HOW AUSTRALIA ONCE LED THE WORLD

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Australia is rarely thought of as a leader in climate law. The Howard government's refusal to ratify the Kyoto Protocol and failure to include a greenhouse trigger in the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) are just the starkest instances of Australia as a climate change laggard. But at least in one respect Australia — or more accurately, South Australia — has been at the forefront of climate law. This rare instance of leadership involves adaptation to rising sea levels — one of the most difficult areas of climate law and policy. Already in 1994 South Australia's Coast Protection Board (the 'Board') secured major changes to the State's planning laws which introduced a substantial legal regime in relation to sea level rise. This article examines how South Australia — a State otherwise known in the environmental law field for only its laws relating to container deposits and clearance of native vegetation — came to have these laws. This article also highlights the benefits of using planning laws to lay down fixed, numerical development standards, even in the context of the highly uncertain and volatile science relating to sea level rise. But the article also underlines the rigidity and slowness of the planning law system — how in a context where substantial adaptive measures are necessary, planning law is anything but a rapidly responsive instrument. The broader policy and legal context in South Australia also illustrates how even the most enlightened governments often undermine their most significant environment measures through other policies and laws.

The need for planning law to address sea level rise induced by climate change had already been discussed by 1985, by Graham Chittleborough as part of an attempt to develop a State Conservation Strategy in Western Australia. He observed:

> With slowly rising sea level, and increasing frequency of cyclonic storms reaching our lower west coast, more severe coastal erosion will require more careful coastal planning in the long-term. Hard decisions may be needed to set development back from the foreshore rather than to rely on increasingly expensive coastal engineering. Housing on low lying land near the coast (including canal estates) may need to be phased out progressively, rather than accepting increasingly expensive claims for damages and/or protective works.[1]

Yet the history of coastal planning gave little cause for optimism as Peter Cullen discussed with characteristic bluntness.

In 1981 Cullen deplored how the coast was being 'irreversibly degraded by poor coastal planning' in which the coast was rarely seen as 'more than the edge of a

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1 R G Chittleborough, *Towards a State Conservation Strategy: 1. Planning to Meet Climatic Changes* (1985) 6–7.

planning district' and developments were repeatedly approved.[2] While day to day management of the coast was 'often beyond the resources of local government', the special coastal agencies created by State governments were typically understaffed, underfinanced and lacked the necessary regulatory powers.[3] And little had changed at the end of the decade when Cullen reported that mistakes had 'continued and multiplied' and most States, especially Victoria and NSW, were 'pottering with the problem with no clear idea of what they want to achieve, and how they might go about doing it'.[4] One example was the 'premature subdivision' of Victoria's Gippsland Lakes area which resulted in 'a massive waste of community resources when Government had to step in and resume blocks that should never have been subdivided on coastal dunes'.[5] Another was Queensland's Gold Coast where high rise development was 'moving further seaward, despite the erosion incidents of the past'.[6]

The uncertainty of the science, combined with the uncertainty about the rate at which greenhouse emissions would continue to occur, also did not make action easy for even the most concerned policy-maker or lawyer as exemplified by the conclusions of the Villach Conference in 1985 which put climate change on the public agenda in many countries. This conference organised by United Nations Environment Programme, the World Meteorological Organisation and the International Council of Scientific Unions followed an intense scientific effort over the previous five years to reduce the uncertainties in the predictions over climate change. The hundred scientists from around the world who gathered at Villach were there to achieve an international consensus, for the first time, about the research that needed to be done. They assumed a direct correlation between temperature increases and sea-level rise. Because they predicted that temperatures would increase between 1.5ºC and 4.5ºC over the next thirty to fifty years, they predicted that sea levels would rise between 0.2 metres and 1.4 metres within this period.[7]

When Australia's foremost climate scientist Graeme Pearman first discussed these estimates, he argued that prudence demanded that 'planners of future development take heed'.[8] But Pearman recognised that the uncertainties in the Villach predictions for sea level rise were not only very large but that the science that that they were based on was too general to form a basis for action in Australia.

2 Peter Cullen, 'Coastal Management: The Challenge Before Us' (Paper presented at the National Workshops on Coastal Management, Gosford N.S.W 18–20 August 1981 and Queenscliff, Victoria 8–10 September 1981), ch 10, 1.

3 Ibid.

4 Peter Cullen, 'Coastal Resource Management and Planning' (1987) 25(3) *Australian Planner* 10, 10, 12.

5 Ibid 10.

6 Ibid.

7 Graeme I Pearman, 'Prediction of Climatic Change from Best Scientific Models', (Paper presented at the first meeting of the Prime Minister's Science Council, Canberra, 6 October 1989) in Prime Minister's Science Council, *Global Climatic Change: Issues for Australia* (1989) 3, 19.

8 Graeme I Pearman, 'Climatic Change and Coastal Planning' (1987) 25(3) *Australian Planner* 23, 28. See also Graeme I Pearman, 'Climatic Change and Coastal Management' (Paper presented at the National Conference on Coastal Management, Coffs Harbour, 7–9 October 1986) in *Proceedings of the National Conference on Coastal Management* (1986) vol 2, 237, 240.

He argued '[w]e can only modify our activities when we can confidently attach a level of probability to the impact'.[9] He called for local and regional studies which would 'integrate the complex interactions of sea level rise and climate change into useful predictions for the future'[10] and provide 'some crude and immediate guidelines for planning'.[11]

By 1989, when public concern over climate change in general and sea level rise in particular reached unprecedented proportions, the Villach predictions were widely under attack in Australia as elsewhere. For example, Graeme Pearman dismissed them as 'very unreliable' because there was 'not proof' that increasing temperatures and sea level rise were directly related.[12] Tony Belperio of the South Australian Department of Mines and Energy warned that 'simplistic correlations of climate and sea level … may be largely misleading'.[13] Ian Lowe recognised that the Villach predictions embodied 'such a wide range' that they did not lend themselves 'easily to sensible planning for the coastal region'.[14] Like other scientific organisations around the world, the CSIRO expected that sea level rise would be at the bottom end of the Villach figures – predicting a 20 to 30 centimetre rise for Australia by 2030.[15] The catalyst for these new figures was not so much a new understanding of the relationship between increasing temperatures and rising sea levels but a new appreciation of the unreliability of much of the old data from tide gauges around the world which failed to take account of land level change.[16] In Australia this was a particular issue because it had been generally assumed that the land along the coast had been tectonically stable when in fact much of it had been tectonically active.[17]

By then the States and Territories appeared to be on the verge of acting. Their common approach was to embark on the preparation of greenhouse strategies in which sea level rise loomed large. Queensland was one example. When an interdepartmental committee issued a discussion paper on behalf of the new National Party government of Mike Ahern in 1989, it declared:

> The coastal strip is the area of the State where the impacts of the greenhouse effect are likely to be felt soonest and most severely. Communities in

9 Pearman, 'Climatic Change and Coastal Planning', above n 8, 28.

10 Ibid 240.

11 Ibid.

12 Pearman, 'Prediction of Climatic Change from Best Scientific Models', above n 7.

13 Tony Belperio, 'The Greenhouse Debate and Rising Sea Levels: Geological and Other Factors Controlling Sea Level Change' (Paper presented at the Greenhouse '88: Planning for Climate Change Conference, Adelaide, 3–5 November 1988) in Tim Dendy (ed), *Greenhouse '88: Planning for Climate Change* (1989) 77.

14 Ian Lowe, *Living in the Greenhouse* (1989) 44.

15 Kathi Eland, *What Effect Would Sea Level Rise* (1992) 5. See also E K Christie, 'Legal Implications of the Greenhouse Effect for Coastal Engineers and Town Planners' (1990) 10 *Queensland Lawyer* 119, 122.

16 Nick Harvey and Tony Belperio, 'Implications of Climate Change for the South Australian Coastline' in M Davies (ed), *Climate Change and its Implications for South Australia* (1994) 45, 50–1.

17 C Matthews, *Sea Level Rise and Climate Change: Implications for the Coorong and Lakes Alexandrina and Albert Ramsar Site, A Preliminary Investigation* (2005) Government of South Australia, Department of Environment and Heritage, 6–7.

> coastal areas will need to develop sophisticated policies of adaption if efforts to limit the greenhouse effect are unsuccessful. The adaption policies will depend heavily on appropriate policies for the management of land use. Such policies can largely be developed on the basis of existing practices, modified to account for greenhouse related effects.[18]

The Queensland discussion paper stated that policies needed to be developed despite the uncertainty of the science which meant that 'as yet the magnitude and in some cases the direction of the changes can not be predicted'.[19] Its reasons were not just environmental but also economic. Much like the Stern report fifteen years later, it argued that early action would be cost-effective. It observed that

> [w]hilst there is no specific research relating to Queensland conditions, work done in the Netherlands suggests that if planning action is taken now, the costs to the community of adapting to the effects of sea level change will be less than if the decision to act is delayed. This still remains true even if the wrong rate of rise is chosen.[20]

The government maintained that the best way of doing so was statewide action. It declared:

> Given that the impact of any changes due to the greenhouse effect upon the coastline will be felt in some form or another at all places on the coastline, it is essential that all parties agree to act in a co-ordinated manner using mutually agreed data input and, ideally, long-term strategies.[21]

Such action, it elaborated, was also necessary

> [t]o avoid the circumstance where some local authorities require the considerations of sea level rise in design of development on the coast and others ignore it and to protect local authorities and other approval agencies from legal action by landholders who consider themselves to be adversely affected [by sea level rise].[22]

For all the criticism of the Villach predictions, the Queensland discussion paper still relied on them because they were the only predictions with international support. The key to Queensland's policy prescriptions was 0.8 metres — the median point of the sea level rise by the year 2030 predicted at Villach. The discussion paper proposed that all new coastal developments be designed so that '[a] sea level rise of 0.8 [metres] by the year 2030 can be accommodated, either in the original construction or by later modification'.[23] The discussion paper also recommended that positioning of coastal developments 'be such that the expected coastal erosion due to a sea level rise of 0.8 [metres] by the year 2030 may be

18 Queensland Government, *The Greenhouse Effect: Implications for Queensland, A Discussion Paper* (1989) 13.

19 Ibid 14.

20 Ibid 20.

21 Ibid 14.

22 Ibid 22.

23 Ibid.

accommodated'.[24] In other words, adapting the standard 'Bruun rule' — that for each unit of sea level rise one should assume the erosion inland of between fifty and one hundred units — Queensland should assume a loss of 40 to 80 metres of beach frontage by 2030.

As with so much of this first burst of concern about climate change in Australia, this proposal went nowhere, as what Roslyn Taplin dubbed 'greenhouse policy inertia' set in across almost the entire country.[25] A green paper for a coastal protection strategy issued in 1991 by Queensland's new Labor government led by Wayne Goss was as vague as could be, devoid of both figures and time-frames. One of its four proposed objectives for coastal management was '[t]o ensure policies are in place to deal effectively with the coastal consequences of the "greenhouse effect"'.[26] The only elaboration of this objective in the strategy's guidelines had no more substance. 'Planning for consequences of the "greenhouse effect" should be based on the best scientific data available at the time of planning',[27] they stated. 'Coastal and environmental conditions should be monitored. Coastal buffer zones, regional plans and development assessments should consider the sensitivity of the coast to changes in sea level'.[28]

South Australia was the one State which acted. It did so partly for reasons which also held good for other parts of the country. So several of Adelaide's northern suburbs were already susceptible to storm tide flooding and dependent on embankments and stormwater flooding, and some of the State's larger coastal cities and several of its seaside townships and holiday settlements were vulnerable because they were on very low-lying land with little margin for erosion.[29] But it was also easier for South Australia to act than the eastern States because relatively little of its coast was subject to the same development pressure. South Australia also had a profound legislative and institutional advantage when it came to coastal protection. In an era when Queensland and New South Wales were the only other jurisdictions with beach of coastal protection Acts, the South Australian *Coast Protection Act 1972* (SA) was the most substantial. The State's Coast Protection Board was also the most effective in both protecting the environment and reducing property damage at least cost.[30]

In approaching their work, the engineers who led the Board were keenly aware of how all too often the approval of inappropriate development, typically on sand dunes, ultimately cost the State dearly, as it resulted in government trying to stabilise the dunes, building protective works or reacquiring critical areas that

24 Ibid.

25 Roslyn Taplin, 'Greenhouse: An Overview of Australian Policy and Practice' (1994) 1 *Australian Journal of Environmental Management* 142, 142.

26 Queensland Government, *Green Paper: Coastal Protection Strategy* (1991) 19.

27 Ibid 19.

28 Ibid.

29 Tony Wynne, 'Implications for Coastal Erosion and Flooding in South Australia', (Paper presented at the Greenhouse '88: Planning for Climate Change Conference, Adelaide, 3–5 November 2008) in Tim Dendy (ed), *Greenhouse '88: Planning for Climate Change* (1989) 90; A A Wynne, 'Sea Level Rise and Coastal Planning Policy in South Australia', in *Ninth Australasian Conference on Coastal and Ocean Engineering* (1989) 302.

30 Cullen, 'Coastal Management: The Challenge Before Us', above n 2, 12.

had been unwisely subdivided in the past. In keeping with this stance, the Board was set on trying to ensure that where coastal land had been inappropriately subdivided, but had not yet been built on, the development of this land should be stopped either through appropriate planning controls or the public acquisition of this land. It equally was set on trying to stop ribbon developments not only because they were costly to service, frequently unsightly and sometimes restricted beach access but also because they 'often eventually require State expenditure to protect them from erosion'.[31] It similarly recognised the advantages of statutory requirements that development be set back from the coast — recommending that the minimum distance on the Yorke Peninsula be 100 metres, which was much more than in most American states.[32]

The pivotal role of engineers in this process runs counter to a common conception of engineers as one of the professions most implicated in environmental destruction. The role of engineers from Tasmania's Hydro-Electric Commission in the damming of Lake Pedder is just one notorious example. Yet the engineering profession has never been entirely monolithic. So a significant critique of the damming of Lake Pedder came from two engineers — John Burton, professor of Natural Resources at the University of New England, and Horry Higgs, the Chairman of the Australian Institute of Engineers National Committee on Environmental Engineering who was also a former director of the Commonwealth Department of Environment. Burton and Higgs even published robust critiques of the dam in the professional journal *Engineers Australia*, prompting the Hydro-Electric Commission to threaten to sue for defamation.[33]

The leadership of engineers in addressing sea-level rise was all the more remarkable because it did not involve big, expensive technological projects which engineers have pursued in so many other contexts. The key was a new understanding of solid coastal defences — otherwise known as coastal armouring. As described by Peter Cullen and Eric Bird in a report to the South Australian Coast Protection Board, it was generally accepted until the mid-1960s that the best protection was provided by the construction of major structures — either massive rock walls or groynes out to the sea built at 90 degrees to the coast. But then experience on the Gold Coast and elsewhere showed that these structures were not only costly to build and maintain but often also displaced damage to other parts of the coast or failed to protect the areas that they were designed to safeguard.[34]

The result was a new consensus within the engineering profession, not just in Australia but internationally, that land management and planning were vital to coastal protection. Consistent with this approach, the South Australian Board treated it as 'widely understood that if a dune is isolated from the coastal system by protective engineering works then beaches are likely to erode'.[35] It equally recognised that sea defences 'would in nearly all situations cause loss of …

31 Peter Cullen and Eric Bird, *The Management of Coastal Sand Dunes in South Australia* (1980) 1.

32 Ibid 70.

33 Peter Thompson, *Power in Tasmania* (1981) 26–30.

34 Cullen and Bird, above n 31, 33.

35 Ibid 54.

coastal wetlands'.[36] Its solution depended on sand dunes acting as key buffers between sea and land and the use of 'a setback line behind the dunes, to ensure all developments are setback a safe distance and will not be threatened by wave erosion of the dune during the expected life of the building or structure'.[37]

The South Australian Board was the first Australian agency which explicitly discussed the impact of climate change on sea level. The catalyst was the release in 1982 of the first major greenhouse predictions by the US Environmental Protection Agency, which were specifically designed to encourage coastal decision-makers to address sea level rise. This report had little impact in the United States[38] but was taken up by the South Australian Board as part of its review of coast protection in Adelaide. The strategy that the Board completed for Adelaide in 1984 assumed that the average annual increase in sea level of 2 millimetres a year for the previous forty years would continue. It also 'considered briefly' the effect of an average annual rate of 10 millimetres a year which might be associated with 'the postulated "greenhouse" warming of the earth'.[39] But while it acknowledged that the US Environmental Protection Agency was calling for 'ameliorative measures' to be taken, it decided against doing so.[40] It concluded that, while large rises could occur, they were 'too uncertain to take into account at this stage'.[41]

The Board went much further in 1988, adopting an interim policy, endorsed by the State government, which one of Australia's foremost coastal experts, Bruce Thom, immediately identified as exemplary.[42] While the South Australian policy purported to adopt the median Villach figure of 80 centimetres of sea level rise, it assumed this rise would take place over 100 years rather than 50 years as at Villach, a profound difference. The Board recommended that 'most developments should be capable of being protected against this'.[43] More generally, the Board recommended that 'the full range of possible greenhouse effects be considered for major projects and that the possible consequences of higher sea level projections should not be ignored'.[44] While undertaking that new developments would not 'be required to have protection from unknown and uncertain future sea levels', the Board declared that it would 'not support their approval unless practical protection measures could be provided in the event of more rapid sea level rise, notwithstanding the cost of these, nor who might have to pay for them'.[45]

36 Tony Wynne, above n 29, 90.

37 Cullen and Bird, above n 31, 54.

38 James Titus and Vijay Narayanan, *The Probability of Sea Level Rise* (1998) 139–40.

39 South Australian Coast Protection Board, *Adelaide Coast Protection Strategy Review 1984* (1984) 17.

40 Ibid.

41 South Australian Coast Protection Board, *Adelaide Coast Protection Strategy Review 1984* (1984) 69, 258–9; AA Wynne, above n 29, 303.

42 Bruce Thom, 'Issues for the Australian Coastal Zone' (Paper presented at the first meeting of the Prime Minister's Science Council, Canberra, 6 October 1989) in Prime Minister's Science Council, *Global Climatic Change: Issues for Australia* (1989) 83.

43 Ibid 122–3.

44 Ibid 123.

45 Ibid. AA Wynne, above n 29, 303.

A year later the Board began looking to do more, which was consistent with its undertaking that it would 'keep abreast of scientific opinion and predictions on higher rates of relative sea level rise' and review its policies.[46] Its goal was 'a more active defining of hazard standards and recommending of minimum building levels and set-backs from eroding coastlines'.[47] Although there was some reluctance within the Board to do so on the basis that it was the responsibility of developers to carry out studies and establish design criteria, the Board recognised that, while it could require large developers to carry out such studies, it was not practical for smaller ones to do so, and there was 'an expectation, and a clear need, for the State to provide standards'.[48] As the Board created an Advisory Committee on Mean Sea Level to do this work, it was aided by what then seemed like a marked improvement in the scientific basis for predicting sea level rise, with a consequent reduction in uncertainty.[49] A key factor was the work of the newly created Intergovernmental Panel on Climate Change ('IPCC') which released its first assessment report in 1990.

When the Board completed its work in 1991, it concluded that the sea level was rising at a rate of about 1.5 millimetres a year along most parts of the South Australian coast and that this rate would increase due to global warming.[50] It recommended that, for most coastal planning, account should be taken of 100 years erosion at the site, starting with an allowance for 0.3 metres of sea level rise by the year 2050. So far as the next 50 years were concerned, the Board recognised that what would occur was less certain, but decided to assume an additional rise of 0.7 metres or 1 metre over the course of the century. In its view, the 'small margin' between the median figure of 0.65 metres predicted by the IPCC in its first assessment report in 1990 and the Board's figure of 1 metre provided 'some allowance against the possibility of greater increases and also for the possibility of storms becoming more severe and causing higher extreme tides'.[51]

The Board declared:

> Ideally new development should not be located where it will need to be protected. This is because coast protection works usually interact with natural processes in environmentally adverse ways, and because they frequently have high initial and ongoing costs.[52]

But the Board did not propose a prohibition. It also did not suggest that new developments, which did not meet its new standard, would have to be secure immediately against this rise. Instead, these developments would have to be

46 Thom, above n 42, 93, 122–3.

47 AA Wynne, above n 29, 303.

48 Ibid.

49 Climate Impact Group SCIRP Division of Atmospheric Research, *The Greenhouse Effect: Regional Implications for Western Australia* (1992) 60.

50 South Australian Coast Protection Board, *Policy on Coast Protection and New Coastal Development* (1991) 3.

51 Ibid.

52 South Australian Coast Protection Board (1992) 26 *Coastline: Coastal Erosion, Flooding and Sea Level Rise Standards and Protection Policy* 1, 5.

capable of being protected against this rise by reasonably practical means. In order to ensure that was possible, the Board's policy was that space should be left not only for future levee banks or walls which the Board expected would be paid for by the developer rather than the community but also for a coastal reserve.[53]

The policy dilemmas in arriving at this proposal were discussed with unusual frankness by an interdepartmental committee that produced South Australia's Greenhouse Strategy in 1991. This committee reiterated that action was necessary as

> [t]o ignore climate change in planning coastal development would close options for the future. It would bring forward the need for seawalls and levee banks and the environmental impacts of these, and would result in high community costs and social impacts in the future.[54]

Because the committee recognised that '[p]rediction of coastline changes requires a good understanding of existing processes at each location, is time consuming and costly and, at this stage, is unlikely to give reliable results',[55] it argued that the only possible response was a general rule for the entire coast. It cast the proposal as one of 'no regrets' — a policy approach which otherwise was widely discussed in the early 1990s but rarely adopted.[56] Its key was, that 'if global warming of the scale predicted does not eventuate, then the measures adopted should be of a kind which will be worth implementing in their own right'.[57] In other words, if sea level rise was less than expected, the new policies would still be beneficial because they would result in 'larger coastal reserves and reduced storm damage'.[58]

The committee was unusually open about the limitations of its policy. It observed that the policy was 'likely to be effective in the short (40–60 year) term, but may be less satisfactory thereafter, as costs and environmental impacts of protection escalate'.[59] It also recognised the case for more ambitious measures, noting that:

> Allowing for a greater amount of change than is presently being considered also warrants consideration, given the IPCC projections. It could be argued that up to 1 m[etre] of sea level rise should be taken into account for this purpose. However, this would result in sterilisation of land and in an unnecessary standard being applied for much of the life of the projects. It also assumes that efforts to limit further global warming

53 South Australian Climate Change Committee, *Greenhouse Strategy for South Australia* (1991) 71; Harvey and Belperio, above n 16, 46.

54 South Australian Climate Change Committee, *Greenhouse Strategy for South Australia*, above n 53, 73.

55 South Australian Climate Change Committee, *Implications of Climate Change for South Australia: First Report of the Climate Change Committee* (1990) 23.

56 Roslyn Taplin, 'International Environmental Policy Development on Climate Change: Australia's Involvement and Our Domestic Policy Response' (Paper presented at Ecopolitics VI, Melbourne, 25–27 September 1992) in Ian Thomas (ed), *Interactions and Actions: Ecopolitics VI Proceedings* (1992) 34, 39.

57 South Australian Climate Change Committee, *Implications of Climate Change for South Australia* above n 55, v.

58 South Australian Climate Change Committee, *Greenhouse Strategy for South Australia*, above n 53, 73.

59 Ibid.

> and hence sea level rise are unsuccessful. The large gap between existing and new development standards would cause inequity and administrative difficulties.[60]

Not least the Committee was alive to the short-term economic costs that could ensue from South Australia adopting a much more stringent policy than that adopted elsewhere, as turned out to be the case. As the Committee put it, 'such a standard would be well above those being considered overseas and in other Australian States, and could discourage coastal development in South Australia'.[61]

The South Australian government of John Bannon endorsed this approach in May 1991. In recommending it, the Minister for Planning and Environment Susan Lenehan acknowledged 'the special difficulties associated with climate change and sea level rise and with the uncertainty about these'.[62] However, she declared herself satisfied that sea level was already rising slowly and that the rate was likely to increase within the next 30 to 50 years. She also emphasised the economic advantages of acting, just like the Queensland government in its 1989 greenhouse discussion paper. 'Because the potential consequences of not taking these changes into account may be far higher than the costs of doing so', Lenehan declared, 'I believe we must act accordingly'.[63] She supported the Board's policies as 'a prudent but cautious approach'.[64]

When yet another committee reviewed South Australia's coastal legislation in 1992, twenty years after its enactment, it also endorsed this approach. The committee observed that

> [p]rojected sea level rise is likely to have a major impact. The presence of existing development (and future protection for this) will make it very difficult to sustain large parts of the coast in their present condition. This is likely to be a special issue for shacks on crown land and other small settlements which may be at future risk. It will become more important to plan for public space at the coast and to allow for inland migration of coastal wetlands. However, there will be constraints and losses will be unavoidable. There will also be loss of existing private uses and an increased level of conflict. Environmental aspects will need to be strongly promoted in forward planning if they are not to suffer.[65]

Implementation was still a problem, however, as with much of the Coastal Protection Board's work. When its legislation was enacted in 1972, it was envisaged that the Board would make management plans for different regions along the entire coast.[66] But even though the Board was relatively well resourced

60 Ibid.

61 Ibid.

62 South Australian Coast Protection Board, above n 50, 1.

63 Ibid.

64 Ibid.

65 Coast Protection Act Review Committee, Parliament of South Australia, *Review of the South Australian Coast Protection Act 1972: Green Paper* (1992) [5.1].

66 *Coast Protection Act 1972* (SA) s 20.

and focused on its responsibilities, the process was very slow, as all too often with the development of management plans, so that fifteen years later the Board had still not made plans for the entire coast and was struggling to keep those plans it had made up to date.[67] The Board had also come to realise that these plans 'were not contributing greatly toward improving management of the coast'[68] even though they were statutory documents because they did not bind local government when it came to development approvals. These plans also 'frequently listed an extensive range of management problems which Local Government and the Coast Protection Board had inadequate resources to address or which regulations were inadequate to control'.[69] As a result, the Board had abandoned this process in 1987.[70]

The Board's only other potential mechanism for implementing its policies was to have them included in supplementary development plans under the State's 1982 *Planning Act* which was replaced in 1993 by a new *Development Act*.[71] These supplementary development plans had more legal force, binding local government. But the great weakness of this approach so far as the Board was concerned was that it did not have control over the process which led to the making of these plans. As the Adelaide academic Nick Harvey later observed of the Board when appearing before the State Parliament's Environment, Resources and Development Committee: 'It does not have any teeth, so it has to rely on the Development Act for enshrining objectives and principles of management'.[72]

The State government decided to use this mechanism for the Board's new sea-level rise policy at the start of 1992 by making a supplementary development plan which would give State wide effect to the policy.[73] But this process was again slow as the State's *Planning Act 1982* (SA) laid down a statutory process which required the government to consult with councils in preparing the supplementary development plan, prepare a statement explaining the change, advertise the plan and an explanatory statement, invite public submissions and provide an opportunity for public hearing before a special Advisory Committee.[74] By the time this process was complete and the new standards had been written into the South Australian Development Plan through a Regional Coastal Areas Policies Amendment as well as into the Development Plans of coastal councils through the normal three to five year revisions of these plans,[75] there was a new State Liberal government led by Dean Brown which endorsed the policy approach taken by its Labor predecessors. It also was 1994 — a sharp illustration of the elaborate, time-consuming processes typically required to amend planning regimes.

67 AA Wynne, above n 29, 303.

68 Coast Protection Act Review Committee, above n 64, [4.3.1].

69 AA Wynne, above n 29, 303.

70 Ibid; Resource Assessment Commission, *Coastal Zone Inquiry: South Australian Case Study* (1993) 37.

71 *Planning Act 1982* (SA); *Development Act 1993* (SA).

72 Evidence to Environment, Resources and Development Committee, *Coastal Development Inquiry*, Parliament of South Australia, Adelaide, 26 June 2007, 72 (Nick Harvey).

73 South Australian Coast Protection Board, (1992) 26 *Coastline: Coastal Erosion, Flooding and Sea Level Rise Standards and Protection Policy*.

74 *Planning Act 1982* (SA) s 41.

75 South Australian Coast Protection Board, *Policy Document endorsed 30th August 2002* (2004) 18, 49.

This achievement was, all too typically, undermined by government in other ways. One, described by Andrew Short, was that the Bannon government decided to 'freehold hundreds of beach shacks, many built close to or on the beaches and in low lying erosion and flood-prone areas', spurring the construction of many more substantial structures on these sites and creating a major issue as to whether it would be left 'to the government and taxpayers to maintain these unsightly ribbon developments and to try and protect these properties as they become increasingly exposed to shoreline erosion and sea level rise'.[76] The other was that the Brown government failed to give the Board adequate power in relation to the approval of an array of inappropriate coastal developments. Its only powers of veto under the State's *Development Act 1993* (SA) were in relation to coastal protection works and large excavations or fills within 100 metres landward of the coast.[77] Otherwise it simply had to be consulted in relation to other developments on coastal land and the decision-maker was free to disregard its advice. In relation to new sub-divisions the decision-maker did not even have to consult the Board but retained the discretion to do so.[78]

As the Board succeeded in getting its policies enshrined in the statutory planning framework, it also was confronted by new science which saw the estimates of sea level rise decrease — not so much again due to any new understanding of the interrelationship between rising temperatures and rising seas but because of further investigations of reliability of sea level monitoring networks.[79] Whereas the median figure in the first report of the IPCC was 0.65 metres by 2100, the median in the IPCC's second report was 0.49 metres, and the median in the third IPCC report was 0.48 metres.[80]

As these figures emerged, the Board had to decide whether to revise its provision for sea level rise. It might well have decided against doing so because the statutory process was so slow and complicated. If it responded to each new report from the IPCC, the Board would almost always be changing its controls, with the prospect of each statutory change being immediately superseded as the IPCC completed its next report. Instead the Board justified its inaction on scientific grounds. In 1997 it declared:

> It should be noted that sea-level rise scenarios are constantly being re-assessed as new data comes to light. There has been a downward revision for the predicted rise in sea level. It now ranges from 25 to 80 [centimetres] for the year 2100, with a best estimate of 50 [centimetres]. This is 25 [per cent] lower than the best estimate of 1990 which was 66 [centimetres] by 2100. However, it should be noted that this represents a rate that is two to

76 Andrew Short, *Impact of Coastal Erosion in Australia* (2007) Coastal Watch <http://www.coastalwatch.com/news/article.aspx?articleId=4524&cateId=3&title=Impact%20of%20coastal%20erosion%20in%20Australia> at 9 April 2010; Environment, Resources and Development Committee, *Coastal Development Inquiry: Coastal Protection Board*, Parliament of South Australia, Adelaide, 16 May 2007, 44 (Graham Foreman).

77 *Development Regulations 1993* (SA) regs 24, 29(3), sch 8.

78 *Development Regulations 1993* (SA), regs 24, 29(3), sch 8.

79 Matthews, above n 17, 6–7.

80 Ibid 7.

> four times that experienced during the last 100 years. This merely reflects the extent of scientific uncertainty and should not be seen as a reason to abandon the precautionary principle in policy formation.[81]

So the Board continued. While it described itself as acting on 'the best advice available … in resolving to use the IPCC median sea level predictions as part of its hazard policy',[82] the Board saw no need to change its policies on the basis of the IPCC's 2001 projections because they were not sufficiently different to those that preceded them. When the South Australian Department of Environment issued a report on the Coorong, it recognised that the central figure of 0.49 metres in the IPCC's 2001 estimates was well below the level of 1 metre adopted by the Coastal Protection Board but maintained that

> given the uncertainty of *absolute* sea level projections and the even greater uncertainty and regional variability of *relative* sea level predictions that include neotectonic and anthropogenic factors, the cautious approach taken by the [Coastal Protection Board] in 1991 seems wise.[83]

Within this context, the Board's policy began to be cast in a new light. While the South Australian greenhouse committee emphasised in 1991 that there was a strong case for doing more — in other words, that the Board's policy was not particularly cautious — the shifting science made it look increasingly so. Nick Harvey, the one South Australian member of the IPCC, was at the forefront of reinterpreting what the Board had done, crediting it with using the 'precautionary principle' in preparing its policy. '[T]he uncertainties surrounding climate change predictions and the associated sea level response necessitate the adoption of the precautionary principle allowing safety margins for building levels and erosion set-backs', Harvey observed in 1994.[84] 'Although this may have major cost implications for costal development, it is unlikely that a greater precision for climate change models and sea level response will be reached in the near future'.[85]

The fruits of the Board's foresight were manifest in 2007 when a company called Northcape proposed a large residential subdivision at Marion Bay on the Yorke Peninsula — a low-lying area vulnerable to sea level rise which has been very popular as a coastal retreat because of its proximity to Adelaide. One of the objectives of the relevant Development Plan was to encourage development that was located and designed to allow for changes in sea level due to natural subsidence and probably climate change during the first 100 years of the development. This objective was given substance through three development principles. Principle 31 was:

81 Nick Harvey, Patricia Carvalho and Beth Clouston, South Australian Coast Protection Board*, Coastline: Coastal Vulnerability Assessment No. 31* (1997) 7 (citations omitted).

82 South Australian Coast Protection Board, *Policy Document endorsed 30th August 2002* (2004) 17.

83 Matthews, above n 17, 12 (emphasis in original). See also Evidence to Environment, Resources and Development Committee, Coastal Development Inquiry: Coastal Protection Board, Parliament of South Australia, Adelaide, 16 May 2007 (Graham Foreman, Murray Townsend, Tony Huppatz).

84 Harvey and Belperio, above n 16, 51.

85 Ibid. See also Nick Harvey, Patricia Carvalho and Beth Clouston, South Australian Coast Protection Board*, Coastline: Coastal Vulnerability Assessment No. 31* (1997) 6–7; Nick Harvey and Brian Caton, *Coastal Management in Australia* (2003) 255.

> Development should be set-back a sufficient distance from the coast to provide an erosion buffer which will allow for at least 100 years of coastal retreat for single buildings or small-scale developments, or 200 years of retreat for large-scale developments such as new towns.[86]

Principle 32 was 'Where a coastal reserve exists, or is to be provided … it should be increased in width by the amount of buffer required'.[87] Principle 33 included:

> the width of the erosion buffer should be based on: … (d) the effect of a 0.3 metres sea level [rise] over the next 50 years on coastal processes and storms; and (e) the availability of practical measures to protect the development from erosion caused by a further sea level rise of 0.7 metres per 50 years thereafter.[88]

This framework was pivotal in the decisions of the local council to reject the development, Commissioner Mosel in South Australia's Environment, Resource and Development Court to do the same then Debelle J of the State's Supreme Court to uphold this ruling — a decision which has attracted not just national but international attention albeit generally without proper understanding of its underpinnings.[89] When Commissioner Mosel heard the case in the Environment, Resource and Development Court, he decided that the proposal was the kind of development where it was appropriate to adopt a 100 year planning horizon when it came to coastal retreat. In a judgment subsequently endorsed by Debelle J, he found that the evidence about erosion and sea level rise suggested that the coastline was in a long-term receding phase and, over the next 100 years, could be expected to shift inland by 35–40 metres.[90] If no special provision were made for this eventuality, the loss of this land would result in the loss of the area which currently served as an erosion buffer.[91] As described on appeal by Debelle J:

> A new erosion buffer would then be necessary on what is now the coastal reserve with a consequential loss of that reserve. That was a result entirely inconsistent with the Objectives of the Development Plan and so required the Commissioner to uphold the Council's decision refusing development consent.[92]

In other respects South Australia began to be left behind. In 2002 Nicole Morcom and Nick Harvey observed:

86 *Northcape Properties Pty Ltd v District Council of Yorke Peninsula* [2007] SAERDC 50 (Unreported, Commissioner Mosel, 19 September 2007) [27].

87 Ibid.

88 Ibid.

89 Gavin Lower, 'Coast Development Denied', *The Advertiser* (Adelaide), 11 March 2008, 10; Orrin H Pilkey and Rob Young, *The Rising Sea* (2009) 176.

90 *Northcape Properties Pty Ltd v District Council of Yorke Peninsula* [2007] SAERDC 50 (Unreported, Commissioner Mosel, 19 September 2007) [38].

91 Ibid [36]–[41].

92 *Northcape Properties Pty Ltd v District Council of Yorke Peninsula* [2008] SASC 57 (Unreported, Debelle J, 4 March 2008) [20]. See also District Council of Yorke Peninsula, Development Assessment Panel, Agenda, 24 April 2007, 15 June 2007.

> Most states have now revised their coastal management legislation and a number of states, such as New South Wales, Tasmania and Victoria have also developed separate coastal policy documents. South Australia is unique in that it has not yet revised its 30-year-old coastal legislation, the Coast Protection Act 1972 and does not have a separate coastal policy document … The changing philosophy from coastal protection to coastal management has not been embraced in South Australia.[93]

Another key issue, highlighted by the Environment, Resource and Development Committee of the South Australian Parliament in 2007, was the Board's very limited powers over development control decisions. The Board reported that the applications for moving sand and constructing new protection works, where the Board had a power of veto, constituted just 15 per cent of applications referred to it.[94] Otherwise, its powers were only advisory and councils rejected its advice in about 20 per cent of applications — primarily in relation to coastal hazards such as the risk of flooding and erosion where it not only had unrivalled expertise but it was also particularly important that its advice be heeded.[95]

The Board's commitment to early action — and capacity to achieve this goal through changing governments — still left South Australia very well placed compared to other parts of the country. While Victoria and Queensland developed policies in 2009 which were based on a sea level rise of 80 centimetres by 2100 and New South Wales moved toward a policy based on a rise of 90 centimetres, only for Victoria to recognise almost immediately that its estimate was likely to be too low,[96] the South Australian policy enshrined in the statutory development plans in 1994 assumed a rise of 1 metre. Little wonder that Board took pride not just in how it had been the first State to incorporate sea level rise allowances in its planning documents and how this system had behaved robustly in relation to the Northcape proposal but also how, in key respects, it retained the best planning framework for sea level rise in Australia.[97]

93 Nicole Morcom and Nick Harvey, 'South Australian Coastal Planning: Protection or Integration?' (2002) 39(1) *Australian Planner* 19, 19, 23.

94 Environment, Resources and Development Committee, Parliament of South Australia, *Coastal Development* (2007) 12.

95 Ibid 12–14.

96 Jason Dowling, 'Sea Rise "Will Exceed Forecast"', *The Age* (Melbourne), 29 August 2009, 7.

97 Cara Jenkin, 'South Australia: Riding the Rise', *One Degree Change the Planet's Future, The Advertiser* (Adelaide), 17 August 2007, U10; Evidence to Environment, Resources and Development Committee, Coastal Development Inquiry: Coastal Protection Board, Parliament of South Australia, Adelaide, 16 May 2007, 51 (Murray Townsend); Evidence to Standing Committee on Climate Change, Water, Environment and the Arts, Parliament of Australia, Adelaide, 8 October 2008, 5–6 (Murray Townsend).