GREAT BARRIER REEF
MARINE PARK AUTHORITY
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CHAIRPERSON

Greg Murtough
Great Barrier Reef Study
Productivity Commission
Locked Bag 2
Collins Street East
MELBOURNE VIC 8003

Dear Mr Murtough,

Thank you for the opportunity to provide comments on the interim report of the Productivity Commission's Great Barrier Reef Study *Industries in the Great Barrier Reef Catchment and Measures to Address Declining Water Quality*.

We wish to address three major points in our comments:

1. The incomplete assessment and presentation of the current knowledge of sources and impacts of terrestrial runoff on the Great Barrier Reef (GBR), including significant omissions of important information;
2. The apparent focus of the Productivity Commission on policy options that implement low cost actions only; and
3. The quality and use of spatial datasets provided by the Great Barrier Reef Marine Park Authority (GBRMPA).

Our main concern is the assessment and presentation of the current knowledge of sources and impacts of terrestrial runoff on the GBR. In preparing the interim report the authors appear to not have fully utilised the available scientific information. The draft report, especially in the summary (*Overview)* section, suggests there is still no conclusive evidence of declining water quality within the GBR lagoon or of any resulting damage to ecosystems. This is incongruent with published scientific literature and with conclusions drawn in other documents that were prepared in the process of developing the *Reef Water Quality Protection Plan*, and which should have been considered in preparing the draft report.

In general, the scientific information synthesised in Chapter 2 is inadequately prepared for consumption by non-specialist readers. The accessibility of difficult information is of major importance, as the Productivity Commission's report is targeted at a wide range of stakeholders and will be used as the basis for decision making. The information available in published literature and provided in submissions to the Productivity Commission from various sources should have been better utilised to present a clear, unambiguous picture of the

◆
2-68 Flinders Street
PO Box 1379
Townsville Qld 4810
Telephone: (07) 4750 0700
International: +61 7 4750 0700
Facsimile: (07) 4772 6093
International: +61 7 4772 6093
e-mail: registry@gbrmpa.gov.au
http://www.gbrmpa.gov.au

impact of land runoff, especially to the coastal areas of the GBR. For example, the submission from the Australian Institute of Marine Science contained important interim results of ongoing studies by the Reef CRC, showing that a number of reefs are in a disturbed state consistent with symptoms caused by a decline in water quality. Some information that has been made available to the Productivity Commission has been omitted from the science synthesis. As it stands now, the chapter implies that the environmental impact of land runoff on GBR ecosystems is overrated and at the most is only a localised problem. General agreement in the scientific community concluded that this is not the case, for example in the *Summary statement of the Reef Science Panel regarding water quality in and adjacent to the Great Barrier Reef.*

The Independent Reef Science Panel, established by Queensland especially to review the science of declining water quality in the GBR, found that:

- There are clear indications that major land use practices in the GBR catchment have led to accelerated erosion and greatly increased the delivery of sediment and nutrients to the GBR Lagoon over pre 1850 levels;
- Causes of this increase include grazing practices in the drier catchments and overgrazing in general, urban development, agricultural production, water use practices, extensive vegetation clearing, wetland drainage on coastal plains and development on acid sulphate soils;
- There is clear evidence of impacts on some rivers, estuaries and inshore areas of the GBR. Some of these environments are obviously located in the GBRWHA;
- Coral reefs at a number of inshore locations along the coast have been disturbed and have remained in a disturbed state;
- Impacts on offshore areas of the Reef are not well understood, but the health of offshore regions is linked to that of inshore areas, estuaries and rivers; and
- Overseas experience shows that by the time widespread effects are obvious, the system would be almost irreparably damaged.

The full report of the Reef Science Panel is expected to be available in the near future, however, should be accessible to the Productivity Commission at this time.

We acknowledge that synthesising the information on the effects of water quality on GBR ecosystems is not a simple task. To assist the Productivity Commission in improving the assessment and presentation of the current knowledge of sources and impacts of terrestrial runoff on the GBR please find enclosed a selection of key scientific references, book chapters, and reports from the GBR region. These focus, for example, on the delivery of land-based pollutants by flood plumes, reduced biodiversity on reefs close to river mouths, and impact of nutrients on coral reefs. A very important concept to present is that of the catchment-to-reef-continuum. Coastal ecosystems are closely linked to terrestrial and freshwater ecosystems on the GBR catchment. The link is not simply downstream, but also involves important migrations of species (some of

commercial value) between coastal marine habitats and inland waterways and wetlands.

Further comments in detail on Chapter 2 are in Attachment 1.

Regarding our second issue, we are extremely concerned that in Chapter 7, *Prelude to an analysis of policy options*, the conclusion is drawn that "since the probability of damage to the GBR is unknown" appropriate strategies should "give priority to implementing low cost options".

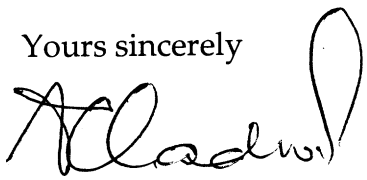
The decline of water quality entering the GBR and the loss of important coastal wetlands and riparian areas is not disputed. There is also wide agreement in the scientific community, government agencies, and land users that there is a serious and ongoing risk to the long-term future of the inshore reef area, and that action is necessary to avoid further damage and to allow affected areas to recover. The selection of management options to halt the further decline of water quality on the GBR catchments should not be governed by cost but by a comprehensive analysis of high risk areas and practices as sources of pollutants on the catchment, identification of valuable areas and resources on the GBR catchment, and advances in knowledge on sustainable development in the catchment industries.

The GBRMPA wishes to further expand on the potential policy options and measures to address declining water quality in the Great Barrier Reef World Heritage Area and its Catchment. Details addressing this term of reference are in Attachment 2.

Lastly, we wish to comment on the quality and use of spatial datasets provided by the GBRMPA. We found that the interim report fails to state (other than as a disclaimer on the maps) the accuracy and currency of data used for the publication. The GBRMPA is not the custodian of the original data required for the maps (mining, land use and aquaculture), which were provided to the Productivity Commission by the GBRMPA as assistance for the preparation of the interim report.

If you would like to discuss any material in this submission please feel free to contact Mr Hugh Yorkston on 07 47500723.

Yours sincerely



Hon Virginia Chadwick
13 December 2002

Attachment 1

Comments in detail on the Chapter 2

- p. 15, the report by Devlin et al. (2001) is not cited at all in the draft report. This report is a central piece of work regarding the distribution and composition of flood plumes in the GBR. Flood plumes are the most important mechanism that transports land runoff into the coastal areas and further offshore. This reference synthesises ten years of monitoring and studying the nature of discharges into the GBR from its catchment.
- p. 17, the statement that flood plumes and runoff only affect a relatively small part of the GBR, although literally correct, implies that there is no serious concern, even though this small part is unarguably the most critical area, not only for reef-based industries but also for ecosystem stability, e.g. by provision of important nursery areas for a large number of fish and prawn species. The following paragraph attempts to dispel this notion, however, the evidence throughout this chapter is ambiguously presented, which leaves the reader uncertain on how serious the problem actually is.
- P. 18/19, the decrease in area of coastal wetlands other than mangrove areas, and of riparian vegetation is not mentioned. All these vegetation types are vital as natural filter and "treatment" systems for land run-off enriched with nutrients and suspended sediments, before they are transported further downstream.
- P. 19, last sentence, this statement implies a generality of decreased coastal sedimentation rates related to changes in agricultural practises. The example, however, applies only to Missionary Bay and the Hinchinbrook Channel. The quoted report cites (on p. 14 under A2.6) further information from the same scientist, that e.g. in Bowling Green Bay a doubling in terrestrial sediment inputs was measured since 1900. The GBRMPA Action Plan and the GBMPA Current Issues report (both GBRMPA 2001) clearly show that the trends of delivery of suspended sediments and nutrients to the reef are increasing and not stabilising.
- P. 21, the issue of sediment delivery to the coastal zone has to be presented more clearly. It is correct that the suspended sediment concentrations are unlikely to have increased in the coastal zone. However, the sediment delivery rates have increased, especially of fine sediments that stay in suspension much longer, and hence the increasing amounts of material associated with sediments (nutrients, pesticides, heavy metals) transported into estuarine and marine waters.
- P. 21, it's phosphorus not phosphorous
- P.22, it is correctly stated that the delivery of nutrients has increased since pre-European times. The inability to measure clear temporal trends in increasing concentrations of nutrients or chlorophyll a in the water column of GBR waters has three main reasons:
  i) Only about 10 years of more comprehensive data are available for chl *a*. less for dissolved nutrients;
  ii) It is understood that nutrients delivered to GBR waters are rapidly

assimilated by biological processes (firstly uptake by phytoplankton) and incorporated and recycled within the foodweb. This will result in a steady increase in nutrient stocks in GBR ecosystems, which will be very difficult to quantify. However, an increase in concentrations of nutrients and chl *a* is unlikely to occur until the buffer capacity of GBR biota is exceeded.
The higher availability of nutrients and the assimilation into biota, however, has lead to the documented changes to coastal and nearshore ecosystems of the GBR; and
iii) There are limitations to the capacity of the monitoring to pick up short-term or localised eutrophication events given the size of the area to be monitored.

- P. 23 & p. 28, statements on low diuron concentrations are misleading. Even though the concentrations of diuron found in nearshore sediments are low compared to other parts of the world, they are significant for GBR ecosystems, as diuron has been shown to have detrimental impacts on seagrass at the concentrations found.
- P. 23, high concentrations of some heavy metals have been found in ports and harbour areas of the GBR region (reviewed in Haynes & Johnson 2000).
- P. 25, Table 2.3 presents load estimates for suspended solids and nutrients from various land uses. The assumptions and original data used to calculate these estimates should be clearly stated. The source publication of the presented estimates (McPhee 2001, except for the sugar cane data) outlines potential flaws in the data. Firstly, loads are estimated for the whole Queensland coast, not only the GBR region. Hence, sewage and agricultural loads are likely to be lower for the GBR region. Prawn farming loads are based on discharge standards that currently are not met by the whole industry. Although it is acknowledged that more accurate data is currently not published, the data presented is likely to be only a rough approximation and should only be used with caution.
- P. 28, phosphorus remains bound to the soil as long as it remains on site; eroded soil particles that become suspended in waterways release the bound phosphorus, which then becomes bioavailable (Eyre 1993).
- P. 28 & 32, significant run-off of diuron and atrazine has been measured during a flood event in the Pioneer River, and was attributed to application to cane-growing areas, as further upstream outside cane areas no pesticides were detected (NRM 2002). This emphasises that agriculture is the main source for pesticides in land runoff.
- P. 29, 35 & 36, the continued growth of seagrass at Green Island after sewage discharge ceased has been attributed to sustained higher nutrient availability from land runoff (Udy et al. 1999). Seagrass at Green Island, which is a coral reef system, would normally be nutrient-limited, and benefits from more nutrients from land-based sources.
  In contrast, seagrasses in coastal areas are generally nutrient-sufficient and are likely to become light-limited in high-turbidity event or if smothered by suspended sediment or organic matter, for example after floods or plankton blooms (Carruthers et al. in press, cited in Williams 2001). In areas with high nutrient availability seagrass epiphytes become more abundant and further

reduce light availability to the seagrass (discussed in Schaffelke et al. 2001). These effects have led to seagrass decline in coastal areas of the GBR. Higher nutrient stores in coastal seagrass (J. Mellors pers. comm., cited in Williams 2001) indicate higher nutrient availability in these regions. A likely explanation for these luxury stores is that because coastal seagrasses are generally nutrient-sufficient surplus nutrients are stored and not used immediately used for growth. The same was found in macroalgae adapted to the episodic nutrient supply in GBR nearshore areas (Schaffelke 1999).

- The effects of declining water quality on GBR ecosystems are addressed by an ongoing study by the Reef CRC (Fabricius, McCook, Furnas, Alongi, Ridd, Larcombe et al.). This integrated study of water quality and reef status has compared reefs in the wet tropics region, adjacent to catchments with intense agricultural activity, with reefs in a regions adjacent to relatively undisturbed catchments north of Princess Charlotte Bay. This study has provided a number of results suggesting human impacts, including:
    - significantly higher levels of most major water quality parameters in the wet tropics region;
    - dramatically lower coral cover and diversity in the impacted areas;
    - apparent imbalances between previous reef development and current potential for reef growth (based on the absence of live corals and reduced coral recruitment);
    - the recent disproportionate loss of exceptionally large, ancient coral colonies (indicating recent conditions at least temporarily worse than over past several centuries);
    - increased area of abundant algae.

- Critically, the study has found that the ability of reefs to recover from any disturbance is significantly less in the impacted area, since the supply of coral recruits is much lower in that area, and the survival of those recruits is probably reduced due to the combined effects of increased sediment trapping by nutrient related increased algal growth.

These results indicate the nature of changes which are likely to occur as a result of ongoing changes in water quality and provide clear evidence of recent, serious ecosystem decline due to terrestrial runoff in two major Queensland embayments, immediately adjacent to the GBR.

First results of this study are contained in the current milestone report of the Reef CRC (Fabricius 2002a), and have recently been presented to an international audience in a plenary lecture of Dr K. Fabricius (AIMS) at the European Coral Reef Conference in Cambridge (Fabricius 2002 b).

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Appendix 2

Policies and Measures to Address Declining Water Quality

A sustainable and integrated natural resource management approach to Reef protection is required, involving all levels of government, industry and Regional NRM Bodies. The strategic steps to implement this approach are outlined in the *Information paper on the proposed Reef Water Quality Protection Plan* and will be briefly summarised below.

Participation of governments

- Local Governments can address management of some natural resources matters in planning schemes, local by-laws, development assessments, land acquisitions, pest management, regional growth management frameworks, economic mechanisms (rates and charges) and other local and regional partnerships.

- The Commonwealth and State Governments are to jointly consider and accredit the regional NRM plans and provide funding from the NAP, NHT and potentially other sources for priority actions identified in an investment strategy for each regional plan.

- Regional planning activities developing regional coastal management plans under the *Coastal Protection and Management Act 1995*, catchment-wide water resource planning under the *Water Act 2000*, regional economic and development plans under the *Integrated Planning Act 1997*, and regional vegetation management plans under the *Vegetation Management Act 1999*.

- The *State Coastal Management Plan* is the key mechanism at a state level to provide for integrated planning in the coastal zone. Implementing the State Coastal Management Plan through regional coastal management plans has potential to be important in achieving water quality targets to protect the GBRWHA.

- At the regional level, the *Integrated Planning Act 1997* provides the opportunity for planning undertaken by State agencies, as well as private and public sector entities to be coordinated and integrated through regional planning advisory committees (RPAC's) and regional organisations of councils (ROCs).

- At the local level, the *Integrated Planning Act 1997* confers the power and function to undertake planning of development activities to local government, and makes provision for planning schemes and planning scheme policies as planning instruments with potential to give statutory effect to agricultural planning and protection of the GBRWHA.

- Existing government and non-government partnership programs aimed at purchasing, protecting, and, where necessary, rehabilitating wetland and riparian habitats are critical to maintaining good water quality in the GBRWHA catchment.
  A policy for management of wetlands and riparian habitat within the GBRWHA catchment should be developed, as well as a compensatory habitat policy focusing on conserving wetlands and other habitat on private land based on no-net-loss of wetland and riparian habitat in the catchments of the GBRWHA.

- Changing land-use to more intensive activities, e.g. grazing changing to sugarcane, should trigger assessment through mechanisms in the *Integrated Planning Act* to ensure developments are within the constraints of land suitability and that areas of high conservation value are not lost or damaged. As such there is the need to clarify triggers for agricultural assessments under the Integrated Development Assessment System, either through changes to the *Integrated Planning Act 1997* or the *Environmental Protection Act 1994*.

- Governments could increase their support for and coordination of water quality monitoring and research orientated towards improving water quality in GBRWHA catchments.

- The Commonwealths *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) includes as a matter of National Environmental Significance (NES) the world heritage values of a declared World Heritage Area. Under the EPBC Act actions likely to significantly impact on the GBRWHA through causing a significant decline in water quality must not be undertaken unless under an approval of the Commonwealth Minister for the Environment and Heritage.

<u>Building on existing planning regimes</u>

A range of existing planning mechanisms can be used to improve water quality:

- Setting water quality objectives and standards (based on targets) under the *Environmental Protection (Water) Policy;*
- Progressively reduce sediment loads by minimising soil erosion;
- Map and designate catchment areas vulnerable to loss of soil and nutrients, and protect as valuable feature on areas prone to land degradation;
- Minimise nutrient loss by efficient use of fertilisers;
- Minimise pesticide loss by efficient application, and by using integrated pest management principles;
- Protect and rehabilitate significant wetlands and riparian habitats; and
- Maintain an acceptable level of vegetation cover, including grasses, shrubs, and trees.

Existing planning regimes that also could be examined include:

- Regional Coastal Management Plans;
- Planning instruments and mechanisms under the *Integrated Planning Act 1997*, including State Planning Policies (SPPs), regional planning processes and local government planning schemes;
- Water Resource and Water Use Plans;
- River Improvement Trust Strategic Plans;
- Regional Strategies for Sustainability;
- Regional Vegetation Management Plans;
- Catchment and Regional NRM Plans;
- *Strategy for the Conservation and Management of Queensland Wetlands 1999*
- Integrated Catchment Management and Natural Resource Management strategies, e.g. the Wet Tropics Management strategies and policies; and
- Property management plans.

Industry Self-management Mechanisms

- Industry Codes of Practice, approved under the *Environmental Protection Act 1994*, state ways for landholders or managers of achieving compliance with the general environmental duty of care. A large proportion of landholders have accepted this, however, government and industries should work together to provide clarity on stewardship obligations, and landholders should be provided with technical support to incorporate appropriate measures into comprehensive property management plans. The potential introduction of a national environment levy, suggested by the Wentworth Group, could go hand in hand with stewardship payments, especially if aligned with maintaining ecosystem services at a farm level.

- Measures to enhance uptake by farmers of the codes and guidelines and processes to evaluate their performance should be considered.

- Environmental management systems and binding property management planning promote progressive improvement in the management of land and its natural resources. Government and industry support needs to be coordinated to assist the development of property management plans. A property management plan could address a variety of factors, such as:
    - Pest Management;
    - Nutrient and soil conservation;
    - Vegetation management;
    - Water management;
    - Best management practices for the industry and the region;
    - Air and water quality;
    - Financial management;
    - Nature/biodiversity conservation;
    - Cultural heritage conservation;
    - Petroleum and chemical storage;
    - Waste management;
    - Wetlands and riparian habitat preservation;

- Transport and access;
- Fire management; and
- Climate forecast response.

Water Quality Targets

It is important to set measurable water quality targets and timelines to achieve these, including end of river load targets that are consistent with the goals and objectives of the Reef Water Quality Protection Plan. Regional NRM Bodies are responsible for setting water quality targets that will provide an appropriate level of protection for the reef.

Statutory backing for the regional water quality targets could be achieved under the *Environmental Protection (Water) Policy*. This policy, in accordance with the *National Water Quality Management Strategy*, provides a framework for identifying environmental values for Queensland waters and for deciding and stating water quality objectives, standards and/or guidelines, and targets to enhance or protect these environmental values.

Economic instruments

Economic instruments should be used as a positive means of encouraging change. Potentially, a number of economic instruments could be used to reduce nutrient and sediment export into the GBRWHA.

Preference could be given to direct payments from Government mechanisms that facilitate retirement of areas contributing large volumes of sediment, poor quality agricultural land, and auctioning conservation and land management agreements.

The removal of any subsidies or disincentives to the adoption of sustainable agricultural production in legislation or administrative practices should be expedited and treated as a high priority action, especially with regard to the current State review of leasehold land management.

Incentives for sustainability, tied to the provision of accredited property management plans, could include things like cheaper, easier or quicker approval processes for water allocation or vegetation clearance, rebates on rates or land taxes. For leasehold and incentives might also include greater lease terms or diversification options.