SHORT NOTE: THE DECLINE OF SALTMARSH IN SOUTHEAST AUSTRALIA: RESULTS OF RECENT SURVEYS.

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Abstract

The results of twenty-eight photogrammetric surveys published since 1982 are presented to establish that the decline of saltmarsh is a widespread trend in southeast Australian estuaries. The decline of saltmarsh is usually associated with invasion by the mangrove *Avicennia marina* (Forssk.) Vierh., though development pressures have also contributed to local losses.
Key Words: saltmarsh, mangrove, estuary, conservation, diversity, development.

Introduction

We present here in summarised form the results of twenty-eight photogrammetric surveys which document substantial losses of saltmarsh in a number of southeastern Australian estuaries (Table I). The purpose of this review is to establish that the trend is widespread, and raise important questions about the long-term viability of saltmarsh along a major portion of the Australian coast.

Discussion

Aerial photographs were first taken of portions of the southeast Australian coastline nearly 70 years ago and contain a valuable source of data about coastal habitats. Starting in the mid 1980s a number of investigators used these photographs to assess changes in estuarine vegetation. Table I lists a series of photographic surveys which document substantial decreases in the area of saltmarsh. The primary cause of this decline has been the landward encroachment of mangroves, principally the grey mangrove, *Avicennia marina* (Forssk.) Vierh. These studies also show that losses to urban development have been an important, though secondary, cause. While many mechanisms have been advanced explaining the landward encroachment of mangroves (Saintilan and Williams 1999), the cause or causes of this phenomenon have yet to be conclusively determined.

Only two surveys revealed an increase in saltmarsh area. Sedimentation on the Tweed River created considerable new intertidal habitat colonised by saltmarshes as well as mangroves, but overall saltmarsh has declined in area in this river since 1971 (West 1993, Saintilan 1998). The increase in the area of saltmarsh on Comerong Island took place in the absence of mangroves, but following the reopening of an adjacent channel in 1989, local losses have occurred

to encroachment by mangrove (Chafer 1998b).

The saltmarsh area of NSW at the time of European colonisation has never been quantified, and it is probably impossible to do so. Nevertheless, the losses expressed in Table I should be placed in context: in 1982, the east and southeast coastal bioregions contained only 354 square kilometres of saltmarsh of a national total of 23,322 square kilometres, and yet contained the highest species richness and incidence of species endemic to Australia (State of the Environment Advisory Council, 1996).

There can be little doubt that the area of mangrove has increased in a number of estuaries. The occupation of the upper intertidal environment by mangroves may be ephemeral, and we cannot discount the possibility of a natural cyclicity in mangrove transgression, perhaps corresponding to patterns of rainfall and sea-level in eastern Australia. However, it is also the case than the most significant of human modifications of the estuary, increased siltation and elevated nutrient levels, appear to promote the expansion and productivity of mangroves more obviously than that of saltmarshes, and competition between these communities along the intertidal gradient may be shifted in favour of mangroves in developed estuaries. Until the mechanisms of mangrove encroachment are properly understood, it will be difficult to determine what, if any, management intervention is warranted.

Social perceptions may operate alongside physical impacts to decrease the competitiveness of saltmarshes in east Australian estuaries. Mangroves have long been recognised as fish habitats (Hutchings and Saenger 1988) which has afforded them greater legislative protection than saltmarshes, even though the contribution of saltmarshes to estuarine fisheries has not been adequately quantified in Australia. For example in NSW unlike mangroves, saltmarshes are not protected under the Fisheries Management Act (1994), and the State Environmental Planning Policy for Wetlands (SEPP 14) does not cover metropolitan areas where development pressures in the upper intertidal zone are greatest.

While examples of saltmarsh rehabilitation have apparently been successful in New South Wales (Burchett *et al.* 1998 a & b), mangroves are more easily and commonly planted in community and government-based rehabilitation programs. It may be timely to review the desirability of mangrove transplanting and rehabilitation in estuaries where mangroves are proliferating naturally, at the expense of other saline wetland communities. A more holistic approach could be taken to intertidal wetland management in these situations, which considered longer-term trends in the relative proportions of mangroves, saltmarshes and seagrasses.

The saltmarsh flora is considerably more diverse than the mangrove flora in temperate southeast Australia (e.g., Adam 1994). If community and species diversity is to be preserved in southeast Australian estuaries, along with the unique faunal habitats they represent, saltmarsh ecology and conservation will need to be addressed as a matter of priority.

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Table I: Changes in the extent of saltmarsh in eastern Australian estuaries.

LOCATION	Saltmarsh lost (% unless specified)	Period	Source
Queensland			
Hinchinbrook Channel	78 (saltpan)	1943-1991	Ebert 1995 cit. Duke 1995
Oyster Point	75 (saltpan)	1944-1983	MacTainsh *et al.* 1988
Moreton Bay	65 hectares	1944-1988	Morton 1994
Coolangatta-Caloundra	11	1974-1987	Hyland & Butler 1988
NSW			
Tweed River	72	1947-1986	West 1993
	local increase	1930-1994	Saintilan 1998
Clarence River	15	1942-1986	West 1993
Macleay River	reduced	1956-1980	Middleton *et al.* 1985
	35	1942-1986	West 1993
Hunter River (excluding Hexham),	67	1954-1994	Williams *et al.* In prep.
Lake Macquarie	25	1954-1986	Winning 1990
Berowra-Marramarra Creek	25	1941-1994	Williams & Watford 1997
Careel Bay	92	1938-1994	Wilton 1997
Couranga Pt., Hawkesbury River	30	1954-1994	Saintilan & Hashimoto 1998
Lane Cove River	not specified	1930-1986	McLoughlin 1987
Homebush Bay Parramatta River	>80	1930-1983	Clarke & Benson 1988
Quibray Bay, Botany Bay	70	1950-1997	Evans 1997
Weeney Bay, Botany Bay	100	1950-1994	Fenech 1994
Woolaware Bay, Botany Bay	63	1950-1994	Fenech 1994, Hughes 1998
Towra Point, Botany Bay	30	1942-1997	Mitchell & Adam 1989
Minnamurra River	49	1938-1997	Chafer 1998a
Comerong Island, Shoalhaven River	increase	1949-1996	Chafer 1998b
Currembene Creek	14 hectares	1944-1989	CSIRO 1994
Merimbula Lake	30	1948-1994	Meehan 1997
Pambula Lake	40	1948-1994	Meehan 1997
Victoria			
Corner Inlet	"extensive"	1941-1985	Vanderzee 1988
South Australia			
Gulf St Vincent	865 hectares	1935-1979	Burton 1982, Fotheringham 1994

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