Economic Assessment of Agricultural Pollution Management Options in Sugar Cane Production in Queensland: A Case Study Involving a Dugong Protection Area

Thesis submitted by

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March 2004

for the degree of Master of Economics
in the School of Business
James Cook University
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Abstract

Sugar cane production inevitably creates off-site environmental impacts. This thesis addresses the joint production of an agricultural good and environmental externalities and investigates options to manage transboundary effects. Sugar production activities upstream of a marine protected area may alter the natural setting and impose costs on individuals and society that are not offset by commensurate increases in benefits. Expanding the Burdekin River Irrigation Area in North Queensland to supply the Molongle Block would bring areas adjacent to Upstart Bay Dugong Protection Area under cane production with the potential to create net social costs. Irrigated cane production might introduce dry season flows and pollution carried by water, affecting the ecological value of dugong (Dugong dugon) habitat. The thesis examines why environmental damage might occur in the coastal region and explores some of the mechanisms that might be used to better minimise problems. The original contribution is an economic analysis of Dugong Protection Areas, identifying appropriate mechanisms for intervention.

A case study of potential cane production adjacent to Upstart Bay is used to explore agricultural pollution mitigation policy options. Constructed wetlands are one option, employing biological processes to mitigate agricultural pollutants. The problem of handling variable loading rates to avoid intertemporal ineffectiveness would lead to high cost mitigation. Controlling the timing of pollutant loadings via retention ponds may be a more cost effective alternative. Retarding dry season flows and first flush events for release in subsequent high flow events is expected to provide reductions in environmental impacts. Subregional retention ponds allow for effective coordination of the timing of wastewater releases and may also have economies of scale advantages.

Integrating agricultural production and ecological criteria in economic analysis of policy options revealed shortcomings in available datasets. Gaps in knowledge constrain a full evaluation of mitigation policy, but reflect a situation commonly encountered in natural resource management. Some existing planning tools could be used as a basis for pollution mitigation. The Coastal Protection and Management Act 1995 might be used to strengthen the environmental aspects of land and water management plans required by the Queensland Water Act 2000. Property level drainage outflow points may allow for effective monitoring of water quality. The strategic location of drainage outflow
points in a new irrigation development could address measurement problems hindering effective responses.

Instruments which might be worthwhile interventions include traditional regulatory approaches and market based instruments. Instruments such as tradeable permits linked to a regional mitigation infrastructure have the potential to further reduce the pollution risk at the lowest social cost. The first challenge in establishing a marketable permit system that creates an incentive to reduce pollution is the setting of limits for the aggregate quantity of pollution permissible.

In considering the potential implications of the case study for the sugar growing industry as a whole, more parameters become relevant for policy analysis. A whole of catchment approach similar to the Productivity Commission investigation of policy options for water quality and the Great Barrier Reef lagoon (2003) provides a framework to address complex land use issues affecting the land-marine interface. It is argued that policy options that inherently create incentives to reveal private information aligning private interests with desired environmental outcomes and allow for site variability must feature as part of the abatement policy mix. Finding ways to lever community capacity to implement policy options and ensure desired environmental outcomes through adopting some targeted regulatory options remains the challenge for agricultural pollution mitigation policy.
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Acknowledgements

Firstly I would like to thank the Cooperative Research Centre for Sustainable Sugar Production (CRC Sugar) for providing a scholarship to conduct this research in 2000. The objective of the Masters project was to provide an economic assessment of agricultural pollution management options in sugar cane production in Queensland involving Dugong Protection Areas as a case study. My personal circumstances have constrained the timely production of this research, and although the CRC Sugar no longer exists, I will endeavour to extend my findings to sugar industry representatives.

Secondly to Thilak Mallawaarachchi, formerly a Senior Natural Resource Scientist at CRC Sugar, who, in so many ways, provides leadership in making economic investigations germane. I wish to thank him for the personal integrity that takes and his commitment to continuing professional development, I find it inspirational.

Thanks also to Associate Professor Owen Stanley, who has provided practical support and encouragement when I needed it most.
DECLARATION

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