Urban planning and sustainable adaptation to sea-level rise

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**Anna HURLIMANN^a, Jon BARNETT^b, Ruth FINCHER^c, Nick OSBALDISTON^d,
Colette MORTREUX^e, Sonia GRAHAM^f**

^aCorresponding Author: Faculty of Architecture Building and Planning, The University of Melbourne, Australia 3010. Email: hurac@unimelb.edu.au, Phone: +61 3 8344 6976; Fax: +61 3 8344 5532

^bDepartment of Resource Management and Geography, The University of Melbourne, Australia 3010. Email: jbarn@unimelb.edu.au

^cDepartment of Resource Management and Geography, The University of Melbourne, Australia 3010. Email: r.finch@unimelb.edu.au

^dDepartment of Resource Management and Geography, The University of Melbourne, Australia 3010¹

^eDepartment of Resource Management and Geography, The University of Melbourne, Australia 3010. Email: colettem@unimelb.edu.au

^fDepartment of Resource Management and Geography, The University of Melbourne, Australia 3010. Email: sonia.graham@unimelb.edu.au

Abstract

Sea-level rise poses major challenges to coastal land uses, and therefore to urban planning processes. In theory, if done well, urban planning can lead to responses to sea-level rise that are socially and environmentally sustainable. In practice, urban planning processes may fall short of this ideal. We use multiple methods to describe and analyse how urban planning processes have led to adaptation to sea-level rise in Lakes Entrance in Victoria, Australia. Adaptation has principally taken the form of restrictions on development on low-lying land. In this town, which is considered particularly vulnerable to sea-level rise, the urban planning process and its outcomes have been controversial and divisive. Policies at the state level were imposed rapidly on this particular local community, and were later applied across the state. Our findings support the emerging consensus that to be sustainable, urban planning needs to: facilitate local ownership of adaptation responses; build collective action within local communities

¹ Now located at: School of Applied Media and Social Science, Monash University, Australia 3852. Email: nick.osbaldiston@monash.edu

and between local communities and different arms and levels of government; and be fair in its application across space and over time. Addressing these social dimensions of adaptation takes time, but they are a *sine qua non* of sustainable adaptation to sea-level rise.

Key words: sea-level rise; climate change adaptation; local government; institutions; policy; urban planning

1. Introduction

Sea-level rise poses major risks to lands along most coasts, and to the 600 million people and two-thirds of the world's major cities that are located in low-lying coastal areas (McGranahan, Balk, & Anderson, 2007). Climate change means that over time, coastal lands will be progressively more exposed to flooding, permanent inundation, erosion, higher storm surges, and saltwater intrusion. Over this same period, coastal populations and economies are projected to increase (Jongman, Ward, & Aerts, 2012). This poses major challenges to urban planning, which in most places seeks to manage use of land in a manner that addresses demands for growth, equity, and sustainability, and which now must contend with an ever increasing scarcity of habitable land (Campbell, 1996).

There is little doubt that urban planning will be a critical driver of adaptation to sea-level rise (Hurlimann & March, 2012; Measham, Preston, Smith, Brooke, Goddard, Withycombe, & Morrison, 2011; Meyer, Rannow, & Loibl, 2010; Tribbia & Moser, 2008; Wilson, 2006). One of the challenges facing urban planning as it seeks to respond to sea-level rise is defining the

measures of successful adaptation. Indeed, success may be elusive given that losses are inevitable (Moser, 2013), and that adaptation will be an ongoing process of responding to change with no ‘end’ point (Nelson, Adger, & Brown 2007; Stafford-Smith, Horrocks, Harvey, & Hamilton, 2011). Sustainable adaptation requires institutions that can negotiate and address the demands made of an ever-changing landscape in ways that are just and legitimate, so that the institutions of planning as well as communities at risk are able to persist over time.

Successful adaptation must therefore be sustainable, both in terms of its ability to ensure “socially and environmentally sustainable development pathways, including both social justice and environmental integrity” (Eriksen, Aldunce, Bahunpati, Martins, Molefe, Nhemachena, O’Brien, Olorunfem, Park, Sydna, & Ulrud, 2011: 8), but also in terms of the process itself being sustained indefinitely over time. Thus it is advantageous for the institutions of adaptation to continue for as long as sea-level rise affects coastal changes, which seems likely to continue indefinitely until some degree of equilibrium in coastal systems is reached. Thus, sustainable adaptation is all about developing institutions that will endure, and this includes urban planning. This is the essence of the nascent theory about successful adaptation that is emerging in the environment and planning literature, and which is the focus of this article.

If there is a theory that explains how to achieve successful adaptation to sea-level rise, it includes the following key factors: vertical integration among levels of government; horizontal integration between government departments and across jurisdictions (e.g. between local and state and national governments); extensive stakeholder engagement; collective agreement between local actors about the types and timing of adaptation actions; mainstreaming of adaptation into all

83 decisions; strengthening of legal frameworks for action; allocation of the costs of benefits of
84 adaptation amongst actors according to levels of risk; and clear and consistent guidelines and
85 plans developed by and adhered to across all levels of government (Abel, Goddard, Harman,
86 Leitch, Landridge, Ryan, & Heyenga, 2011; Amundsen, Berglund, & Westskog, 2010; Baker,
87 Preston, Brown, & McAlpine 2012, Barron, Canete, Carmichael, Flanders, Pond, Sheppard, &
88 Tatebe 2012; Eriksen et al., Martin, Fackler, Nichols, Lubow, Eaton, Rung, Smith, & Langtimm,
89 2011; Measham et al., 2011; Moser, Williams, & Boesch, 2012; Tompkins, Few, & Brown,
90 2008; Tribbia & Moser 2008; Storbjörk & Hedren 2011; van den Berg 2010; Wilson, 2006; Few,
91 Brown, & Tompkins, 2007b).

92
93 These factors can be categorised as being about: 1) facilitating local ownership of adaptation
94 responses; 2) developing collective forms of action (within local communities and between local
95 communities and different arms and levels of government); and 3) ensuring fairness across
96 space, and over time. The focus of the literature to date has been on the social dimensions of
97 sustainable adaptation, which we focus on here.

98
99 Standardised policy frameworks may well be necessary to ensure consistent approaches to
100 adaptation, but the legitimacy and social sustainability of processes requires adaptation to be
101 contextualised in and owned by local communities (Adger & Barnett 2009; Adger, Arnell, &
102 Tompkins, 2005; Adger, Barnett, Brown, Marshall, & O'Brien, 2013; Barron et al., 2012;
103 Douglas, Kirschen, Paolisso, Watson, Wiggin, Enrici, & Ruth, 2012; Picketts, Werner, Murdock,
104 Curry, Dery & Dyer, 2012). This involves more than the oft-cited calls for stakeholder
105 engagement, which may do little more than maintain 'the illusion of inclusion' (Burton &

Mustelin, 2013; Few, Brown & Tompkins, 2007a). Building local ownership involves, among other things: allowing time for information about risks to settle with local cultures such that they make sense to communities, communicating in a way which resonates with cultural cognition/s; developing methods and processes to ensure local values inform the goals of adaptation responses; understanding and negotiating the trade-offs associated with different sets of responses; identifying conflict resolution processes; and to develop and implement iterative and flexible planning pathways that provide individuals and communities with some confidence that their core lived values will be sustained over time despite changes along the coast; (Barron et al., 2012; Graham, Barnett, Fincher, Hurlimann, Mortreux, & Waters, 2013; Khan, Jenkins-Smith, & Braman, 2011; Moser, 2013; Moser et al., 2012; Walker, Haasnoot, & Kwakkel, 2013).

Overall, such local engagement needs to ensure that the process and outcomes are considered to be fair by the local community.

Collective action is no less important than local ownership for sustainable adaptation to sea-level rise. Lack of a collective government (and local) response repeatedly hampers adaptation efforts (Moser et al., 2012; Barnett, Waters, Pendergast, & Puleston, 2013). Vertical, top-down approaches have frequently undermined more local and expansive institutions that enable adaptive capacity (Brown, 2011). At a local level conflicting sets of values and worldviews creates challenges for the development and realisation of acceptable adaptation options (O'Brien & Wolf, 2010). These examples point to a need for coordinated, collective action between communities and various arms and levels of government, as well as within communities (Barnett et al., 2013).

129 Such collective action not only requires a large number of individuals and organisations to
130 cooperate during planning and implementation phases, but also preparedness on the part of all
131 parties to make sacrifices to achieve a collective benefit (Van Vugt & Snyder, 2002). Essential to
132 achieving such an outcome is the establishment of trust among all actors. This takes time to
133 establish and genuine effort to maintain. While adaptation may never be conflict free,
134 sustainable adaptation can be facilitated by explicitly acknowledging the distribution of losses
135 and the winners and losers from change and addressing these in a formal, transparent, and
136 consistent manner. Transparent processes for mediation and conflict resolution in adaptation
137 processes will be critical to achieve this aim.

138

139 Clear and fair policies that apply across jurisdictions, and which do not radically change over
140 time, are also essential for sustainable adaptation (Storbjörk & Hedren 2011; Tribbia & Moser,
141 2008; Macintosh, 2012). In their study of the barriers to adaptation to sea-level rise in Australia,
142 Barnett et al., (2013) found that there are three elements of clarity and consistency that currently
143 act as governance barriers to adaptation. These are: lack of clarity on roles and responsibilities
144 across levels of government; lack of clarity on roles and responsibilities between the public and
145 private sector; and inconsistency in standards and policies across jurisdictions. If sustainable
146 adaptation is to be achieved greater consistency, clarity and coordination of adaptation
147 governance and policy is required. Brown (2011) argues that sustainable adaptation will only be
148 achieved if there is a fundamental institutional reconfiguration in support of long term equity,
149 fairness and resilience. The characteristics of coastal adaptation may warrant a flexible policy
150 approach that will endure over time, possibly in the form of a pathways type approach whereby

adaptation unfolds over a sequence of linked strategies that are triggered by a change in social and/or environmental conditions (Haasnoot, Kwakkel, Walker, & ter Maat, 2013).

This nascent theory of sustainable adaptation to sea-level rise is based more on reason than evidence, for there remains very little evidence about how adaptation actually happens, particularly at the local level. This paper provides such evidence, by examining how adaptation has transpired in the town of Lakes Entrance in the state of Victoria, Australia. Through the use of Lakes Entrance as a case study, we aim to: 1) describe the origins and interactions of the urban planning processes that aimed to effect adaptation to sea-level rise; and 2) assess the extent to which these actions are consistent with the emerging consensus that sustainable adaptation requires planning responses that are locally-owned, collective, and fair. The paper begins by outlining the approach and methods used in this study, including an overview of the study area. We then explain the adaptation governance framework for the state in which the case study is set, before describing the urban planning processes that sought to effect adaptation in Lakes Entrance. This is followed by a discussion of the extent to which these have effected sustainable adaptation to sea-level rise in this case.

2. Research Approach

2.1 Methods of analysis

As advocated by Yin (2003), we used multiple methods to inform our analysis of the case of adaptation to sea-level rise in Lakes Entrance. Methods employed include: qualitative

interviews, policy analysis, observation of decision making processes, and the examination of decision documents relating to significant legal and planning decisions. Multiple methods (triangulation) were explicitly employed to reduce the acknowledged reliability problems that can be associated with qualitative research methods (Babbie 2008). The benefit of qualitative case study approaches such as ours is the depth of understanding it provides (Babbie 2008). Indeed, such an approach widely applied in adaptation research (e.g. Few et al., 2007b, Storbjörk 2007, Storbjörk and Hendren, 2011). Our research was informed by our collective knowledge of adaptation processes in the Gippsland East area (stretching between Port Albert in the south-west to Victoria's border with New South Wales to the north-east), and that of our industry partners (see acknowledgements).

A series of interviews with thirty key actors were conducted in November 2010 – July 2011. Interviewees were based in a wide range of federal, state and local government institutions, industry bodies, and interest groups (see Table 1). Participants were identified through our diverse research methods, by industry partners, and by other interviewees. Participation was voluntary. Due to the small sample from which our study draws, interviewees and their quotes reported here remain anonymous in line with our research ethics protocol. Each interview lasted approximately one hour. Discussion was structured around seven questions that asked about the organisations' involvement in adaptation to sea-level rise, and the processes, actors, policies, studies, and documents that they thought were significant. Interviews were recorded and transcribed for analysis.

<Insert Table 1>

197
198 The analysis of interview transcripts allowed the studies, policies, events and significant legal
199 decisions, which were significant to adaptation processes to be identified and/or confirmed.
200 Exact details of adaptation processes were verified by cross-checking with government websites
201 and policy documents. These were themselves analysed to identify further documents and events
202 of influence. Analysis of the transcripts allowed insights into the process of implementation
203 through the opinions stakeholders expressed.

204
205 Some decision-making processes and relevant community consultation activities were observed
206 by our research team in Gippsland June 2010 – November 2011. Numerous key meetings and
207 events were attended (both through invitation and attendance as a member of the public)
208 including for example, meetings of the Lakes Entrance Inundation Steering Committee; the
209 Gippsland Coastal Board's 'Future Directions' workshops; and Local Resident Associations'
210 meetings. Detailed notes were made of the observed events for later use in analysing the case
211 study. Our diverse research methods formed an important aspect of the study's triangulation.

212

213 **2.2 Case study site - Lakes Entrance**

214 Lakes Entrance is the major coastal town in the Gippsland East area of the State of Victoria,
215 Australia (Figure 1). Located within the East Gippsland Shire Council (EGSC), Lakes Entrance
216 has a population of 5,965 (Australian Bureau of Statistics (ABS), 2011a). Despite significant
217 numbers of tourists during the summer months, and some lifestyle migration, people in Lakes
218 Entrance are disadvantaged relative to most settlements in Victoria, ranking in the lowest quintile
219 in the Australian Bureau of Statistic's Socio-Economic Index (ABS, 2011b).

220
221 Lakes Entrance is situated at the eastern end of the Gippsland Lakes (Figure 1), which are a large
222 coastal lagoon system comprised of three major lakes fed by six river basins. The town is located
223 near the only permanent artificial and maintained channel between the Gippsland Lakes and the
224 sea, maintained since 1889 (Grayson, Candy, Tan, McMaster, Chiew, Provis, & Zhou, 2004).
225 The town is prone to flooding due to the combined influence of tides, winds, atmospheric
226 pressure, and rainfall (Grayson et al., 2004). Yet it is streamflow into the lakes - not tides - that
227 are the dominant influence on flooding (Grayson et al., 2004). Over time, the impact of sea level
228 rise including flooding, storm surges, erosion, is predicted to become more influential.

229
230 *<Insert Figure 1>*

231
232 The Gippsland Lakes is one of the most intensively studied ecosystems in Australia, with a
233 history of research dating back over a century. From the mid 1980's there has been a growing
234 recognition that climate change may exacerbate many of the environmental and flooding
235 problems in the Gippsland Lakes (e.g. Bird 1985, Vanderzee 1988). This century there have
236 been numerous studies of the impact of climate change on flooding and sea-level rise for the area
237 (e.g. CSIRO consultancy reports commissioned by the EGCB: McInnes, Macadam, Hubbert,
238 Abbs, & Bathols, 2005a; 2005b; McInnes, Macadam, & Hubbert, 2006). We now turn to the
239 governance of adaptation to sea-level rise.

240

241

242 **3. Victoria's governance framework for adaptation to sea-level rise**

243 Two main pieces of legislation have governed the planning response to sea-level rise in the State
244 of Victoria. The *Coastal Management Act* 1995 aims ‘to provide for coordinated strategic
245 planning and management for the Victorian coast.’ The Act establishes the Victorian Coastal
246 Council (which undertakes state-wide strategic coastal planning), and Regional Coastal Boards.
247 Management of these processes is currently the responsibility of the Department of Environment
248 and Primary Industries (DEPI, formerly the Department of Sustainability and Environment
249 (DSE)). Section 14 of The Act directs that the Victorian Coastal Council must prepare a
250 Victorian Coastal Strategy (VCS) to ‘provide clear direction for the future use of the coast’.

251
252 The second main piece of legislation is the *Planning and Environment Act* 1987, which
253 ‘establishes a framework for planning the use, development and protection of land in Victoria in
254 the present and long-term interests of all Victorians.’ At the state level, the activity of planning
255 is currently the responsibility of the Department of Transport, Planning and Local Infrastructure,
256 (DTPLI, formerly the Department of Planning and Community Development (DPCD)).
257 Planning control is largely provided for through planning schemes, based on the municipality to
258 which the scheme applies. Local government authorities are normally responsible for
259 considering and determining planning permit applications and for ensuring compliance with the
260 scheme (Eccles and Bryant 2006).

261
262 In addition to the Act and Planning Schemes, there are a range of policies, tools and guidance
263 documents that inform planning decisions (see Table 2). For example, the 2008 VCS
264 recommended that ‘a policy of planning for sea level rise of not less than 0.8 metres by 2100
265 should be adopted.’ Following the 2008 Strategy, various state government departments

developed guidelines on planning for various aspects of climate change including sea-level rise, and subsequent amendments to existing planning policy were made to ensure consistency across policy (see table 2 and section 4).

<Insert Table 2>

Catchment Management Authorities (CMAs) are also significant actors in coastal management in Victoria. Under the *Planning and Environment Act* CMAs are designated referral authorities when there is an application to use or develop land that is identified as being located in one of many flood zones or flood control areas. However, there is not yet a specific planning overlay (control) to address sea-level rise in Victoria. When a CMA is a referral authority, on their advice, permit applications to use or develop land may be refused, or conditions may be attached to a permit (Eccles and Bryant, 2006). Thus CMAs can exercise significant power. The *Water Act* 1989 and *Catchment and Land Protection Act* 1994 define and influence the work of these actors.

Planning disputes, which arise under the *Planning and Environment Act* are dealt with by the Victorian Civil and Administrative Tribunal (VCAT). VCAT can only determine appeals when parties take a dispute to it (Eccles and Bryant, 2006), and there is broad scope for third-party objections and rights of appeal in Victoria. There have been some significant cases involving the consideration of climate change impacts (Peel and Godden, 2008).

288 This is the policy setting in which adaptation is to take place: adaptation to sea-level rise is
289 primarily the responsibility of local governments, who are to implement change through land use
290 planning, advised in the process by multiple institutions including the Victorian Coastal Council,
291 the Regional Coastal Boards, VCAT and CMAs. Yet, as MacIntosh (2012) has compellingly
292 argued, these policies lacked clarity with respect to goals and means, and their implementation
293 was left to local governments, with little support from State (or Federal) governments in terms of
294 information, guidelines, money, or human resources. This suggests a lack of coordination and
295 collective action, and is consistent with the findings of our empirical research to be detailed later
296 in this paper.

297
298 This situation puts Victorian local governments in an uncomfortable, if not impossible, position
299 for two reasons. First, local governments face significant risks of liability for past and present
300 decisions that may expose built assets to sea-level rise, and there is a genuine fear of liability for
301 negligence should new developments be inundated (McDonald, 2007). On the contrary, in the
302 state of Queensland Australia, the potential liability of refusing development later deemed
303 appropriate in court has been found to drive incremental development in areas susceptible to
304 future sea-level rise (Abel et al., 2011). This is not helped by the way in which higher levels of
305 government shift responsibility (and the costs) for adaptation to local governments (MacIntosh,
306 2012). Second, one of the only opportunities that local governments have to increase revenue to
307 meet the additional costs associated with adaptation – which is through increasing rates on local
308 properties – is itself at risk from sea-level rise, as recognised by one local key actor we
309 interviewed:

310 *“there will be some risk to us as an organisation in terms of rate-able properties*
311 *and our ability to generate income or share the burden of the rate requirement”*

312
313 Growth in income from development is needed to fund adaptation but such development cannot
314 be at risk from future sea-level rise and must conform to the expectations that the referral
315 authorities and state-level planning institutions have of them with respect to adaptation. So, local
316 governments bear the responsibility and risks for adaptation to sea-level rise, but they do so with
317 no increase in support, and with constraints on their ability to fund adaptation through rates. In
318 the absence of additional funding to meet revenue deficits, or of funding, with limited guidance
319 and technical support, few local governments are able to plan in the very careful way that is
320 necessary to meet this challenge. It is in this context that decisions about adaptation in Lakes
321 Entrance were made. We now turn to detail how this transpired for the case of Lakes Entrance.

324 **4. Enacting adaptation to sea-level rise in Lakes Entrance**

325 In addition to the well-known adaptation strategies for sea-level rise – protect, accommodated,
326 retreat – there are a multitude of other possible mechanisms available to adapt. These include
327 amongst other possibilities more individual actions such as private building modification,
328 property insurance, and structured decision making approaches (Cheong 2011, Haasnoot et al.,
329 2013).

330 The results of our case study found that the emergent adaptation governance framework
331 described above provided a new decision-making context in the sphere of urban planning e.g. the
332 need to plan for 0.8m sea-level rise by 2100, instituted through the VCS 2008. Our interviews

and policy analysis identified that this was the major force in adaptation to sea-level rise in Lakes Entrance. A VCAT case *Taip v East Gippsland SC [2010] VCAT 1222* (decision released 28/7/10) and planning scheme amendment were significant factors driving adaptation. They transpired concurrently, albeit independently of one another.

4.1 The VCAT Case

The VCAT case was significant for Lakes Entrance and other coastal areas of Victoria, as evidenced in the key actor interview quote below and noted in the Tribunal Member's reasons for the decision which follows:

There's the VCAT decisions that we've had... it changes the profile... it changes community perceptions. It.. makes the whole issue more pressing to address by government.

"perhaps more than any other case that has come before the Tribunal to date, this matter brings into focus how the Victorian planning system seeks to deal with the pressing issues of climate change, rising sea levels and the vulnerability of coastal communities to the associated impacts of these conditions" (p.5)

The planning permit application that was the subject of this VCAT case was for an eight-dwelling residential development in the Lakes Entrance business centre. EGSC decided to grant a permit for the proposal in November 2008. An application to VCAT to review that decision was made by a neighbour concerned about amenity impacts which were resolved by the permit applicant in revised plans circulated at the VCAT hearing. However, subsequent to the

application for review by the neighbour, the East Gippsland CMA (EGCMA) applied for, and was granted leave to be joined as a party to the application for review.

The Tribunal Member resolved to set the decision of EGSC aside (thus no permit to be issued). The main ground for this decision was that the design response to deal with projected sea-level rise – raising the sensitive use areas of the development to above the projected flood and sea-level rise levels – was insufficient. The Tribunal Member found it was a “simplistic and ultimately a misguided approach” (p.16) for a number of reasons including: intensification of land use, poor access, unacceptable risk, and inability to access services in the future. The Tribunal Member concluded:

“The decision to grant a permit would not lead to an orderly planning outcome, as it would fail to satisfy the purposes of planning in Victoria for intergenerational equity, sustainable, fair and socially responsible development” (p.6)

What transpires through this case is that while EGSC knew about the risk of climate change and sea-level rise for the subject site, Lakes Entrance and the coastal areas of the Shire (e.g. through reports such as McInnes et al., 2005a; 2005b, 2006), it had not yet embraced this knowledge in its decision-making. The Tribunal Member stated there was no evidence that EGSC was adequately addressing the risks associated with climate change. The Member noted that since EGSC began a process of managing continued development of the commercial centre of Lakes Entrance, it had:

377 *“failed to respond to changes in state coastal planning policy. These changes arise*
378 *from a growing recognition of the level of impact from climate change and the*
379 *corresponding impacts to the Gippsland Lakes and Lakes Entrance.” (p.5)*

380
381 However, the relatively swift timeframes under which these policy changes occurred could have
382 been one reason for EGSC’s perceived lack of action.

383 384 **4.2 Planning Scheme Amendment**

385 Amendment C68 to the East Gippsland Planning Scheme was approved by the Minister the day
386 after the VCAT case decision was published. The Amendment sought to change various aspects
387 of the East Gippsland Planning Scheme to implement recommendations arising from the *Coastal*
388 *Spaces Landscape Assessment Study* (DSE, 2006), and the *Coastal Towns Design Framework*
389 (see Table 2). While the amendment did not relate specifically to climate change, it did seek to
390 include some statements in the planning scheme about the likely impact of climate change on the
391 coastal areas of EGSC.

392
393 A Panel reviewed the Amendment prior to approval by the Minister. Panel members are
394 planning experts appointed by the Minister to hear submissions made by interested parties about
395 proposed amendments to Planning Schemes. They make recommendations and advise the
396 Minister about whether the amendment should proceed. The Panel warned EGSC of the risks of
397 failing to plan for sea-level rise (Moles, Dwyer and & Holdsworth, 2009 p.93).

The Panel hearing for Amendment C68 was held 17-19 November 2008, before the release of the 2008 VCS and before the VCAT case started. The day after the release of the VCS (11/12/2008), the Panel Chair wrote to all parties who presented at the hearing or made submissions, advising them of the release of the strategy and providing them the opportunity to make further submissions. EGSC made a further submission arguing that the VCS direction to ‘plan for 0.8m sea-level rise by 2100’ does not provide specific direction, and that the associated *General Practice Note* and *Coastal Planning Fact Sheet* (see Table 2) provided only general guidance. Strategically, like all coastal councils, EGSC was left to interpret the meaning of ‘plan’ in the VCS policy, and to implement the policy from within its own means. This may explain why the EGSC exhibited a certain amount of policy procrastination with respect to adaptation, described by the Tribunal as EGSC shying away from “the hard decision making and planning required to address future risks.”

During the Panel hearing, and in their submissions subsequent to the release of the VCS, EGSC maintained that the information about climate change was: 1) inadequate at the scale which they needed to make planning decisions; and 2) lacked socio-economic impact assessments for policy consequences. EGSC was of the view that it would be premature to make decisions without full knowledge, and without state government guidance:

“It is considered to be premature and arguably inappropriate for a planning authority to attempt to unilaterally adopt specific planning provisions for dealing with sea level rise in the absence of any clear national or state policy guidance”

(p.82)

422 *“the work of the GCB had provided more information for Gippsland than in other*
423 *regions about the impacts of climate change and rising sea levels, but said that*
424 *there has as yet been no assessment of the economic and social impacts of those*
425 *changes nor of the planning responses that are or might be available.” (p.84)*

426
427 Here EGSC claims they needed guidance from jurisdictions at a higher level. This claim sits
428 uncomfortably with arguments that adaptation should be driven in a bottom-up process and
429 delivered in local contexts (e.g. see Measham et al., 2011, Webb, 2011). However, the EGSC
430 position may be reflective of their preference to follow, rather than take a leadership role.
431 Perhaps the EGSC were shying away from the political risks associated with leading on
432 adaptation. Such a circumstance was evidenced in Christchurch Bay (UK) where promoting
433 development pinned discussions of vulnerability (Few et al., 2007b). One local-level
434 interviewee identified limitations to local government authorities’ ability to lead change given
435 the current Victorian planning system:

436 *“the planning system in Victoria is by and large state driven... on a strategic level*
437 *we can’t initiate things that are more advanced than what the State Planning Policy*
438 *Framework has allowed us to do... I think the state framework provides a very*
439 *abstract, high-level expert guidance for us but it doesn’t provide other tools we*
440 *need, other resources we need.”*

441
442 Indeed, any local planning policies in Victoria must be consistent with state planning policies.
443 This indicates there may be limits to local-level initiatives to adapt if they do not align with state
444 policy. It also indicates the difficulty of simultaneously achieving local ownership and state-

wide policy consistency. This situation also exists in the Australian State of New South Wales, and has been identified as a constraint to effective adaptation in the Tweed Shire Council (Svikis & Lofthouse, 2011).

The policies and associated guidance documents were found to be confusing to some of the key actors interviewed, they did not clearly identify what adaptation is to be, who is responsible, and how it is to take place, as one local actor we interviewed explains:

“No-one has actually defined what, how you will enact those things. Like it says use the precautionary principle – what is that? Make strategic decisions in certain areas to either defend or retreat? What the hell do they mean? Who pays? How does it all work out? What does vulnerability mean? ... let alone those questions about how would you retreat”

The situation in Lakes Entrance supports a view that higher levels of government do not provide adequate support for local adaptation processes in the form of clear and consistent guidelines (Storbjörk and Hedren 2011, Tribbia and Moser 2008, Macintosh 2012, Barnett et al., 2013). Given the amount of guidance regarding adaptation to sea-level rise evident in the state of Victoria (as detailed in Table 2), the biggest issue here could be the translation of this to the local level and local implications and planning, particularly strategic planning activities. It also indicates the difficulty of achieving coordinated, collective action across different tiers and arms of government. This difficulty was also noted for the case of ‘Coastby’ in Sweden, where Storbjörk & Hendren (2011) critiqued local coastal zone management to investigated the institutional constraints to climate change adaptation.

4.3 Beyond VCAT and the C68 Amendment

In response to the VCAT decision, in October 2010 the *Lakes Entrance Business District Interim Use and Development Control* (herein *Interim Control*) was introduced. Significantly, this document was incorporated into the local (EGSC) planning scheme through Ministerial intervention. Here as with other initiatives discussed above, the adaptation action was implemented on the local community by a higher-level institution, in a way that did not appear to foster consistency, collective action or local ownership or fairness.

The stated purpose of the Interim Control included minimizing potential flood risk from projected combined river, storm tide and sea-level rise impacts and “to ensure that existing and future vulnerability to sea-level rise is considered in decisions to use and develop land.” The controls prohibited some types of development under certain conditions, and required appropriate design responses in other circumstances. About the way in which the interim control was introduced a local actor had the following to say:

“We rarely get much information out of them [DPCD] other than... when the information becomes formally available, through the approval of planning amendments, media releases, and so forth. There’s no informal communication....It’s frustrating, even the recent Interim Controls for Lakes Entrance were imposed upon people whilst Council and ... [t]he Inundation Steering Committee...were I think given an opportunity to comment on, or to provide comment in the preparation of the interim controls, but no one else was”

The way in which decision making occurred for various adaptation initiatives in this case involved limited consultation, as found in other adaptation policy implementation cases (Few et al., 2007a, Burton & Mustelin 2012), which could be detrimental to a sustainable outcome. The local key actor's comment indicates their frustration with the process. Two components of procedural (in)justice are evident. The actor's concern about not being able to comment on the *Interim Controls* provides evidence of the 'voice effect' (e.g. opportunity to voice opinions, see Lind, Kanfer, & Earley, 1990). Their frustration with the DPCD's top-down approach suggests the 'dignitary effect' (perception of trust, neutrality and standing of the organization responsible for developing and implementing a decision see Lind & Earley, 1992; Tyler, 1994) because they do not feel that the DPCD is neutral, it cannot be trusted.

The *Interim Control* differed from the VCAT decision and other Victorian Government Policy Guidance deriving from the VCS 2008, in that they looked to a planning horizon of 2040 in addition to 2100. In effect, the *Interim Control* provided EGSC with some of the guidance they were calling for. On the other hand the fact that they were interim continued an element of the uncertainty surrounding the VCAT case decision. The controls were to expire on 31 December 2011, but were subsequently extended to 30 June 2012. It was intended that by the expiry date longer-term planning controls being prepared as part of the Gippsland Lakes Inundation Management Project and informed by other state-wide bodies would be available.

On 4 July 2012, the Minister for Planning introduced an Amendment VC94 to the State Planning Policy Framework for all planning schemes across the state. The amendment included a change to policy (Clause 13.01), so that while maintaining a long-term commitment to plan for 0.8m

513 sea-level rise by 2100 for greenfield development, a statement was introduced about considering
514 0.2m sea-level rise by 2040 for infill development in established areas (note no baseline year is
515 provided in the policy). The General Practice Note (DPCD 2012) was also changed to reflect the
516 impact of this Amendment (e.g. 2040 time horizon), and information provided by more recent
517 policy documents (see 2012 entries to Table 2). This amendment was largely consistent with one
518 of the Coastal Climate Change Advisory Committee's (2010) recommendations in their final
519 report which proposed inclusion of planning benchmarks for 2040 and 2070 in addition to 2100.
520 This report, while submitted to the government in December 2010, was not publicly released
521 until July 2012; most likely due to a change of government at the state level in November 2010.

522
523 The VCAT decision, the subsequent activities resulting from the decision, and the VCS described
524 above received considerable criticism, particularly at the local level. After the *Interim Control*
525 was announced an editorial piece in the *Bairnsdale Advertiser* described the VCAT decision as
526 rubbing "salt into the developers' wounds", and said that it was "based on speculation about
527 weather conditions that might or might not prevail between now and century's end" (*Bairnsdale*
528 *Advertiser*, 16 August 2010, p.2). Others described VCAT's decision as an act that would leave
529 local economic development 'dead' (*Bairnsdale Advertiser*, 9 August 2010, p.7). One interview
530 respondent reflected on the implications of the VCAT decision as follows:

531 "An appalling result... You've got a town like Lakes Entrance which is more than
532 90% developed on the foreshore, and then to prevent further development on the
533 basis of forecast sea-level rise is a complete folly. It is counter-intuitive ... it shows a
534 complete lack of common sense, and it has caused great disruption to that
535 community. It has resulted in less investment in the town, it has created great

536 *uncertainty for the business, for the building industry in the region, and it's*
537 *undermined confidence in that town."*

538

539 These views were associated with concern for the equity and fairness of how adaptation might
540 transpire between rural areas of Victoria and metropolitan Melbourne. As one local level key
541 actor stated:

542 *"given the lower land value, given the lower, poorer access to community*
543 *infrastructure in the rural areas it will continue to be a challenge to the state and*
544 *federal governments, how they can deliver equitable solutions that will not be...*
545 *seen as an abuse of the coastal community in this case because we are talking about*
546 *stopping developments, we're talking about taking away people's money in some*
547 *ways, because they're going to suffer financial loss if when they try to sell their*
548 *block they can't just get the price they want... But the Melbourne people are not*
549 *suffering the same issues at the moment... think about St Kilda [coastal suburb in*
550 *the city of Melbourne], think about those areas with sea wall protections. Even*
551 *without state government the city councils there would have a little bit more money*
552 *to develop asset solutions but we don't have the same level of privilege to do it"*

553

554 The information above shows the adaptation actions have had a significant impact on the psyche
555 of Lakes Entrance and on development there. We now turn to consider whether these adaptation
556 actions will be sustainable.

557

558

5. Discussion: Urban Planning and Sustainable Adaptation in Lakes Entrance

Actions aiming to adapt to sea-level rise in Lakes Entrance have occurred as a result of complex and long-term interactions between, knowledge generated by research consultancies, state-level planning and coastal policy and governance processes, local-level planning actions, and significant legal decisions. These have influenced adaptation to sea-level rise more broadly for the state of Victoria. The institution of planning has been significant in influencing adaptation, particularly the 2008 VCS, subsequent planning scheme amendments, policy guidance, and legal decisions. This aligns with theory advocating spatial planning's ability to facilitate adaptation (Hurlimann & March, 2012; Measham et al., 2011; Meyer et al., 2010; Tribbia & Moser, 2008; Wilson, 2006). A key question we seek to address is whether the actions which have sought to adapt to sea-level rise in Lakes Entrance are sustainable. As set out earlier in this paper, current literature suggests that key aspects of sustainable adaptation will include: 1) facilitating local ownership of adaptation responses; 2) developing collective forms of action – within local communities and between local communities and different arms and levels of government; and 3) ensuring fairness across space and time. We now address each of these for the case of Lakes Entrance.

First, we argue that adaptation as it transpired in Lakes Entrance did not foster local contextualisation or ownership (Adger & Barnett, 2009, Adger et al., 2005, Adger et al., 2013, Barron et al., 2012, Douglas et al., 2012, Picketts et al., 2012). This may have been in part driven by the EGSC's unwillingness to lead change ahead of state government guidance. As a result, the key adaptation actions were initiated by higher-level institutions. For example, the VCS and its requirement to plan for 0.8m of sea-level rise by 2100 was implemented by the

Victorian Coastal Council, and the guidance documents that followed were implemented by higher-level institutions including The Minister for Planning, the DPCD, and the then DSE – see Table 2 for details.

The result of this higher-level involvement was that there was little consideration of: other adaptation options and the tradeoffs associated with these, local values, or the incorporation of flexibility into the planning pathways (argued to be important by Graham et al., 2013, Moser, 2013, Moser et al., 2012, Walker et al., 2013). Perhaps if the EGSC played a more proactive role in initiating adaptation ahead of state government guidance, a different outcome may have eventuated. In the case of ‘Coastby’ in Sweden, adaptation was also challenged by a lack of vertical administrative coordination. However, contrary to the case of Lakes Entrance, there was a lack of national level policy in ‘Coastby,’ despite this viewed as necessary and lobbied for by local actors (Storbjörk & Hedren, 2011).

The policies discussed, and the changes which occurred in Lakes Entrance, were all implemented within a short time period (2007-2012), which is in conflict with the longer timeframes believed to be necessary for sustainable adaptation (Barron et al., 2012). At best the short time frame in which policy was implemented exacerbated the lack of room for local-level determination in how adaptation should transpire. At worst it prevented it from happening altogether. These short timeframes may therefore be another reason why the process and subsequent adaptation actions have been resisted by members of the community and EGSC. Our findings align with research conducted in Christchurch (UK), where Few et al., (2007b) found that a paucity of long-term planning limited the construction of more detailed and diverse adaptation options.

Second, we argue that the adaptation actions that transpired in Lakes Entrance did not develop collective forms of action (Van Vugt & Snyder, 2002; Moser et al., 2012). There appears to have been little guidance or support among the various tiers and arms of government involved in developing and implementing climate change policies (also found in ‘Coastby’ Sweden – Storbjörk and Hedren, 2011). Where cooperation did occur it tended to be located within a particular tier of government, such as the DPCD working together with the Victorian Coastal Council, both state government bodies, but even within departments limitations were evident. There was limited cooperation evident across the various tiers of government. Additionally, difficulty was evident in implementing the generalised state wide policy (VCS) at the local level, a phenomenon consistent with the findings of Few et al., (2007b) in the case of adaptation to sea level rise in Christchurch Bay in the UK. The consequence of not achieving widespread cooperation meant that trust and positive working relationships were not established. This brings into question the sustainability of the adaptation actions enacted in Lakes Entrance. Our findings support previous arguments made within the climate adaptation literature that a lack of collective action, resulting from a lack of clear governance roles and responsibilities, undermines sustainable adaptation (Barnett et al., 2013).

The adaptation actions also appear to have been divisive, further evidence that collective action was not achieved. VCAT was pointed in its criticism of EGSC, blaming it for failing to implement the Victorian coastal planning policy. This guidance from VCAT makes it easy for some of those who feel that their businesses are at risk to blame EGSC for the situation. We acknowledge that such blame games are common-place in the politics of decision-making at the

local level, where there are inevitably those who will gain and those who will lose as a result of any decisions made and change initiated. Indeed, responding to climate change uncertainty has been found to be complex, and controversial in other coastal contexts (e.g. Christchurch Bay in the UK Few et al., 2007b). However, we believe that this should be managed carefully in the case of Lakes Entrance, for should they escalate, such divisions between local businesses and EGSC could significantly impede the kinds of collective action and cross-sectoral coordination required for effective and fair adaptation in Lakes Entrance.

Third, we argue that adaptation actions have not been fairly applied both across space and time, a necessary condition for sustainable adaptation identified in literature (Barnett et al., 2013). The *Interim Control* applied to Lakes Entrance only, no other locations in the state (thus articulating a spatial inconsistency in adaptation policy). As demonstrated above, it was perceived by members of the local community as constraining, confusing and created uncertainty for Lake Entrance and its future. After more than a year and a half after their introduction, the *Interim Control* was replaced by a state-wide policy. However, they arguably created a stigma (perceived or real), that some in the local community view will be hard to diminish. Spatial inconsistencies in the application of adaptation via spatial planning have been found to be evident in the case of Norrköping in Sweden (Storbjörk & Hjerpe, 2013).

There are also other inconsistencies with the current adaptation planning instruments. They largely only prevent new developments that may be at risk from future sea-level rise in certain circumstances, e.g. those covered by relevant planning policies. It should be noted that in Victoria, there is a significant amount of development that currently does not fall under

consideration of planning policy. For example, a significant body of building works do not require a planning permit, e.g. if the works include the development of land with one dwelling and the site is over a certain size (which varies depending on jurisdiction) and not encumbered by any other planning controls (e.g. specific overlays). Thus the fairness, equity, clarity and consistency, of the policy application could be questioned. The extant adaptation policy applies differently to building and works which occur outside the consideration of planning policy. Additionally, at present there is not a planning overlay (planning control) specifically designed for consideration of sea-level rise. Adding to this challenge is the discretionary nature of planning in the state.

6. Conclusions

Based on empirical evidence, our study provides important information about how adaptation transpired for the case of Lakes Entrance, from which an assessment about its sustainability could be made. We conclude that urban planning was a significant institution in adaptation to sea-level rise. In some ways the adaptation processes witnessed for Lakes Entrance to date could be judged successful. This is in so far as the actions implemented in Lakes Entrance have limited further exposure to sea-level rise under some conditions. The adaptation processes have and will generate explicit consideration of the risks of sea-level rise in the strategic planning processes of local governments throughout Victoria. Yet, while adaptation in this sense is occurring, it is limited in that it is not dealing with existing assets at risk – which is an even harder problem to address than limiting future development. However, most importantly we find that the process by which these adaptation actions have transpired have not worked towards achieving socially sustainable adaptation. They have not facilitated local ownership of adaptation

responses, did not develop collective forms of action, and have not achieved fairness across space and over time. This adds valuable empirical support to nascent theory about the requirements for sustainable adaptation.

Overall, the existing controls offer limited solutions with respect to existing assets at risk, other than to restrict investment in these. They do not appear to constitute the ‘plan’ for sea-level rise that the VCS recommended, and that EGSC was chastised for failing to implement. It is still therefore uncertain exactly what the ‘plan’ for adaptation in Lakes Entrance is, and EGSC is not in a very different position with respect to advice and resources than it was when the VCS was released. A clearly articulated local-level adaptation plan that provides greater certainty and long-term vision for investors is necessary if Lakes Entrance is to remain a viable town (and one in which adaptation to sea-level rise is still an important and meaningful activity). Thus, there is arguably a greater role for local-level strategic planning processes to articulate the adaptation futures for local communities, with resources allocated to achieving this.

The evidence we have gathered for this case suggests that sustainable adaptation to sea-level rise will take time. Successful and sustainable policy will be policy that progresses carefully, deliberatively, flexibly, fairly, and patiently. Urban planning needs to address these issues to be a sustainable institution for adaptation. For Lakes Entrance, we hope we have observed the beginning of the process of adapting to sea-level rise, rather than the end.

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Table 1: Organisations from which key actors interviewed are based

Organization	Number of Interviewees
Federal level organisations	
National Seachange Taskforce	1
Department of Climate Change and Energy Efficiency	2
Department of Housing, Communities and Indigenous Affairs	1
State level organisations	
Department of Sustainability and Environment	3
Department of Planning and Community Development	3
Local level/locally based organisations	
Gippsland Coastal Board	2
East Gippsland Water	1
South Gippsland Water	1
Wellington Shire Council	3
East Gippsland Shire Council	2
Gippsland Climate Change Network	1
Gippsland Ports	1
East Gippsland Catchment Management Authority	1
West Gippsland Catchment Management Authority	1
Local Developer	1
Local Town Planning Consultancies	2
Member of Parliament	1
East Gippsland Marketing (funded by the business community)	1
Gippsland environment Groups	2
Total	30

Table 2: Policies which have influenced adaptation to sea level rise in Lakes Entrance *

Year	Title
1998	Tract Consultants Pty Ltd and Chris Dance Land Design Pty Ltd. <i>Siting and Design Guidelines for Structures on the Victorian Coast</i> , VCC.
2000	DoI. Victorian Planning Provisions Practice Note: <i>Applying the Flood Provisions in Planning Schemes</i> .
2002	GCB. <i>Integrated coastal planning for Gippsland: coastal action plan</i>
2006	GCB. <i>Gippsland Estuaries Coastal Action Plan</i> .
2007	Meinhardt Infrastructure & Environment Pty Ltd. <i>Lakes Entrance Urban Design Framework, Coastal Towns Design Framework Vol. 3</i> . EGSC, WSC, DSE.
	Meinhardt Infrastructure & Environment Pty Ltd. <i>Strategic Regional Background Report East Gippsland and Wellington Shires Coastal Towns Design Framework Vol.1</i> . EGSC, WSC, DSE.
	VCC. <i>Draft Victorian Coastal Strategy</i> .
2008	Introduction of Wellington Shire Council's <i>Guidelines for Preparation of a Climate Change (Sea Level Rise) Response Plan</i>
	VCC. <i>Victorian Coastal Strategy</i> . 10 December
	Planning Minister. Ministerial Direction No. 13: <i>Managing Coastal Hazards and the Coastal Impacts of Climate Change</i> . DPCD. 18 December
	DPCD. General Practice Note: <i>Managing Coastal Hazards and the Coastal Impacts of Climate Change</i> DPCD. December
	Planning Scheme Amendment (VC52) to clause 15.05-3 of the State Planning Policy Framework. December 28. The clause requires 'responsible authorities' to make decisions consistent with the Victorian Coastal Strategy. It has since been superseded (see below).
	DPCD. Coastal Planning Fact Sheet: <i>Managing Coastal Hazards and the Coastal Impacts of Climate Change</i> . 23 December
2009	DSE. Advisory Note: <i>How to Consider a Sea Level Rise along the Victorian Coast</i> .
	DCCEE. <i>Climate Change Adaptation Actions for Local Government</i>
	Letter from the Minister for Water instructing Coastal CMAs to implement the policy of allowing for 0.8m of mean sea level rise by 2100. December 17.
2010	<i>Planning for sea level rise: Interim guidelines – assessing development in areas prone to tidal inundation from sea level rise in the Port Phillip and Westernport Region</i> , Melbourne Water, June
	Amendment C68 to the East Gippsland Planning Scheme (Coastal Landscapes and Urban Settlement Plans) Gazetted July 20.
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	Amendments made to General Practice Note: <i>Managing Coastal Hazards and the Coastal Impacts of Climate Change</i> DPCD, to reflect changes made through amendment VC94.

*See Appendix 1 for a list of acronyms

Figure 1 – Location of Lakes Entrance in relation to the state of Victoria, Australia

Appendix 1: List of acronyms

ABS	Australian Bureau of Statistics
CMA	Catchment Management Authorities
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCCEE	Australian Government Department of Climate Change and Energy Efficiency
DOI	Department of Infrastructure
DEPI	Department of Environment and Primary Industries
DSE	Victorian Government Department of Sustainability and Environment
DPCD	Victorian Government Department of Planning and Community Development
EGCMA	East Gippsland Catchment Management Authority
EGSC	East Gippsland Shire Council
GCB	Gippsland Coastal Board
NST	National Sea Change Taskforce
VCAT	Victorian Civil and Administrative Tribunal
VCC	Victorian Coastal Council
VCS	Victorian Coastal Strategy
WSC	Wellington Shire Council

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Author/s:

Hurlimann, A;Barnett, J;Fincher, R;Osbaldiston, N;Mortreux, C;Graham, S

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