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WORKING GROUP REPORT ON GREEN ISLAND  
L. Zann and J. Day

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BACKGROUND

Green Island, 27 kilometres north-east of Cairns, is a vegetated sandy cay of approximately 12 hectares. The cay (660m x 260m) lies roughly east-west, surrounded by a lagoonal platform reef of approximately 1200 hectares (4.6 km x 2.8 km). The reef is regarded as a mid-shelf reef although it is situated relatively close to the mainland.

The cay has probably been the subject of intensive human use longer than anywhere else on the Great Barrier Reef. It has been a popular tourist destination since the 1890s, and the first regular tourist ferry service began in 1924. In 1987 approximately 190 000 people visited the cay.

The reef has been subjected to two major infestations of crown of thorns starfish during the periods 1962-67 and 1979-81. Because it was the first reef on which infestations of the starfish were seen on both outbreaks of crown of thorns starfish on the Great Barrier Reef (1962-1974; 1979 - present), it has been suggested that Green Island was at or near the epicentre of A. planci outbreaks on both occasions.

Today the reef environment surrounding Green Island is generally considered to be severely degraded, and there is circumstantial evidence to relate this degradation with changes in nutrient levels.

MANAGEMENT CONCERNS RELATED TO NUTRIENTS

There are two levels of concern regarding changes in nutrients in relation to Green Island:

1. Local influences - From island based septic systems, existing and previous. For example, the Cairns City Council permit to discharge septic waste
  - current permit requires only flow volumes to be recorded and typical analyses of effluent
  - Queensland Water Quality Council requirements do not include nutrient analysis.
2. Broader area concerns - What are the external nutrient influences affecting Green Island? For example, many mainland/broader area influences, such as the effects of clearing, mining, canefield tillage, urbanization and/or trawling of adjacent seabeds, could be having an effect.

## CURRENT STATUS OF KNOWLEDGE ABOUT GREEN ISLAND

While there are only a few scientific publications, there are many relevant past research studies; for example:

- Beach Protection Authority's beach profiles
- Geomorphological studies (Kuchler)
- COTS program (Pearson 1960s; Harriott and Fisk, 1980s)
- Flow modelling (Wolanski, Black)

Most of these have been summarised in the Review of Current Knowledge of Green Island (Ian Baxter, James Cook University).

Current research and monitoring studies include:

- Northern Fisheries Research Centre - studies of seagrass, barramundi and prawns
- James Cook University multi-disciplinary study
  - a) sediment cores through **seagrass**
  - b) coral cores to determine past levels of nutrients
  - c) dye studies to determine the fate of sewage
- Crown of Thorns Starfish Program - studies of crown of thorns starfish recruitment (Fisk)
- Cairns City Council - water quality analysis
- Beach Protection Authority - monitoring and aerial photography of beach areas

## RECOMMENDED MANAGEMENT STRATEGIES

### 1. Ascertain the problem - Identify the causes and quantify the impact

- a)-De-t-ermine.-the-extent /nature\_of\_the\_local problem, conduct immediate research (over at least a one year period)
  - monthly analyses of wastes
  - dye studies to establish dispersion
  - establish baseline levels
- b) Establish fixed monitoring sites to be monitored regularly, at different tides and different seasons. It is recommended that Green Island should not be studied in isolation from the region.
- c) Search "back in time" using cores and sediment profiles to establish past trends. (Importance of Isdale/Rasmussen studies).
- d) Longer-term research (2-3 years)
  - Compare Green Island situation with other islands of similar proximity to the mainland (e.g. Low Isles and Three Isles).

### 2. Rehabilitate from the present autotrophic to a heterotrophic, coral-dominated community

The management actions required will depend on the extent of the problem. Examples from other areas (e.g. Kaneohe Bay, Hawaii) indicated that a disturbed reef may quickly recover when the disturbance is removed.

## POSSIBLE MANAGEMENT ACTIONS

- a). If a local point source is shown to be the main problem, (i.e. if local sewage is the major concern), then the alternatives are:
  - tertiary treatment on island
  - ship waste water back to Cairns for treatment
  - develop better bacteriological process for treatment (e.g. new systems which work more effectively in salt water)
- b) If mainland influences turn out to be the main problems; rather than or in addition to local sources, then there are major political and environmental implications.

## RECOMMENDED MONITORING STRATEGY

The main objective should be to determine if changes are occurring, and their likely causes (e.g. anthropogenic influences)

It is important to have a structured monitoring program. Monitoring of the following key parameters for nutrients should be undertaken in the priority order indicated:

- a) Water quality
  1. - phosphates
  2. - nitrogen compounds - nitrates
    - nitrites
    - ammonia
  3. - chlorophyll a
- b) Biological
  4. - algal indicators
  5. - state of the corals (especially the susceptible corals)
  6. - crown of thorns starfish populations

## FURTHER POINTS WHICH NEED TO BE CONSIDERED

Members of the working group also raised the following points in their discussions:

- a) If desalination plants are to be widely used in the Great Barrier Reef Region, the use and effects of flocculants (e.g. Calgon) should be investigated.
- b) High salinity levels (and variations in salinity) reduce the efficiency of septic **systems**.
- c) The implications of fishfeeding affecting nutrient levels should not be overlooked.
- d) Large dams (like Lake Tinaroo) act as nutrient storages which are often flushed out after a "big wet".
- e) Need to collect and disseminate results of chemical analyses in a standardised way - it is suggested that GBRMPA should print cards/sheets for universal recording methods.

- f) The importance of coral cores for past trends in nutrient levels should be emphasised.
- g) The regional study undertaken on anthropogenic inputs by C. Rasmussen and D. Hopley (JCU) is important, as Green Island should not be studied in isolation.
- h) The general productivity of the Cairns reefs is being investigated by remote sensing (Coastal Zone Colour Scanner for chlorophyll a),
- i) There is a need for low-cost field equipment to **be** developed for in-situ monitoring. D. McConchie (NRCAE) is currently developing such a kit.
- j) The subject of nutrient enrichment in the Great Barrier Reef Region should be considered as a Research and Monitoring priority area for the Great Barrier Reef Marine Park Authority.