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# Urban planning and sustainable adaptation to sea-level rise

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## 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

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

39

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

42

43

## 44 **1. Introduction**

45

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

55

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

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

66  
67 Successful adaptation must therefore be sustainable, both in terms of its ability to ensure  
68 “socially and environmentally sustainable development pathways, including both social justice  
69 and environmental integrity” (Eriksen, Aldunce, Bahunpati, Martins, Molefe, Nhemachena,  
70 O’Brien, Olorunfem, Park, Sydna, & Ulsrud, 2011: 8), but also in terms of the process itself  
71 being sustained indefinitely over time. Thus it is advantageous for the institutions of adaptation  
72 to continue for as long as sea-level rise affects coastal changes, which seems likely to continue  
73 indefinitely until some degree of equilibrium in coastal systems is reached. Thus, sustainable  
74 adaptation is all about developing institutions that will endure, and this includes urban planning.  
75 This is the essence of the nascent theory about successful adaptation that is emerging in the  
76 environment and planning literature, and which is the focus of this article.

77  
78 If there is a theory that explains how to achieve successful adaptation to sea-level rise, it includes  
79 the following key factors: vertical integration among levels of government; horizontal integration  
80 between government departments and across jurisdictions (e.g. between local and state and  
81 national governments); extensive stakeholder engagement; collective agreement between local  
82 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 &

106 Mustelin, 2013; Few, Brown & Tompkins, 2007a). Building local ownership involves, among  
107 other things: allowing time for information about risks to settle with local cultures such that they  
108 make sense to communities, communicating in a way which resonates with cultural cognition/s;  
109 developing methods and processes to ensure local values inform the goals of adaptation  
110 responses; understanding and negotiating the trade-offs associated with different sets of  
111 responses; identifying conflict resolution processes; and to develop and implement iterative and  
112 flexible planning pathways that provide individuals and communities with some confidence that  
113 their core lived values will be sustained over time despite changes along the coast; (Barron et al.,  
114 2012; Graham, Barnett, Fincher, Hurlimann, Mortreux, & Waters, 2013; Khan, Jenkins-Smith,  
115 & Braman, 2011; Moser, 2013; Moser et al., 2012; Walker, Haasnoot, & Kwakkel, 2013).  
116 Overall, such local engagement needs to ensure that the process and outcomes are considered to  
117 be fair by the local community.

118  
119 Collective action is no less important than local ownership for sustainable adaptation to sea-level  
120 rise. Lack of a collective government (and local) response repeatedly hampers adaptation efforts  
121 (Moser et al., 2012; Barnett, Waters, Pendergast, & Puleston, 2013). Vertical, top-down  
122 approaches have frequently undermined more local and expansive institutions that enable  
123 adaptive capacity (Brown, 2011). At a local level conflicting sets of values and worldviews  
124 creates challenges for the development and realisation of acceptable adaptation options (O'Brien  
125 & Wolf, 2010). These examples point to a need for coordinated, collective action between  
126 communities and various arms and levels of government, as well as within communities (Barnett  
127 et al., 2013).

128

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

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

153  
154 This nascent theory of sustainable adaptation to sea-level rise is based more on reason than  
155 evidence, for there remains very little evidence about how adaptation actually happens,  
156 particularly at the local level. This paper provides such evidence, by examining how adaptation  
157 has transpired in the town of Lakes Entrance in the state of Victoria, Australia. Through the use  
158 of Lakes Entrance as a case study, we aim to: 1) describe the origins and interactions of the  
159 urban planning processes that aimed to effect adaptation to sea-level rise; and 2) assess the extent  
160 to which these actions are consistent with the emerging consensus that sustainable adaptation  
161 requires planning responses that are locally-owned, collective, and fair. The paper begins by  
162 outlining the approach and methods used in this study, including an overview of the study area.  
163 We then explain the adaptation governance framework for the state in which the case study is  
164 set, before describing the urban planning processes that sought to effect adaptation in Lakes  
165 Entrance. This is followed by a discussion of the extent to which these have effected sustainable  
166 adaptation to sea-level rise in this case.

167

168

## 169 **2. Research Approach**

170

### 171 **2.1 Methods of analysis**

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

174 interviews, policy analysis, observation of decision making processes, and the examination of  
175 decision documents relating to significant legal and planning decisions. Multiple methods  
176 (triangulation) were explicitly employed to reduce the acknowledged reliability problems that  
177 can be associated with qualitative research methods (Babbie 2008). The benefit of qualitative  
178 case study approaches such as ours is the depth of understanding it provides (Babbie 2008).  
179 Indeed, such an approach widely applied in adaptation research (e.g. Few et al., 2007b, Storbjörk  
180 2007, Storbjörk and Hendren, 2011). Our research was informed by our collective knowledge of  
181 adaptation processes in the Gippsland East area (stretching between Port Albert in the south-west  
182 to Victoria's border with New South Wales to the north-east), and that of our industry partners  
183 (see acknowledgements).

184

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

195

196 <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

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

269

270 <Insert Table 2>

271

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

281

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

287

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.

322

323

#### 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

333 and policy analysis identified that this was the major force in adaptation to sea-level rise in Lakes  
334 Entrance. A VCAT case *Taip v East Gippsland SC [2010] VCAT 1222* (decision released  
335 28/7/10) and planning scheme amendment were significant factors driving adaptation. They  
336 transpired concurrently, albeit independently of one another.

337

#### 338 **4.1 The VCAT Case**

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

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

345

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

350

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

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

358

359 The Tribunal Member resolved to set the decision of EGSC aside (thus no permit to be issued).

360 The main ground for this decision was that the design response to deal with projected sea-level

361 rise – raising the sensitive use areas of the development to above the projected flood and sea-

362 level rise levels – was insufficient. The Tribunal Member found it was a “simplistic and

363 ultimately a misguided approach” (p.16) for a number of reasons including: intensification of

364 land use, poor access, unacceptable risk, and inability to access services in the future. The

365 Tribunal Member concluded:

366 *“The decision to grant a permit would not lead to an orderly planning outcome, as*

367 *it would fail to satisfy the purposes of planning in Victoria for intergenerational*

368 *equity, sustainable, fair and socially responsible development”* (p.6)

369

370 What transpires through this case is that while EGSC knew about the risk of climate change and

371 sea-level rise for the subject site, Lakes Entrance and the coastal areas of the Shire (e.g. through

372 reports such as McInnes et al., 2005a; 2005b, 2006), it had not yet embraced this knowledge in

373 its decision-making. The Tribunal Member stated there was no evidence that EGSC was

374 adequately addressing the risks associated with climate change. The Member noted that since

375 EGSC began a process of managing continued development of the commercial centre of Lakes

376 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).

398

399 The Panel hearing for Amendment C68 was held 17-19 November 2008, before the release of the  
400 2008 VCS and before the VCAT case started. The day after the release of the VCS  
401 (11/12/2008), the Panel Chair wrote to all parties who presented at the hearing or made  
402 submissions, advising them of the release of the strategy and providing them the opportunity to  
403 make further submissions. EGSC made a further submission arguing that the VCS direction to  
404 ‘plan for 0.8m sea-level rise by 2100’ does not provide specific direction, and that the associated  
405 *General Practice Note* and *Coastal Planning Fact Sheet* (see Table 2) provided only general  
406 guidance. Strategically, like all coastal councils, EGSC was left to interpret the meaning of  
407 ‘plan’ in the VCS policy, and to implement the policy from within its own means. This may  
408 explain why the EGSC exhibited a certain amount of policy procrastination with respect to  
409 adaptation, described by the Tribunal as EGSC shying away from “the hard decision making and  
410 planning required to address future risks.”

411

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

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

420 *(p.82)*

421

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-

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

448  
449 The policies and associated guidance documents were found to be confusing to some of the key  
450 actors interviewed, they did not clearly identify what adaptation is to be, who is responsible, and  
451 how it is to take place, as one local actor we interviewed explains:

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

457 The situation in Lakes Entrance supports a view that higher levels of government do not provide  
458 adequate support for local adaptation processes in the form of clear and consistent guidelines  
459 (Storbjörk and Hedren 2011, Tribbia and Moser 2008, Macintosh 2012, Barnett et al., 2013).

460 Given the amount of guidance regarding adaptation to sea-level rise evident in the state of  
461 Victoria (as detailed in Table 2), the biggest issue here could be the translation of this to the local  
462 level and local implications and planning, particularly strategic planning activities. It also  
463 indicates the difficulty of achieving coordinated, collective action across different tiers and arms  
464 of government. This difficulty was also noted for the case of ‘Coastby’ in Sweden, where  
465 Storbjörk & Hendren (2011) critiqued local coastal zone management to investigated the  
466 institutional constraints to climate change adaptation.

467

468 **4.3 Beyond VCAT and the C68 Amendment**

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

475  
476 The stated purpose of the Interim Control included minimizing potential flood risk from  
477 projected combined river, storm tide and sea-level rise impacts and “to ensure that existing and  
478 future vulnerability to sea-level rise is considered in decisions to use and develop land.” The  
479 controls prohibited some types of development under certain conditions, and required  
480 appropriate design responses in other circumstances. About the way in which the interim control  
481 was introduced a local actor had the following to say:

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

489

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

500

501 The *Interim Control* differed from the VCAT decision and other Victorian Government Policy  
502 Guidance deriving from the VCS 2008, in that they looked to a planning horizon of 2040 in  
503 addition to 2100. In effect, the *Interim Control* provided EGSC with some of the guidance they  
504 were calling for. On the other hand the fact that they were interim continued an element of the  
505 uncertainty surrounding the VCAT case decision. The controls were to expire on 31 December  
506 2011, but were subsequently extended to 30 June 2012. It was intended that by the expiry date  
507 longer-term planning controls being prepared as part of the Gippsland Lakes Inundation  
508 Management Project and informed by other state-wide bodies would be available.

509

510 On 4 July 2012, the Minister for Planning introduced an Amendment VC94 to the State Planning  
511 Policy Framework for all planning schemes across the state. The amendment included a change  
512 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

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

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

75  
76 First, we argue that adaptation as it transpired in Lakes Entrance did not foster local  
77 contextualisation or ownership (Adger & Barnett, 2009, Adger et al., 2005, Adger et al., 2013,  
78 Barron et al., 2012, Douglas et al., 2012, Picketts et al., 2012). This may have been in part  
79 driven by the EGSC's unwillingness to lead change ahead of state government guidance. As a  
80 result, the key adaptation actions were initiated by higher-level institutions. For example, the  
81 VCS and its requirement to plan for 0.8m of sea-level rise by 2100 was implemented by the

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

585  
586 The result of this higher-level involvement was that there was little consideration of: other  
587 adaptation options and the tradeoffs associated with these, local values, or the incorporation of  
588 flexibility into the planning pathways (argued to be important by Graham et al., 2013, Moser,  
589 2013, Moser et al., 2012, Walker et al., 2013). Perhaps if the EGSC played a more proactive role  
590 in initiating adaptation ahead of state government guidance, a different outcome may have  
591 eventuated. In the case of ‘Coastby’ in Sweden, adaptation was also challenged by a lack of  
592 vertical administrative coordination. However, contrary to the case of Lakes Entrance, there was  
593 a lack of national level policy in ‘Coastby,’ despite this viewed as necessary and lobbied for by  
594 local actors (Storbjörk & Hedren, 2011).

595  
596 The policies discussed, and the changes which occurred in Lakes Entrance, were all implemented  
597 within a short time period (2007-2012), which is in conflict with the longer timeframes believed  
598 to be necessary for sustainable adaptation (Barron et al., 2012). At best the short time frame in  
599 which policy was implemented exacerbated the lack of room for local-level determination in  
600 how adaptation should transpire. At worst it prevented it from happening altogether. These short  
601 timeframes may therefore be another reason why the process and subsequent adaptation actions  
602 have been resisted by members of the community and EGSC. Our findings align with research  
603 conducted in Christchurch (UK), where Few et al., (2007b) found that a paucity of long-term  
604 planning limited the construction of more detailed and diverse adaptation options.

605  
606 Second, we argue that the adaptation actions that transpired in Lakes Entrance did not develop  
607 collective forms of action (Van Vugt & Snyder, 2002; Moser et al., 2012). There appears to have  
608 been little guidance or support among the various tiers and arms of government involved in  
609 developing and implementing climate change policies (also found in ‘Coastby’ Sweden –  
610 Storbjörk and Hedren, 2011). Where cooperation did occur it tended to be located within a  
611 particular tier of government, such as the DPCD working together with the Victorian Coastal  
612 Council, both state government bodies, but even within departments limitations were evident.  
613 There was limited cooperation evident across the various tiers of government. Additionally,  
614 difficulty was evident in implementing the generalised state wide policy (VCS) at the local level,  
615 a phenomenon consistent with the findings of Few et al., (2007b) in the case of adaptation to sea  
616 level rise in Christchurch Bay in the UK. The consequence of not achieving widespread  
617 cooperation meant that trust and positive working relationships were not established. This brings  
618 into question the sustainability of the adaptation actions enacted in Lakes Entrance. Our findings  
619 support previous arguments made within the climate adaptation literature that a lack of collective  
620 action, resulting from a lack of clear governance roles and responsibilities, undermines  
621 sustainable adaptation (Barnett et al., 2013).

622  
623 The adaptation actions also appear to have been divisive, further evidence that collective action  
624 was not achieved. VCAT was pointed in its criticism of EGSC, blaming it for failing to  
625 implement the Victorian coastal planning policy. This guidance from VCAT makes it easy for  
626 some of those who feel that their businesses are at risk to blame EGSC for the situation. We  
627 acknowledge that such blame games are common-place in the politics of decision-making at the

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

635  
636 Third, we argue that adaptation actions have not been fairly applied both across space and time, a  
637 necessary condition for sustainable adaptation identified in literature (Barnett et al., 2013). The  
638 *Interim Control* applied to Lakes Entrance only, no other locations in the state (thus articulating a  
639 spatial inconsistency in adaptation policy). As demonstrated above, it was perceived by  
640 members of the local community as constraining, confusing and created uncertainty for Lake  
641 Entrance and its future. After more than a year and a half after their introduction, the *Interim*  
642 *Control* was replaced by a state-wide policy. However, they arguably created a stigma (perceived  
643 or real), that some in the local community view will be hard to diminish. Spatial inconsistencies  
644 in the application of adaptation via spatial planning have been found to be evident in the case of  
645 Norrköping in Sweden (Storbjörk & Hjerpe, 2013).

646  
647 There are also other inconsistencies with the current adaptation planning instruments. They  
648 largely only prevent new developments that may be at risk from future sea-level rise in certain  
649 circumstances, e.g. those covered by relevant planning policies. It should be noted that in  
650 Victoria, there is a significant amount of development that currently does not fall under

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

660

## 661 **6. Conclusions**

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

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

677  
678 Overall, the existing controls offer limited solutions with respect to existing assets at risk, other  
679 than to restrict investment in these. They do not appear to constitute the ‘plan’ for sea-level rise  
680 that the VCS recommended, and that EGSC was chastised for failing to implement. It is still  
681 therefore uncertain exactly what the ‘plan’ for adaptation in Lakes Entrance is, and EGSC is not  
682 in a very different position with respect to advice and resources than it was when the VCS was  
683 released. A clearly articulated local-level adaptation plan that provides greater certainty and  
684 long-term vision for investors is necessary if Lakes Entrance is to remain a viable town (and one  
685 in which adaptation to sea-level rise is still an important and meaningful activity). Thus, there is  
686 arguably a greater role for local-level strategic planning processes to articulate the adaptation  
687 futures for local communities, with resources allocated to achieving this.

688  
689 The evidence we have gathered for this case suggests that sustainable adaptation to sea-level rise  
690 will take time. Successful and sustainable policy will be policy that progresses carefully,  
691 deliberatively, flexibly, fairly, and patiently. Urban planning needs to address these issues to be  
692 a sustainable institution for adaptation. For Lakes Entrance, we hope we have observed the  
693 beginning of the process of adapting to sea-level rise, rather than the end.

694

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## References

- Abel, N., Gorddard, R., Harman, B., Leitch, A., Landridge, J., Ryan, A., & Heyenga, S. (2011). Sea level rise, coastal development and planned retreat: analytical framework, governance principles and an Australian case study. *Environmental Science and Policy*, 14, 279-288.
- Adger, W. N. (2003). Social capital, collective action, and adaptation to climate change. *Economic Geography*, 79(4), 387-404.
- Adger, W.N., Arnell, N.W., & Tompkins, E.L. (2005). Successful adaptation to climate change across scales. *Global Environmental Change*, 15(2), 77-86.
- Adger, W. N., Barnett, J., Brown, K., Marshall, N., & O'Brien, K. (2013). Cultural dimensions of climate change impacts and adaptation. *Nature Climate Change*, 3(2), 112-117.
- Amundsen, H., Berglund F., & Westskog, H. (2010). Overcoming barriers to climate adaptation – a question of multilevel governance? *Environment and Planning C: Government and Policy C*, 28(2), 276-289.
- Australian Bureau of Statistics. (2011a). 2011 Census of Population and Housing: Urban Centres and Localities, Lakes Entrance (UCL214012). Canberra, Australian Bureau of Statistics.
- Australian Bureau of Statistics. (2011b). 2033.0.55.001 - Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2011. Canberra, Australian Bureau of Statistics.
- Babbie, E. (2008) *The Basics of Social Research*, 4 ed. Wadsworth Publishing, Belmont, California.
- Baker, I., Peterson, A., Brown, G., & McAlpine, C. (2012). Local government response to the impacts of climate change: An evaluation of local climate adaptation plans. *Landscape and Urban Planning*, 107(2), 127-136.
- Barnett, J., Waters, E., Pendergast, S., & Puleston, A. (2013). *Barriers to adaptation to sea-level rise*. National Climate Change Adaptation Research Facility, Gold Coast.
- Barron, S., Canete, G., Carmichael, J., Flanders, D., Pond, E., Sheppard, S., & Tatebe, K. (2012). A Climate Change Adaptation Planning Process for Low Lying Communities Vulnerable to Sea Level Rise, *Sustainability*, 4, 2176-2208.
- Bird, E. (1985). *Coastline Changes, a Global Review*. Chichester - John Wiley & Sons.
- Brown, K. (2011). Sustainable adaptation: An oxymoron? *Climate and Development*, 3(1), 21-31.
- Burton, P., & Mustelin, J. (2013). Planning for Climate Change: Is greater Public Participation the Key to Success? *Urban Policy and Research*, DOI:10.1080/08111146.2013.778196.
- Campbell, S. (1996). Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of Sustainable Development, *Journal of the American Planning Association*, 62(3): 296-312.
- Cheong, S.-M. (2011) Policy solutions in the U.S. *Climatic Change* 106, 57-70

Coastal Climate Change Advisory Committee. (2010). *Issues and Options Main Report*, Victorian Government Melbourne. Retrieved November 26, 2010 from - [http://www.dpcd.vic.gov.au/data/assets/pdf\\_file/0003/34374/CCCAC\\_Issues\\_Paper\\_Main\\_Report.pdf](http://www.dpcd.vic.gov.au/data/assets/pdf_file/0003/34374/CCCAC_Issues_Paper_Main_Report.pdf)

Douglas, E., Kirshen, P., Paolisso, M., Watson, C., Wiggin, J., Enrici, A., & Ruth, M., (2012). Coastal Flooding, Climate Change and Environmental Justice: Identifying Obstacles and Incentives for Adaptation in Two Metropolitan Boston Massachusetts Communities, *Mitigation and Adaptation Strategies for Global Change*, 17, 537-562.

DSE. (2006). *Coastal Spaces Landscape Assessment Study*. Melbourne - Victorian Government.

Eccles, D., & Bryant, T. (2006). *Statutory Planning in Victoria*. Sydney - The Federation Press.

Eriksen, S., Aldunce, P., Bahinpati, C., Martins, R., Molefe, J., Nhemachena, C., O'Brien, K., Olorunfem, F., Park, J., Sydna, L., & Ulsrud, K. (2011). When not every response to climate change is a good one: identifying principles for sustainable adaptation. *Climate and Development*, 3, 7-20.

Few, R., Brown, K., & Tompkins, E. L. (2007a). Public participation and climate change adaptation: avoiding the illusion of inclusion. *Climate Policy*, 7(1), 46-59.

Few, R., Brown, K., & Tompkins, E. L. (2007b). Climate Change and Coastal Management Decisions: Insights from Christchurch Bay, UK. *Coastal Management*, 35(2-3), 255-270

Graham, S., Barnett, J., Fincher, R., Hurlimann, A., Mortreux, C., & Waters, E. (2013). The social values at risk from sea-level rise. *Environmental Impact Assessment Review*, 41, 45-52.

Grayson, R., Candy, R., Tan, K-S., McMaster, M., Chiew, F., Provis, D., & Zhou, S. (2004). *Gippsland Lakes Flood Level Monitoring Project: Final Report*. Centre for Environmental Applied Hydrology, University of Melbourne.

Haasnoot, M., Kwakkel, J.H., Walker, W.E. & ter Maat, J. (2013). Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world. *Global Environmental Change*, 23(2), 485-498.

Hurlimann, A.C., & March, A.P. (2012). The role of spatial planning in adapting to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 3(5), 477-488.

Jongman, B., Ward, P.J., & Aerts, J.C.J.H. (2012). Global exposure to river and coastal flooding: Long term trends and changes. *Global Environmental Change*, 22(4), 823-835.

Kahan, D.M., Jenkins-Smith, H., & Braman, D. (2011) Cultural cognition of scientific consensus. *Journal of Risk Research*, 14, 147-174.

Lind, E.A., Kanfer, R., & Earley, P.C. (1990). Voice, control, and procedural justice: instrumental and noninstrumental concerns in fairness judgments. *Journal of Personality and Social Psychology*, 59(5), 952-959.

Lind, E.A., & Earley, P.C. (1992). Procedural justice and culture. *International Journal of Psychology*, 27(2), 227-242.

Martin, J., Fackler, P., Nichols, J., Lubow, B., Eaton, M., Runge, M., Stith, B., & Langtimm, C. (2011). Structured decision making as a proactive approach to dealing with sea level rise in Florida. *Climatic Change*, 107, 185-282.

- McGranahan G., D. Balk., & B. Anderson, (2007). The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones. *Environment and Urbanization*, 19, 17-37.
- Macintosh, A., (2012). Coastal climate hazards and urban planning: how planning responses can lead to maladaptation, *Mitigation and Adaptation Strategies for Global Change*. DOI 10.1007/s11027-012-9406-2
- McDonald, J., (2007). A risky climate for decision-making: The liability of development authorities for climate change impacts. *Environmental and Planning Law Journal* 24, 405-416.
- McInnes, K L, Macadam, I., & Hubbert, G. D. (2006). *Climate Change in Eastern Victoria Stage 3 Report: The effect of climate change on extreme sea levels in Corner Inlet and the Gippsland Lakes*. CSIRO, Melbourne. Commissioned by the Gippsland Coastal Board.
- McInnes, K. L., Macadam, I., Hubbert, G. D., Abbs, D. J., & Bathols, J. (2005a). *Climate Change in Eastern Victoria Stage 1 Report: The effect of climate change on coastal wind and weather patterns*. CSIRO, Melbourne. Commissioned by the Gippsland Coastal Board.
- McInnes, K. L., Macadam, I., Hubbert, G. D., Abbs, D. J., & Bathols, J. (2005b). *Climate Change in Eastern Victoria Stage 2 Report: The effect of climate change on storm surges*. CSIRO, Commissioned by the Gippsland Coastal Board.
- Measham, T. G., Preston, B. L., Smith, T. F., Brooke, C., Goddard, R., Withycombe, G., & Morrison, C. (2011). Adapting to climate change through local municipal planning: barriers and challenges. *Mitigation and Adaptation Strategies for Global Change*, DOI: 10.1007/s11027-011-9301-2.
- Meyer, B. C., Rannow, S., & Loibl, W. (2010). Climate change and spatial planning. *Landscape and Urban Planning*, 98 (3-4), 139-140.
- Moles, J., Dwyer, S., & Holdsworth, J. (2009). *Panel Report: East Gippsland Planning Scheme Amendment C68 - Coastal Landscapes and Urban Settlement Plans*. Melbourne - Government of Victoria.
- Moser, S., Williams, S., & Boesch, D. (2012). Wicked Challenges at Land's End: managing Coastal Vulnerability Under Climate Change. *Annual Review of Environment and Resources*, 37, 51-78.
- Moser, S. (2013). Navigating the Political and Emotional Terrain of Adaptation: Community Engagement When Climate Change Comes Home. pp 289-305. In S. Moser, & M. Boykoff (Eds.) *Toward Successful Adaptation: Linking Science And Practice In Managing Climate Change Impacts*. London - Routledge.
- Nelson, D., Adger, N., & Brown, K. (2007). Adaptation to Environmental Change: Contributions of a Resilience Framework, *Annual Review of Environment and Resources*, 32, 395-419.
- O'Brien, K.L., & Wolf, J. (2010). A values-based approach to vulnerability and adaptation to climate change. *Wiley Interdisciplinary Reviews: Climate Change* 1(2):232-242.
- Peel, J., & Godden, L. (2008-2009). Planning for Adaptation to Climate Change: Landmark Cases from Australia. *Sustainable Development Law and Policy*, 37, 37-41.

- Picketts, I., Werner, A., Murdock, T., Curry, J., Dery, S., & Dyer, D. (2012). Planning for climate change adaptation: lessons learned from a community-based workshop. *Environmental Science and Policy*, 17: 82-93.
- Stafford-Smith, M., Horrocks, L., Harvey, A., & Hamilton, C. (2011). Rethinking Adaptation for a 4°C World. *Philosophical Transactions of the Royal Society A.*, 369: 196-216.
- Storbjörk, S., & Hendren, J. (2011). Institutional capacity-building for targeting sea level rise in the climate adaptation of Swedish coastal zone management. Lessons from Coastby. *Ocean and Coastal Management* 54, 265-273.
- Storbjörk, S., and Hjerpe, M. (2013) “Sometime Climate Adaptation is Politically Correct”: A Case Study of Planners and Politicians Negotiating Climate Adaptation in Waterfront Spatial Planning” *European Planning Studies*. DOI:10.1080/09654313.2013.830697
- Svikis, M., & Lofthouse, J. (2011). *Eroding our Values, Accreting our Liability: Equity in planned retreat options for Tweed coastal residents?* Paper presented at the 20th NSW Coastal Conference, 8-11 November, Tweed Heads.
- Tompkins, E.L., Few, R., & Brown, K., (2008). Scenario-based stakeholder engagement: incorporating stakeholders preferences into coastal planning for climate change. *Journal of Environmental Management*, 88(4), 1580–1592.
- Tribbia, J., & Moser, S. (2008). More than information: what coastal managers need to plan for climate change. *Environmental Science & Policy*, 11(4), 315-328.
- Tyler, T.R. (1994). Psychological models of the justice motive: antecedents of distributive and procedural justice. *Journal of Personality and Social Psychology*, 67(5):850-863.
- Van den Berg, M.M., Lafferty, W.M., Coenen, F.H.J.M. (2010). Adaptation to climate change induced flooding in Dutch municipalities. In P. Martens, & P. Chang (Eds.) *The social and behavioural aspects of climate change: linking vulnerability, adaptation and mitigation*. Greenleaf Publishing, Sheffield, UK.
- Van Vugt, M., & Snyder, M. (2002). Cooperation in society: Fostering community action and civic participation. *American Behavioral Scientist*, 45(5), 765-768.
- Vanderzee, M. (1988) Changes in saltmarsh vegetation as an early indication of sea level rise. In G. Pearman (Ed) *Green-house. Planning for climate change*. Collingwood - CSIRO (pp.147–160).
- Walker, W., Haasnoot, M., & Kwakkel, J. (2013). Adapt or Perish: A Review of Planning Approaches for Adaptation under Deep Uncertainty, *Sustainability*, 5, 955-979
- Webb, J. (2011). Making climate change governable: the case of the UK climate change risk assessment and adaptation planning. *Science and Public Policy* 38(4), 279-292.
- Wilson, E. (2006). Adapting to Climate Change at the Local Level: The Spatial Planning Response. *Local Environment*, 11(6), 609-625.
- Yin, R.K. (2003). *Case Study Research: design and methods*, Sage, London.

**Table 1: Organisations from which key actors interviewed are based**

<b>Organization</b>	<b>Number of Interviewees</b>
<b>Federal level organisations</b>	
National Seachange Taskforce	1
Department of Climate Change and Energy Efficiency	2
Department of Housing, Communities and Indigenous Affairs	1
<b>State level organisations</b>	
Department of Sustainability and Environment	3
Department of Planning and Community Development	3
<b>Local level/locally based organisations</b>	
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
<b>Total</b>	<b>30</b>

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

<b>Year</b>	<b>Title</b>
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.
	Planning Scheme Amendment VC71. Created Clause 13 of the State Planning Policy Framework <i>Environmental Risks</i> , including Clause 13.01 <i>Climate Change Impacts</i> , and Clause 13.01-1 <i>Coastal Inundation and Erosion</i> . (Part of a revision/reordering etc of Clauses 11-19). September 20.
	EGSC. <i>Lakes Entrance Business District Interim Use and Development Control, Incorporated Document</i> . October
2012	Melbourne Water. <i>Planning for sea level rise – Assessing development in areas prone to tidal inundation from sea level rise in the Port Phillip and Westernport Region</i> , 5 June 2012.
	DSE. <i>Guidelines for Coastal Catchment Management Authorities: Assessing Development in relation to Sea Level Rise</i> , 8 June 2012.
	Amendment VC94. Amended Clause 13 of the State Planning Policy Framework to include a recommendation to plan for 0.2m of mean sea-level rise by 2040 for infill development in established areas. Gazetted July 4.
	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

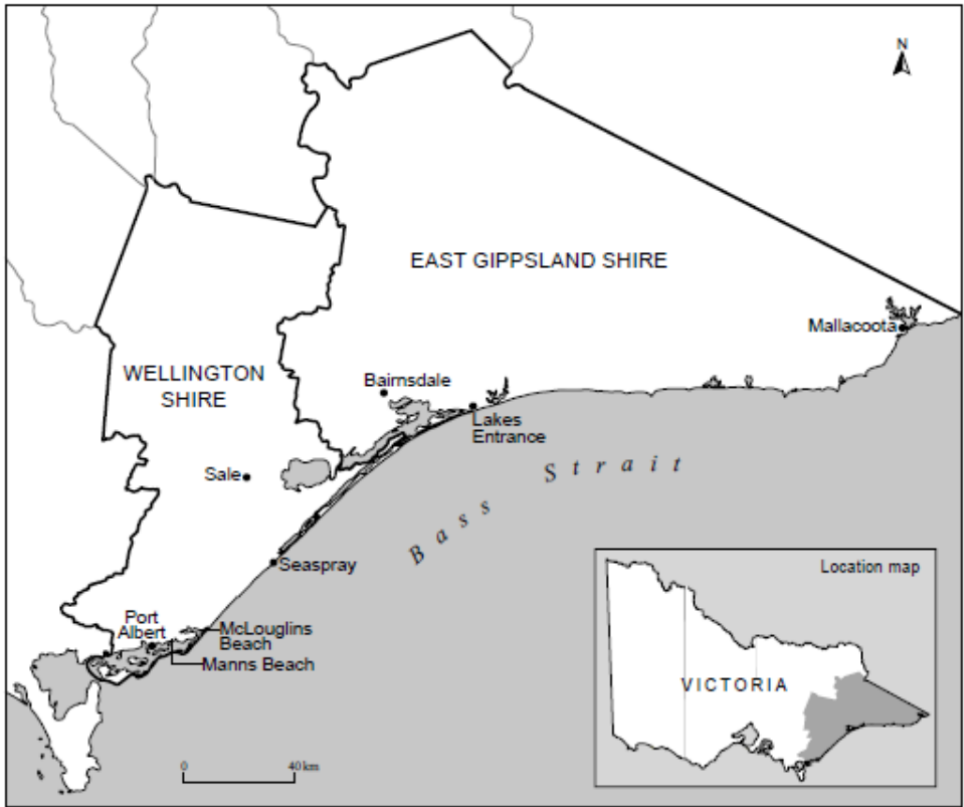


Figure 1 – Location of Lakes Entrance in relation to the state of Victoria, Australia

## **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