

## **Evaluating the effectiveness of laws protecting the Great Barrier Reef**

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### **ABSTRACT**

The research presented in this paper evaluated the effectiveness of the laws protecting the Great Barrier Reef ("GBR") using a case study of the Cardwell-Hinchinbrook region. Three conclusions were reached. First, the best available conceptual and analytical framework for evaluating the effectiveness of environmental policy, including environmental law, is the pressure-state-response method of State of the Environment Reporting ("SoE"). Second, while SoE reporting is widely adopted in Australia, current practice in SoE reporting, at least in relation to the GBR, is largely descriptive and rarely evaluates the effectiveness of the response. Third, while there are many effective parts of the response to pressures on the GBR, the current response is not likely to be effective in preventing climate change from causing very serious damage to the GBR. Based on what we know at this point in time, particularly the technology that is currently available and current greenhouse gas emissions, the impacts of climate change appear likely to swamp the many good aspects of the legal, policy and governance systems protecting the GBR.

### **INTRODUCTION**

Many laws exist to protect our environment but research into the effectiveness of these laws is rare indeed. The complexity of the environment and the laws themselves makes evaluating the effectiveness of an environmental legal system a Herculean, multi-disciplinary task requiring the integration of environmental science and law. Without a clear conceptual and analytical framework this task is practically impossible and the communication of any results of such research for policy improvement is severely hampered. The doctoral research presented here aimed to address these issues.

In a legal and policy context, "effectiveness" can be seen as a measure of how successful law is in solving the problem it was designed to address (Zaelke et al 2005: 22). Evaluating the effectiveness of an environmental legal system considers whether it is likely to achieve its goal of sustainable development. Given the scale and complexity of the task of achieving sustainable development, an environmental legal system is unlikely to be effective in the long-term unless it is generally efficient, cost-effective, equitable, politically acceptable, and optimal (Gunningham and Grabosky 1998). Short term success at a cost that leads to long-term failure is not truly effective.

### **OBJECTIVE**

The objective of the research presented here was to analyse how to evaluate the effectiveness of an environmental legal system. It used a case study of the laws protecting the GBR with particular focus on the Cardwell-Hinchinbrook region.

### **THEORY**

The theoretical framework within which the research was placed was Policy Analysis and Evaluation Theory. Zammit et al (2000) provide a useful summary of these topics in the context of evaluating Australian natural resources management policies and programs, although their framework differs from the SoE method adopted in this research. Dovers explained the theory of creating, implementing and evaluating environmental policy. He suggested that, "a tendency to ignore basic policy knowledge from other areas is a weakness of much environment and sustainability policy thinking" (Dovers 2005: 21).

## **METHODOLOGY**

The methodology adopted in this research was based on Robson's recommendations for 'real world research' (Robson 2002). A case study of the environmental legal system protecting the GBR was used to test the hypothesis that the pressure-state-response ("PSR") method of SoE reporting is the best available method for evaluating the effectiveness of an environmental legal system. The case study evaluated the effectiveness of the environmental legal system protecting the GBR, focusing particularly on Cardwell-Hinchinbrook region. The results of this case study were compared with published SoE reports relevant to the GBR to test whether, in practice, these reports were evaluating the effectiveness of environmental policies.

## **RESULTS**

### **Pressures**

The results of the case study of the environmental legal system protecting the GBR indicated that coral reefs continue to decline globally and in the GBR due to threats from direct human pressure and indirect pressure such as climate change:

"While Australian coral reefs remain in generally good condition due to relatively low levels of human pressures, there is rising concern about the increasing threats from land runoff from the wet tropical areas, climate change and over-fishing on the GBR." (Wilkinson 2004: 304)

The Intergovernmental Panel on Climate Change ("IPCC") also concluded that climate change is a major threat to coral reefs worldwide, including the GBR, in its summary for policymakers dealing with climate change impacts, adaptation and vulnerability, released on 6 April 2007 (IPCC 2007). Specifically in relation to Australia and New Zealand, it found that there is a very high confidence that, "significant loss of biodiversity is projected to occur by 2020 in some ecologically-rich sites including the Great Barrier Reef and Queensland Wet Tropics" (IPCC 2007: 11). It defined "very high confidence" as "at least 9 out of 10 chance of being correct." It found, when considering the impacts of climate change on coastal systems, there is very high confidence that:

"Corals are vulnerable to thermal stress and have low adaptive capacity. Increases in sea surface temperature of about 1 to 3°C are projected to result in more frequent coral bleaching events and widespread mortality, unless there is thermal adaptation or acclimatisation by corals." (IPCC 2007: 9)

For these reasons, the major threat to the GBR is currently regarded as global climate change (Wilkinson 2004: 305-327). The consequences of climate change for reef ecosystems are likely to be severe, widespread and irreversible. The economic and social changes needed to avoid it are extensive and the capacity of the community to make such changes is doubtful. Land-sourced marine pollution and over-fishing are also serious, chronic pressures on the GBR able to cause severe damage at a local and regional scale. However, it is likely that these pressures pose a lower risk to the GBR as they are more readily managed, and are potentially less severe and widespread than climate change.

### **State / Condition**

The GBR is considered one of the least-disturbed coral reef systems in the world with most of it still in a relatively good condition (Wilkinson 2001: 304); however the expected trend for the condition of the GBR due to climate change and coral bleaching is very negative. The GBR has already experienced two major coral bleaching events due to extreme summer water temperatures in 1998 and 2002 (Berkelmans et al 2004). Using the IPCC "business as usual" scenario for future greenhouse emissions, Hoegh-Guldberg projected coral cover would decline to near zero in all sectors of the GBR by 2030-2040 (Hoegh-Guldberg and Hoegh-Guldberg 2004: 66). The IPCC also concluded there is a

very high confidence that, “significant loss of biodiversity is projected to occur by 2020 [to] the Great Barrier Reef” due to climate change (IPCC 2007: 11).

The condition of the coastal catchment in the Cardwell-Hinchinbrook region is indicative of the condition of the GBR coastal catchment. While the vegetation on the steep slopes of the upper catchments of rivers has been well protected, the vegetation on the coastal plains has been largely cleared for agriculture such as sugarcane farming.

## **Response**

The current response to pressures on and the condition of the GBR involves a wide range of measures operating at international, national, regional and local levels. The environmental legal system protecting the GBR can be conceptualised in four main layers: International law, Commonwealth / Australian law, Queensland law and the Common Law with the overarching purpose of sustainable development (McGrath 2006).

At an international level, the GBR is protected through inclusion, since 1981, in the World Heritage List under the World Heritage Convention in recognition of the outstanding universal value of the GBR as the common heritage of humanity.

Beneath the international level, the principal legislation directly regulating activities within the GBR is the *Great Barrier Reef Marine Park Act 1975* (Cth). The Act and regulations created under it provide a framework for planning and management of the GBR Marine Park, incorporating Zoning Plans and Plans of Management. The Act also established the Great Barrier Reef Marine Park Authority (“GBRMPA”) as the leading government body concerned with the protection of the reef.

Fisheries management in the GBR involves a complex system of federal and State laws and policies. At a federal level, the area of fully protected (no fishing) green zones in the GBR was increased from 4.6% to 33.1% in 2004 to improve fisheries management. At a State level, the *Fisheries Act 1994* (Qld) provides the legislative framework for the regulation of fisheries, coastal areas important as fisheries habitat and marine plants. The Act provides a range of mechanisms aimed at the sustainable management of fisheries including management plans, quotas, licences, and declarations of closed seasons, closed waters, and fisheries habitat areas.

To address land-sourced marine pollution, in 2003 the Commonwealth and Queensland Governments agreed to adopt the Reef Water Quality Protection Plan (“RWQPP”). This recognised that the water quality of near-shore reefs had declined due to coastal development, particularly agriculture, and set out a range of management measures to address this decline. The management measures include education, economic incentives, planning, research and regulatory frameworks.

In addition to the RWQPP, the response to coastal development pressures is illustrated by comparing Stage 1 and Stage 2 of the Port Hinchinbrook residential, harbour and canal-estate development at Cardwell. A 2005 decision to refuse Stage 2 appeared to have been based, primarily, upon expert advice of the impact of the development on the adjacent wetland area and application of the many planning instruments relevant to the site that had been developed since Stage 1 was approved. This suggests that the system improved considerably during the period in which the two developments occurred, between 1990 and 2005, and has, thereby, improved protection of the GBR through better protection of its adjacent coastal catchment.

The response to global warming has involved the international community and all levels of government in Australia. The principal international treaty for collective action to address climate change is the *United Nations Framework Convention on Climate Change 1992*. At national and State levels the policy response of the Australian Government and

the Queensland Government to climate change is almost entirely based upon non-legislative and non-regulatory programs. An important, legislative contribution made by the Queensland Government was to end broad-scale land clearing for agricultural development in 2006 (McGrath 2007a). This measure has also significantly improved the regulation of the vegetation clearing in the coastal catchment of the GBR.

### **Evaluating the effectiveness of the response**

The results of the research indicated that the best available conceptual and analytical framework for evaluating the effectiveness of an environmental legal system is the PSR method. It is the simplest, most systematic, comprehensive and meaningful framework with the greatest predictive power for evaluating the effectiveness of the total social and legal response to human-induced environmental degradation currently available.

The research indicated that the response to the condition of, and pressures on, the GBR is in many respects sound. Five responses in particular have contributed to protecting the condition of the GBR and reducing pressures on it. First, the establishment of the GBRMPA has provided important leadership for protecting the GBR. Second, the establishment of the GBR Marine Park and inclusion of the GBR on the World Heritage list has improved the protection of the GBR greatly when implemented through planning and management of the marine park as a whole under the *Great Barrier Reef Marine Park Act 1975* (Cth), regulations, zoning plans, and plans of management. Third, within this legislative framework, fisheries laws and the expansion of fully protected areas within the GBR Marine Park in 2004 from 4.6% to 33.1% of the total area based upon a bioregional planning approach have made very significant contributions to protecting the GBR. Fourth, the regulation of ship-sourced marine pollution has largely been effective in preventing major marine pollution incidents on the GBR. Fifth, after allowing largely unregulated coastal development and vegetation clearing for over a century, regulation of development in the GBR catchment has improved dramatically in the past 15 years. This is illustrated by the changes in the development approval processes in the Cardwell Hinchinbrook region and the much greater controls on vegetation management in the GBR catchment during the past 15 years.

However, while there are many effective parts of the response to pressures on the GBR, the research indicated that the current environmental legal system is not likely to be effective in preventing climate change from causing very serious damage to the GBR (McGrath 2007b). Based on what we know at this point in time, particularly the technology that is currently available and current greenhouse gas emissions, the impacts of climate change appear likely to swamp the many good aspects of the legal system protecting the GBR. Atmospheric concentrations of carbon dioxide in 2005 were approximately 379 parts per million ("ppm") and rising by 2 ppm per year. Limiting the total increase in mean global temperature to approximately 1°C by 2100 would require stabilization of atmospheric greenhouse gases and aerosols close to their existing levels. Increasing atmospheric greenhouse gas concentrations to 450-550 ppm carbon dioxide equivalents is expected to result in a 2-3°C rise in mean surface temperatures. These increases are expected to severely degrade the GBR by 2030-2040 (Hoegh-Guldberg and Hoegh-Guldberg 2004, IPCC 2007). There are currently no international or national legal constraints to hold greenhouse gas concentrations beneath the thresholds that endanger further, widespread bleaching events and these thresholds appear likely to be exceeded, which indicates the environmental legal system protecting the GBR not likely to be effective in relation to climate change (McGrath 2007b).

### **Review of published SoE reports**

One of the objectives of SoE reporting is to "report on the effectiveness of policies and programs designed to respond to environmental change, including progress towards achieving environmental standards and targets" (SEAC 1996). To review whether this

objective is currently being met, the evaluation of the effectiveness of the response to protecting the GBR, summarised above, was compared with published SoE reports relevant to the GBR (particularly SEAC 1996, EPA 1999, ASEC 2001, EPA 2003, and Beeton et al 2006). The results of this comparison indicate that SoE reports relevant to the GBR currently tend to merely describe and catalogue conditions, pressures and responses, and, generally, do not evaluate the effectiveness of the response.

## CONCLUSION

The PSR framework of SoE reporting provides the best available method for evaluating the effectiveness of environmental legal systems and environmental policy generally, but current practice, at least in relation to the GBR, is largely descriptive and rarely evaluates the effectiveness of government policy. This is a significant deficiency in current SoE reporting as evaluating the effectiveness of environmental policies is one of the primary objectives of SoE reporting.

The environmental legal and policy system protecting the GBR is sound in many respects but deficiencies in its response to climate change appear likely to undo the many good parts of the current system. To protect the GBR from climate change, atmospheric concentrations of greenhouse gases and aerosols must be stabilized close to existing levels, thereby allowing a maximum 1°C rise in mean global temperatures. Current policies are far from achieving such stabilization targets and, therefore, severe impacts to the GBR from climate change are likely in coming decades.

Two major recommendations of general relevance arise from the research. First, SoE reports should include a stand-alone chapter evaluating the effectiveness of the response to provide greater emphasis on this task. Second, the environmental legal system protecting the GBR should take strong and comprehensive measures to reduce greenhouse gas emissions. Such measures should include setting policy targets for stabilizing atmospheric greenhouse gas concentrations and limiting increases in global temperatures. Policy targets of stabilizing atmospheric greenhouse gases at 450-550 ppm carbon dioxide equivalents to limit increases in mean global temperatures to 2-3°C are likely to be too high to avoid severe impacts of coral bleaching to the GBR. Stabilizing greenhouse gases and aerosols around year 2000 levels, of 370 ppm carbon dioxide equivalents, and allowing a rise in mean global temperature of 1°C appear to be the highest targets that should be set if the GBR is to be protected from serious degradation.

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## **SPEAKER BIOGRAPHY**

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