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STAFF PAPERS

WASTE DISCHARGE IN THE GREAT BARRIER REEF MARINE PARK

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BACKGROUND

In May 1984 the Marine Park Authority sponsored a Workshop on Contaminants in Waters of the Great Barrier Reef Marine Park. The Workshop concentrated on heavy metals, polychlorinated biphenyls (PCBs) and other organochlorines, and hydrocarbons. In attempting to assign priorities to areas of further research, participants noted that sediments and nutrients were more likely to be of greater concern to the Reef than the three contaminant groups considered at that workshop. In particular, an area recommended for further research was:

"the effects of agricultural fertilisers and other nutrients exported to the GBR from the mainland."
(Dutton, 1985, p.iii)

Interest in nutrient and sediment input has continued in the Authority. We are assessing an increasing number of permit applications for waste discharge into the Marine Park from island resorts and other tourist facilities such as pontoons and the floating hotel. As part of this assessment, we have had to determine discharge standards appropriate for marine coastal waters. A recent report to the Authority on waste discharge guidelines by Greenfield, et al. (1987) highlighted a need to examine the tolerance level of corals to nutrients in particular, and suggested standards for waste discharge into reef waters.

Internationally, concern is also being expressed about nutrient levels in freshwater and groundwater systems, and estuarine and coastal environments.

As a result of a recent review of wastes and their disposal in the marine environment, the U.S. Office of Technology Assessment concluded after investigating other options such as ocean dumping, that "with regard to impacts caused by waste disposal activities and run-off, the only policy choice available to maintain and improve the health of estuaries and coastal waters is to minimise pollutant inputs to these waters," by either maintaining or expanding the current system of pollutant controls or establishing additional site specific controls on waste disposal and non-point pollution where needed (O.T.A., 1987, p.13).

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The Australian Environment Council has also reviewed the problem of deterioration of streams and lakes in Australia due to overfertilisation by nutrients (1987). Eutrophication of lakes, rivers and estuaries, (taste and odour problems in country town water supplies and stock deaths attributed to blue-green algae) have all been documented. However, the impacts of nutrients on coastal waters have yet to be adequately determined.

A wide range of sewage impacts on coral reef communities has been reported in various parts of the world. Little or no impact has been observed on some reefs in well-flushed waters that have received small quantities of effluent, whereas large discharges of effluent into poorly flushed lagoons and bays have caused major changes in species composition and abundance (Pastorak, 1985).

It is expected that lethal and sublethal impacts of nutrients on corals will be addressed more extensively during the Workshop.

SOURCES OF NUTRIENTS IN THE MARINE PARK

There are many sources of nutrient rich waste entering the Great Barrier Reef Marine Park each requiring some consideration. The point sources are obvious and more readily managed than the diffuse or non-point sources.

To date management has focused on point source discharges directly into Marine Park waters such as sewage outfalls from island based resorts. Many resorts already have secondary treatment plants and others are in the process of upgrading.

These outfalls are currently regulated under conditional permits issued by the Authority and under licences issued by Queensland Water Quality Council. Through the permit system we are able to regulate the quantity, quality and point of discharge for effluent as well as stipulating monitoring procedures. It is recognised though that the standards are not necessarily appropriate for coral reefs or open waters. While we accept that these controls have not significantly reduced the total amount of nutrients entering the Marine Park, they do enable us to more adequately assess and monitor the situation and to regulate any future expansion of wastes disposed.

As a growth industry in Queensland, tourism will have more and more of an impact on Reef waters. It may be helpful to briefly outline some of the trends in resort tourism that have convinced the Authority of the need to come to terms quickly with impacts from effluent discharge.

To give an idea of the number of visitors generated by type of facility, a comparison of visitor days in the Marine Park by facility is illustrated in Table One.

TABLE ONE

Facility	Visitor Days
Island resorts	790 000
Charter boats	1 274 000
Private boats	690 000

(Driml, 1987)

There are 21 resort islands in the GBR Region. Of these, the bulk of island accommodation, with 73% of available rooms, is located in the Central Section. Islands of the Mackay/Capricorn Sections provide a further 23% and islands of Cairns Section contribute 4% of island resort rooms (Driml, 1987).

Green Island is the single most heavily visited reef, with an increase of 12% in visitors between 1985/86 and 1986/87, to total 193,500 visitors in 1986/87.

Growth in visitor nights at island resorts has accelerated in recent years with a 17.5% increase from 1983/84 to 1984/85. The year 1984/85 to 1985/86 saw more moderate growth with a 6.5% increase in visitor nights. This is still substantial. A considerable amount of investment is currently being made in building new island resorts and in the redevelopment and extension of existing resorts. Plans to build or extend resorts are reported to exist for 14 islands and have been projected to lead to a doubling of rooms within a few years (Driml, 1987).

While we progress towards better control of point source discharges directly into the Marine Park, it is important not to ignore non-point or diffuse source discharge.

Of concern in this category is the ever increasing boating activity within the Marine Park. Between 1980 and 1984/85 the number of commercial vessels operating to take passengers to the Great Barrier Reef more than doubled to approximately 275 (Driml, 1987). Whilst many of the larger vessels including the large catamarans have holding tanks, they legally discharge untreated waste while underway.

Fish feeding is part of the visitor entertainment at a number of resorts and pontoons. To give an idea of the magnitude of the situation, preliminary estimates by Q.NPWS indicate that 47 tonnes of bread and food scrap was fed to fish by the combined operators at Green Island in 1987 (pers. comm., T. Stevens). This may also contribute to enhanced nutrient levels.

In the same 12 month period from July 1986 to end of June 1987 recreational boating increased between 5% and 7%. Very few of these vessels have holding tanks for wastes.

Most large cruise vessels and cargo ships which transit through the GBR have holding tanks, however, many have limited capacity. A recent incident in Whitsunday Passage where a large passenger liner purged its tanks helps to highlight the potential for significant problems.

Wastes are discharged into the Park via rivers or creeks. The expanding population on land adjacent to the GBR has made disposal of waste increasingly problematic. Many of the population centres on the North Queensland coastline are presently incapable of suitably handling the volume of human and industrial waste generated. Many of these wastes are high in nutrients and usually discharge indirectly via creeks and coastal waters into the Marine Park.

Wastes that are typically high in nitrogen and/or phosphorus and are generated adjacent to the Marine Park are domestic sewage, those generated by feedlots, fertiliser production and use in agriculture, meat processing, milk processing, and commercial laundries.

Run-off and groundwater from agricultural areas can contain very high levels of nutrients either from fertilisers or decomposing matter. It is possible that nutrient rich discharges to the Marine Park will increase with the onset of the wet season in northern regions, particularly in those areas that have been subject to drought or cyclonic events.

In addition, with the expansion of the mariculture industry, one might speculate that the use of high protein feeds could add to nutrient levels in receiving waters.

Many would argue that the level of dilution of all these wastes in receiving waters should be high enough to raise little concern. There may however be some cause for debate on this issue.

LEGISLATIVE MANDATE FOR GREAT BARRIER REEF MARINE PARK

The Great Barrier Reef Marine Park Act 1975 Section 66(2)(e) provides for the regulation or prohibition of acts (whether in the Marine Park or elsewhere) which may pollute water in a manner harmful to animals and plants in the Marine Park.

The Regulations, drafted in accordance with the Act, specify that the written permission of the Authority is required prior to discharging or depositing "household, industrial or commercial waste in the Marine Park", with the following exceptions:

- a) where a Zoning Plan provides for the Zone to be used or entered for that purpose;

- b) the discharge of human waste from a vessel or aircraft which does not contain a storage tank of a kind designed for the storage of human waste;
- c) offal from fish caught in the Marine Park;
- d) other biodegradable waste from a vessel or aircraft which is more than 500 metres seaward from the seaward edge of a reef.

The provision that sources of pollution "in the Marine Park or elsewhere" may need to be considered, is of particular significance as it is one of the few provisions of the Act relating to management of activities which are not entirely within the boundaries of the Marine Park.

In all normal circumstances the Authority would not seek to use this regulatory mechanism but instead would prefer to collaborate with other relevant agencies to achieve a common goal of protection of the environment. Other legislative controls relevant to waste discharge in the Great Barrier Reef Region include:

a) Queensland Clean Waters Act 1971

Administered by the Water Quality Council of Queensland, the provisions of this act regulate discharges which are likely to cause damage to the environment of the territorial waters of the State of Queensland.

b) Commonwealth Environment Protection (Sea Dumping) Act 1981

Administered by the Department of the Arts, Sport, the Environment, Tourism and the Territories, this legislation regulates, amongst other things, the dumping of wastes and other matter from vessels, aircraft and structures into Australian waters. For the purposes of this Act dumping does not include discharge of human waste from a vessel, aircraft or structure where that activity is incidental to normal operations.

c) Commonwealth Protection of the Sea Legislation Amendment Act 1986

This legislation will give force to Annex IV of the International Convention for the Prevention of Pollution from Ships. Annex IV proposes the introduction of a requirement for ships of 200 tons gross tonnage and ships which are certified to carry more than 10 persons to have holding tanks for wastes and to discharge wastes only outside of the Great Barrier Reef Region, for example, through a facility at a port. This Act will only take effect once the Annex has been ratified by 50% of nations representing 50% of world shipping tonnage; expected to take several more years.

The impact of the latter legislation, when and if it comes into effect, will be significant, not just for ship-owners, but also for coastal communities which may need to provide sewage treatment facilities for more than just a local population.

Like the Great Barrier Reef Marine Park legislation, the administration of the above Acts relies principally on the regulation of waste discharges through permits or licencing. It is perhaps the common objectives of the legislation and a similar approach to regulation which has resulted in the close liaison and cooperation between staff of each of the various agencies.

NEED FOR AGENCY LIAISON

The cooperative approach adopted by the various agencies is perhaps best illustrated by the example of the Four Seasons Floating Hotel. The Hotel itself is to be located at John Brewer Reef, in Commonwealth waters beyond the three mile territorial sea. It will cater for about 450 to 500 guests, staff and day visitors. Wastes, other than discharge of hypersaline water from the water desalination plants, are not to be released into the John Brewer Reef lagoon. The proposal is to carry out secondary treatment of wastes on site, incinerating sludge and transporting the treated effluent by barge to a dump site outside of the John Brewer Reef lagoon. The developer is also required to monitor effluent discharge and impact on the reef through an Environmental Monitoring Program approved by the Marine Park Authority.

As the principle agency responsible for approving the operation of the Floating Hotel, the Authority has been required to consider all aspects of waste disposal, including the treatment methods, proposed standards and the means and locations for disposing of the treated wastes. In carrying out this review the Authority has sought and received extensive advice from staff of the Queensland Water Quality Council, the Commonwealth Department of the Arts, Sport, the Environment, Tourism and Territories, oceanographers and various other scientists.

THE FUTURE

To date this Authority has focussed on the regulation of discharges from identifiable point sources. Standards adopted have generally been those applied to waste discharged in Queensland waters, in most cases equivalent to secondary treatment. The problems to be faced in the future are far more complex and must consider such matters as non-point source discharges, from land run-off, groundwater, and discharges into adjacent waters not within the Marine Park. In addition, discharges from vessels, both those transiting the Marine Park and those operating regularly within the waters of the Park must be considered. It is hoped that this workshop will provide guidance to the Authority with regard to both the threshold or critical levels for nutrients in GBR waters and appropriate management of sources of those nutrients.

The Authority has as one of its aims, "to protect the natural qualities of the Reef, whilst providing for reasonable use of the Reef's resources".

Recent surveys of tourists, and divers in particular, have indicated that Barrier Reef water quality and marine life are important features for most tourists (Pearce, 1987).

It would not be difficult to argue that the natural qualities of the Reef would command a high value. In fact, the economic value of tourism, for example, to the Reef Region measured as gross output is around \$220 million per annum. This value is increasing in real terms by 10% per annum. (Driml, 1987). This figure represents strictly that expenditure involved in visiting the offshore islands and reefs.

It is the intention that this Workshop will function to enlighten Park managers on the direction we should take in regard to nutrients.

We need to know more about the effects of enhanced nutrient levels on Great Barrier Reef biota.

We need to consider acceptable levels for waste discharge and coastal run-off in the Marine Park and to determine management strategies to achieve those levels.

We may need to consider implementation of a monitoring programme and select appropriate components.

Any such programme will have to be implemented with limited resources and must be "spot-on" to reduce scientific uncertainty to the point where a management solution is clear. It must also provide results in time to enable management to take action to prevent detrimental impacts.

By concentrating on the conditions that managers are attempting to maintain in a park and that users expect, the central question for resource managers should be "How much change is acceptable in the marine environment?". And then, "How do we maintain the quality that is desired?".

REFERENCES

- Australian Environment Council, 1987. Nutrients in Australian Waters. AEC Report No. 19. Dept. of Arts, Heritage and Environment, Canberra.
- Driml, S.M., 1987. Great Barrier Reef Tourism: A Review of Visitor Use. Great Barrier Reef Marine Park Authority, Townsville.
- Dutton, I.M. (ed.), 1985. Workshop on Contaminants in Waters of the Great Barrier Reef. Great Barrier Reef Marine Park Authority, Townsville.
- Greenfield, P., P. Bell, D. Connell, D. Hawker, 1987. Report to the Great Barrier Reef Marine Park Authority: Guidelines for Management of Waste Discharges into the Great Barrier Reef Marine Park. Unpublished report.
- Office of Technology Assessment, 1987. Wastes in Marine Environments. Congress of the United States, Washington.
- Pastorak, R. A. and G. R. Bilyard, 1985. Effects of Sewage Pollution on Coral-reef Communities. Marine Ecology - Progress Series. Vol. 21: 175-189.
- Pearce, P. and G. M. Moscardo, 1987. Study of the Social Impact of Tourist Boats and Facilities on Existing Users of Norman Reef. Unpublished report.