minds and largely accepted by the community. The information that we have provided in our various reports will, we hope, aid in the final step of managing and preserving the resource for the greatest benefit of the tourists, the tourist operators, and the reef corals and its other inhabitants.

ACKNOWLEDGEMENT

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