

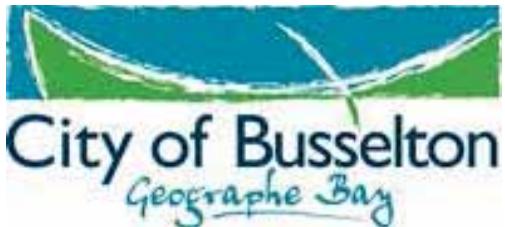


NCCARF

National
Climate Change
Adaptation
Research Facility

ACCARNSI

Australian Climate Change
Adaptation Research Network for
Settlements and Infrastructure



DEVELOPMENT OF A PILOT COASTAL COMMUNITY ADAPTATION AWARENESS PLAN FOR CITY OF BUSSELTON - OCTOBER 2013

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Pilot participatory mapping workshop on *Community Awareness of Coastal Adaptation to Climate Change in Busselton* at the City of Busselton Council chambers, Friday 12 July 2013

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1. INTRODUCTION

1.1 Purpose and scope

The purpose of this pilot Coastal Community Adaptation Awareness Plan ('the pilot Plan') is to ensure that communities in the City of Busselton (CoBusselton) are adequately prepared to respond to current coastal processes and issues impacting the coastal zone, and potential future impacts and opportunities posed by coastal climate change. This pilot Plan also informs decision-making in the Peron Naturaliste Partnership (PNP) and in other local government partnerships further afield, seeking to develop similar community awareness and stakeholder engagement initiatives.

The Approach and Methodology to devise this pilot Plan rest on 'three pillars':

- i. Build on the PNP and CoBusselton's existing partnerships and strategies
- ii. Share ACCARNSI's expertise and skills in facilitating coastal climate change adaptation, and its nationwide research and evaluation of local governments' community engagement programs
- iii. Evaluate and leverage the outcomes of the participatory mapping workshop at the City of Busselton Council chambers on Friday 12 July 2013, facilitated by the team from Curtin University Sustainability Policy Institute (CUSP) – refer to CUSP Annexes 1 to 6.

1.2 A framework of concept strategies

The 'three pillars' support a framework of *concept strategies* for CoBusselton's coastal climate change adaptation and community awareness program. The concept strategies (1) consolidate conclusions and meta-analyses of the mapping workshop participants' responses; and (2) enable further clarification of key policy drivers and progress towards resolving central challenges and key issues raised at the workshop debriefing. This framework also (3) reflects *critical success factors* and *key learnings* that ACCARNSI has identified from its nation-wide research and evaluation of challenges and opportunities that local governments face in engaging their communities and managing their expectations. Successful approaches taken by three Councils are showcased in Appendix A.

1.3 Program of short-term and medium-term actions, and future steps

The framework provides guidance for CoBusselton and the PNP to devise detailed strategies to implement a coherent community awareness and stakeholder engagement program. This program consists of recommended practical short-term and medium-term actions, and future steps – presented in sections 6, 7 and 8 - that align with the PNP Business Plan 2013-2015, Communication Strategy 2013-2015 and guiding State policies notably State Planning Policy (SPP) 2.6. In addition, this pilot Plan suggests communication strategies that speak to, and build on, *direct actions* in the PNP Pilot Community Engagement Strategy (this is to be revised and enhanced for key deliverables in 2013-2015 as a result of the recommendations of this report.) Communication strategies and media campaigns can also be framed to support implementation of the recommended short-term and medium-term actions.

1.4 Agreed aims and key deliverables

Aims and objectives for this pilot Plan were provisionally outlined in ACCARNSI's Expression of Interest, reflecting the key deliverables in the Brief. These were reviewed at the project inception meeting (held at the NCCARF national conference in Sydney on 26th June 2013).

The following **clarified** aims and key deliverables were agreed on at the project inception meeting:

- i. Leverage the outputs and outcomes of the *Community Awareness of Coastal Adaptation to Climate Change in Busselton* Pilot Workshop ('the pilot mapping workshop') facilitated by CUSP at the City of Busselton Council on 12th July 2013, which raised awareness and understanding of current coastal processes and future impacts of climate change in CoBusselton;
- ii. Highlight community (including indigenous) and stakeholder concerns about significant social, economic, ecological and cultural assets in the coastal zone;
- iii. Identify potential adaptation pathways for the Busselton Coast including high-level strategic options, and options which may be implemented by communities, that assist in protecting natural and built environments;
- iv. Identify research gaps in mapping coastal erosion and inundation hazards, further data collection needs and on-ground works that require undertaking or commissioning by CoBusselton;
- v. Identify funding and co-funding possibilities and options;

- vi. Indicate high level stakeholders to approach who can support this Plan and provide advice on strengthening cooperative arrangements with state and national government departments, NRM agencies and other relevant organisations;
- vii. Outline a framework for monitoring and evaluating the intended and emergent outcomes of the recommended actions.



Image of workshop participants courtesy of CUSP

2. APPROACH AND METHODOLOGY TO DEVISE THE PILOT PLAN

2.1 Three pillars for devising the pilot Plan

ACCARNSI's Expression of Interest for devising this pilot Plan outlined how the 'three pillars' approach and methodology would enable development of a strategic framework and program of recommended community awareness actions and future steps.

i. Build on key partnerships and strategies

The first pillar in ACCARNSI's approach builds on the key partnerships between City of Busselton, PNP, City of Mandurah, CUSP, the WA Department of Planning, Climate Change Unit at Department of Environment Regulation WA, the South West Catchment Council and other supportive agencies, to ensure a smooth transition from Stage 1 (Pilot Mapping Workshop) to Stage 2 (pilot Plan). This first pillar rests on firm foundations provided by the set of strategies developed by the PNP and CoBusselton including the PNP Business Plan 2013-2015, Communication Strategy 2013-2015, the Pilot Community Engagement Strategy 2013-2015, and guiding State policies notably State Planning Policy 2.6.

ii. Share leading edge knowledge in coastal adaptation and community engagement

The second pillar brings in ACCARNSI's research skills and expertise in coastal climate change adaptation. This encompasses (1) the national and international expertise of Ron Cox, ACCARNSI's Convener in coastal engineering, hazard mapping, and clarifying and prioritizing coastal adaptation management options; and (2) identifying *adaptive learnings* from case studies of other Councils' leading practices in community engagement. These case studies provide an understanding of the degree to which the pilot mapping workshop met *key drivers* and *critical success factors* for community engagement that ACCARNSI has identified from three preceding stages of research and evaluation conducted in partnership with the Australian Local Government Association (ALGA), Western Australian Local Government Association (WALGA) and all other State and Territory counterparts: the Stage 1 Case Studies Report and accompanying Portfolio of 19 Councils, a report on the follow-on national survey of in Stage 2, and the Stage 3 Synthesis Report. These reports are publicly available to download from the ACCARNSI website: <http://www.nccarf.edu.au/settlements-infrastructure/>.

In addition, ACCARNSI was recently involved in researching and presenting 19 national case studies of Climate Change Adaptation Good Practice. Two of the case studies featured the PNP and City of Mandurah's LAPP project. These case studies can be accessed at:

http://www.nccarf.edu.au/localgov/map/list?type%5B0%5D=case_study&field_state_tid>All

One of ACCARNSI's key findings is that for many Councils across Australia, their greatest challenge is engaging their communities in climate change adaptation and managing their expectations. Councils struggle to garner local understanding and support unless decision-makers can attain community buy-in. Engagement enables communities to own and support adaptation action plans. An issue is how best to engage communities and key stakeholders with local knowledge inputs to collaborate with experts in council-led hazards and vulnerability studies e.g. inundation mapping and risk assessment workshops? *Key drivers* and *critical success factors* for engaging communities, reflected in the successful outcomes of the pilot mapping workshop, are highlighted in section 3.2.

Exemplary approaches to engaging communities taken by three Councils – City of Clarence in Hobart, City of Port Adelaide Enfield, and Mornington Peninsula Shire Council - are showcased in Appendix A. These Councils presented their communities with the best currently available scientific and technical information on coastal climate change impacts, as the basis for generating meaningful considerations of response options and developing trusted relationships.

iii. Evaluate and leverage the outcomes of the pilot mapping workshop

The pilot mapping workshop provides the third pillar for developing this pilot Plan. Initially, Ron Cox and Philip Booth (ACCARNSI) were made familiar with the scope, aims, methodology and facilitation processes of the pilot mapping workshop at the project inception meeting on 26th June in Sydney. They requested a pre-workshop briefing on 11th July at CoBusselton at which minor improvements were suggested to the pre-and post workshop survey, and to the questions in the concluding component, identifying *Adaptation Pathways for the Busselton Coast*. These suggestions were incorporated in the final workshop program - refer to the *Google Earth Mapping Workshop* process and survey design (CUSP Annexes 1 to 4)

Observations of the pilot mapping workshop and initial findings and conclusions from the debriefing are unpacked in section 3. Meta-evaluations of the workshop outcomes are

presented in section 4.

2.2 Blending appropriate evaluation methodologies

ACCARNSI's approach blends three evaluation methodologies that are well suited to interpreting the pilot mapping workshop participants' values and concerns, meta-analysing key issues that emerge, and providing guidance to policy makers and program designers:

- i. ***Realist Evaluation*** approach to policy and program development - *What works for whom? Why? And under what circumstances?*¹
- ii. ***Appreciative Inquiry*** - a 'people friendly' evaluation method that encourages community participants to share their lay knowledge, concerns and opportunities for positive change²
- iii. ***Developmental Evaluation*** - this methodology is especially suited for evaluating innovative sustainability and climate change pilot programs, and scaling-up for wider roll out. It supports collaborative decision-making enterprises and continuous improvement - refer to five applications outlined in **Appendix B: Developmental Evaluation and Climate Change Adaptation**. The evaluator plays a key role in facilitating *evaluative thinking* skills among decision-makers and stakeholders. These roles include *sense-making* and *reality-testing*, and providing evaluative feedback to decision makers in *real time*.³

For example, in evaluating CoBusselton's participatory mapping project, *sense-making* and *reality-testing* roles were operationalised in the pre-workshop briefing and the debriefing processes described above. Providing evaluative feedback to decision makers in *real time* was operationalized, in a spirit of collaboration with the project Steering Committee, by sharing ACCARNSI's notes from the post-workshop debriefing together with meta-analyses of the survey results and mapping outcomes, and inviting feedback.

2.3 Three stages of research and evaluation

ACCARNSI's methodology reflects three generic stages of research and evaluation that are evident in the structure and content of the following sections of this pilot Plan:

- What has been achieved? What does the monitoring data and other information sources tell us?
- So what? What can we learn from what's emerged?

- Now what? Where to, from here, with our policies, programs and action plans?

i. What were the key outcomes of the pilot mapping workshop? What do we conclude?

The Realist approach is especially helpful in reaching conclusions in this initial stage of evaluation i.e. *What works for whom? Why? And under what circumstances?* By agreement at the post workshop debriefing, much of this initial stage was undertaken by the CUSP team in its analyses and conclusion from the pre-and post workshop survey results and other outcomes. These are presented in the *Report on Community Feedback* and the *Interim/Summary Report on Google Earth Results* from the pilot mapping workshop (CUSP Annexes 5 and 6).

However, this initial stage of analysis only gets us so far... To take it to the next stage of strategic considerations, a higher level of *meta-analysis* is required.

ii. So what? How to use the conclusions and meta-analyses to frame this pilot Plan?

This next stage requires meta-analyses of the pilot mapping workshop outcomes, to develop a strategic framework that supports the design of policies and programs. ACCARNSI's meta-analyses of the CUSP *Report on Community Feedback* and the *Interim/Summary Report on Google Earth Results* inform a framework of *concept strategies* that underpin the follow-on development of short term and medium term community awareness actions, and future steps. These meta-analyses of the survey results and mapping outputs were shared with the project Steering Committee. Feedback was taken on board and incorporated to identify the concept strategies presented in section 5.

iii. Now what – where do we go from here?

This culminating stage informs good decision-making, including the selection and implementation of feasible and cost effective actions, and adaptive policy learning. This stage further informs the design of the program of short and medium term community awareness actions presented in sections 6 and 7, and potential future (long term) steps in section 8.

2.4 Fostering Social Learning for Climate Change Adaptation

A Social Learning approach to climate change adaptation is a central concept in building community awareness in this Plan. The benefits of this approach are well recognised in

integrated catchment management and are transferable to coastal climate change adaptation. Transferable benefits that are reflected in this pilot Plan include equitable learning partnerships that combine expertise from professionals with the lay knowledge of local communities, and stakeholders with different perspectives and power bases. They are facilitated to meet in *discourse arenas* to share concerns, resolve conflicts, learn collaboratively and make collective decisions for concerted action. Other benefits of social learning that inform this pilot Plan include the five ‘braided strands’ identified by Keen, Brown and Dyball⁴. These are:

- **Reflection:** iterative reflection and evaluation of processes and activities to improve understanding and develop approaches.
- **Systems orientation (systems thinking):** addressing issues at a systems level, for example a whole-of catchment approach
- **Integration:** integration and synthesis of rigorous quantitative data with anecdotal information; and expert knowledge with local or lay knowledge (for example the lived-wisdom of farmers, fishers, trades-people, parents, and youth leaders).
- **Negotiation:** negotiation and collaboration among key stakeholders.
- **Participation:** broad engagement and participation of professionals, experts, interest groups and local people through their involvement in communities of practice, interest and place.

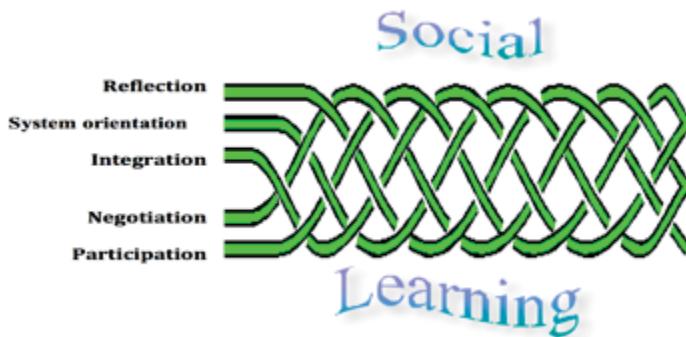


Figure1: The five braided strands of social learning (Keen et al 2005)

Other facets of the Social Learning approach are unpacked in Appendix C: What is Social Learning for Sustainability and Climate Change Adaptation?

2.5 Targeting communities of place, interest, knowledge and practice

CoBusselton is not comprised of a single, amorphous community. Instead of referring to ‘the community’, this pilot Plan acknowledges that residents, local business people,

professionals, workers, retirees, young people and so forth variously belong to overlapping communities of *place* such as at the sustainability hotspots, communities of *interest* such as sports clubs, cultural associations, and communities of *knowledge* and *practice* including farmers, entrepreneurs and members of Landcare or Coastcare Groups⁵. Further differentiations include communities of *professional practice and decision-making* including planners, coastal engineers, climate change adaptation practitioners, scientists, and NRM and integrated catchment managers.

Together with Social Learning, this differentiated approach to overlapping communities underpins the awareness actions and *adaptive learning* advocated in this pilot Plan. Nuanced approaches are more effective than treating '*people*' amorphously, which limits the range of targeting strategies for various community segments as well as limiting richer understandings of why and how people prefer to learn to adapt to climate change.

2.6 Concomitant engagements with key stakeholders

'Stakeholders' are defined as those with a right of access to a resource – whether economic, social, cultural, or environmental (a natural resource). Effective community awareness often proceeds hand-in-hand with effective stakeholder engagement, because stakeholders may well be members of communities of interest and practice with some connection to particular locales and key issues. To that end, this Plan frequently addresses communities *and* stakeholders.



Image of workshop participant courtesy of CUSP

UNPACKING INITIAL CONCLUSIONS FROM THE PILOT MAPPING WORKSHOP OBSERVATIONS AND DEBRIEFING

Ron Cox and Philip Booth (ACCARNSI) agreed to prepare notes of key points from observations of the pilot mapping workshop, and the post workshop debriefing. These notes were circulated to the project Steering Committee the following week for review (refer to Appendix D). They provide a record of initial conclusions on ‘where to, from here’: which salient issues and outcomes emerged from the workshop; and what to concentrate on, in follow-on analyses.

2.7 Observing the mapping workshop processes

Ron Cox and Philip Booth observed the combination of activities in the workshop – the expert and indigenous speakers, panel discussions, group interactions around local maps and overlays, and outputs recorded in Google Earth formats. These activities combined to build a shared understanding of climate change impacts on the coast - refer to the CUSP *Report on Community Feedback* (CUSP Annex 5) and the Summary of Initial Results in the *Interim/Summary Report on Google Earth Results* (CUSP Annex 6 pp. 6-15).

2.8 Key drivers and critical success factors

The pilot mapping workshop matched most of the *key drivers* and *critical success factors* for local governments to engage with their communities, identified in ACCARNSI’s preceding case studies and national survey. Three key drivers are:

- i. Identify and respond to community or stakeholder issues/concerns about impacts especially in vulnerable areas
- ii. Meet the expectations of community members who would like their council to prepare for climate change impacts
- iii. Provide a structured platform for ongoing engagement with stakeholders to enable further inputs on key climate change issues including local knowledge and histories of hazards caused by extreme weather events.

Factors that directly contributed to the workshop’s success as a foundational community

engagement event, and a solid platform for further community awareness actions, included:

- iterative improvements to the design and flow of activities, questions and mapping tasks that reflected the Curtin University CUSP team's adaptive learning from facilitating three preceding workshops;
- considerable efforts to identify and invite a representative and manageable range of 30 or so residents and stakeholders;
- positive attitudes of the participants and willingness to get the mapping tasks done
- good table facilitation processes

Furthermore, the mapping processes succeeded in matching other Councils' reports on the **benefits of visual tools** and processes that provide baseline data, a clear structure for identifying responsibilities for action, a method to build community understanding of impacts, risks and adaptation options, and enable meaningful ongoing engagements with communities and key stakeholders. Good use of scenarios and visual modeling tools at community and stakeholder meetings is essential. Effective reporting on outputs is also essential, through visually engaging communiqués so that councilors, community champions and residents can 'get their heads around' key challenges and issues.

2.9 Conclusions on central challenges and key issues to resolve

At the post-workshop debriefing on 13 July, initial findings from the workshop were agreed on. These are unpacked below. Two central challenges to address in devising the pilot Plan stood out. These are:

- 'Where to, after the successful pilot mapping outcomes, for CoBusselton and the PNP in the next 12 to 18 months?
- 'How do we (Council and community) decide what coastal assets to hold onto, and what to let go?'

It was also agreed that this pilot Plan should provide guidance to resolve these flow-on key issues that arose at the debriefing:

1. How best to leverage the key workshop outputs – the concerns and values, flexible adaptation pathways, and the survey responses - to:
 - i. Inform and guide State Government, Local Council's and PNP's decision-makers?

- ii. Gain further community awareness of, and consensus on the agreed hot spots and cherished places?
 - iii. Continue facilitating meaningful community involvement in understanding and discussing adaptation pathways for the Busselton Coast?
2. How to maintain the social learning generated in the workshop, and sustain the positive energy and enthusiasm among participants, so that it does not fade away like a one-off event?
 3. What kinds of follow-on community awareness activities are best suited in CoBusselton's hotspots?
 4. What other unresolved big issues emerged from the pilot mapping workshop? What decisions and actions do they point towards taking, in the next 12 to 18 months?
Principally:
 - i. What follow-on detailed assessment processes are required to clarify the options that best suit CoBusselton?
 - ii. Should final decision-making be held off until fine-scale maps are produced and options costed?
 5. In the meantime, which short-term community awareness actions and concomitant stakeholder engagement initiatives can be designed and implemented to successfully move different demographic groups along the awareness -> action spectrum?

2.10 Four initial 'compass points' for developing this pilot Plan

Four initial 'compass points' for directing the development of this pilot Plan also emerged from the debriefing:

i. Unpack the identified hotspots and emerging adaptation pathways

Structure and communicate analyses of the workshop outcomes and reporting outputs around:

- Social learning for sustainability
- Implications for adaptive management options
- Policy learning for decision makers in CoBusselton, PNP, WA Departments of Environment Regulation, Planning, Transport and Water and Regional agencies including the South West Catchment Council and the South West Development Commission.

ii. Feedback concerns and opportunities identified in the hotspot mapping

- Inform participants in follow-on workshops and related events. Invite comments and afterthoughts to be gathered
- Disseminate to wider communities e.g. through *Community Conversations* (as per Mornington Peninsula Shire Council case study)

iii. Provide information on the coastal decision-making hierarchy

It was evident that workshop participants were, in the main, unfamiliar with the meanings of the options in the *coastal decision-making hierarchy as spelled out in the State Planning Policy 2.6*: i.e. avoid, retreat, accommodate, soft protection, hard defense. There was also a lack of understanding that one or more of these options may apply, at different spatial and temporal scales, along the coast – in other words, not just one option. However, there was consensus on the need for:

- further scientific, engineering and planning information to improve community awareness and understanding of the rationale for the coastal adaptation hierarchy in State Planning Policy 2.6
- more robust indications of the magnitude and location of impacts on public and private properties and assets in the prioritized hotspots;
- detailed costs of options (e.g. in percentiles such as \$10,000 - \$20,000 or \$\$90,000 - \$100,000) so that residents and small businesses can make firmer decisions.

iv. Drill down into unresolved issues

Key issues that were not fully covered by the presentations at the pilot workshop, or unresolved at this point in time included:

- costs and benefits of the emerging options;
- engineered responses and their relative advantages;
- predicted changes in weather / rainfall trends and projected catchment management issues impacting on the Vasse-Wonnerup wetlands and the Broadwater.

3. META-ANALYSES OF WORKSHOP SURVEY RESPONSES

As described in the Approach and Methodology, an agreement was reached on a best way forward to analyse and leverage the pilot mapping workshop outcomes. Firstly, the CUSP team clarified initial analyses and conclusions from the pre-and post-survey results - refer to the *Report on Community Feedback* (CUSP Annexes 4 and 5). Then ACCARNSI undertook meta-analyses of these initial analyses and conclusions, circulated them to the project team and invited feedback. Key issues raised in the meta-analysis that inform this pilot Plan are presented below.

3.1 Demographics

- i. The pilot mapping workshop was a rather 'blokey' event with a female/male ratio of 30/70. A preceding workshop at Mandurah was similar with 20 males and 12 females. How best to rectify the low participation by women, and achieve a better ratio in future community awareness processes?
- ii. Age percentiles were skewed towards over-50s, with almost negligible participation by under-30s and under-20s. A preceding workshop at Mandurah also showed a bias towards retirees with more free time. This highlights the need to consider alternative times that are more suitable for working people, such as a weekend afternoon or morning, and other ways to generate awareness among younger percentiles.

3.2 Pre and post workshop self-assessed knowledge, concern and involvement

The post workshop graph shows synchronous **sharpening** of high levels in all three domains of participants' self-assessments i.e. their *active involvement*, *concern*, and *knowledge of coastal implications*. Concomitantly, very low pre-and low post workshop levels shrank. There are at least two possible interpretations of this change are: firstly, that participants may have realized, after hearing from the expert presenters, that they actually knew more than they had initially credited to themselves beforehand; and secondly, what they heard from the experts reinforced their lay knowledge. Whichever, leverage this sharpening of participants' *active involvement*, *concern*, and *knowledge of coastal implications* in follow-on community awareness actions and events.

3.3 Views about the coastal zone

- i. The highest response was to '*under increasing pressure*' – which presumably contributes to the sense of '*fragility*'.
- ii. On a more positive note, a clear majority view the coastal zone as '*able to be protected/managed*', which begs two questions posed in the culminating Adaptation Pathways process:
 - best managed by whom?
 - paid for by whom?
- iii. '*Resilience*'(or the lack of it) – the low response rate to this concept warrants attention. It may indicate that this concept is not well understood in the context of coastal climate change adaptation, compared with *fragile*.

3.4 Best way to solve coastal problems

- i. The most strongly supported 'best way' is to *take a sustainability perspective by balancing economic, social and environmental objectives*. This validates the mapping process, which presented these values equally.
- ii. The 2nd most favoured way – i.e. *involve a wide range of stakeholders* - suggests that CoBusselton and the PNP would benefit from aligning their community awareness strategies and approaches with stakeholder engagement initiatives.
- iii. The next favoured way is that *governments should take a strong leadership and coordinated role in solving coastal problems*. CoBusselton and PNP would do well to highlight the positive and negative consequences of this expectation, in approaches to state and national departments and agencies for co-funding.
- iv. Clear distrust of market forces (and the private sector generally?) as the key driver is perhaps the most surprising outcome.

3.5 Influence on climate change opinions

- i. High acceptance of scientific evidence among participants is encouraging.
- ii. '*My intuition*'was also a strong influence. In future questioning, this could be split to gain a better understanding of whether this influence stems from either or both:
 - a gut feeling
 - lived experiences and direct observations of a climate changing world.

4. STRATEGIC FRAMEWORK FOR THE PILOT PLAN

This framework of *concept strategies* identifies key policy drivers and goals for coastal climate change adaptation and community awareness programs. The framework provides guidance for CoBusselton and the PNP to devise detailed strategies to implement a coherent community awareness and stakeholder engagement program. The concept strategies consolidate the meta-analyses of the workshop participants' responses and enable progress towards resolving the central challenges and key issues raised at the workshop debriefing, described in section 3.3. This strategic framework also reflects the *critical success factors* and *key learnings* that ACCARNSI has identified in other Councils' exemplary community awareness programs, described in section 3.2 and Appendix A.

4.1 Program of short and medium term actions, and future steps

A coherent program of recommended community awareness actions for the City of Busselton and the PNP to undertake is recommended in the following sections. This program is divided into short and medium term phases, and future steps. These recommended actions are open to further discussions and negotiations to determine whichever are feasible to implement and cost effective.

The short-term actions are aimed at resolving the 1st central challenge: 'Where to, after the successful mapping, for CoBusselton and the PNP in the next 12 to 18 months?' They maintain the momentum of the pilot mapping workshop and can be initiated while funding is sought to undertake detailed hazard studies in several hotspots in the medium term.

Medium-term actions and suggested future steps assist in resolving the 2nd central challenge: 'How do we - Council and communities - decide what coastal assets do we hold onto, and what to let go?' They may require some reshaping to 'mesh' with the Purpose and Themes in CoBusselton's forthcoming Local Planning Strategy (currently in working draft stage). They may also require culling and reshaping to determine which targets are achievable, following monitoring and evaluations of implemented short-term actions (refer to the outline of an Evaluation Framework in section 9).

4.2 Develop a tailored approach to raising awareness in prioritized hotspots

The CUSP *Interim/Summary Report on Google Earth Results* (ANNEX 6) presents consolidated results from mapping the participants' concerns about the risks and impacts of climate change, their layers of social, economic, cultural and ecological values, and similarly their responses to the questions in the culminating Adaptation Pathways component of the workshop. **Table 1: Sustainability Hotspots** (pp. 6-7) lists the highly significant hotspots where the pilot mapping workshop participants' sense of place, belonging and identity was strong, and a corresponding sense of potential loss felt by some.

These consolidated results provide CoBusselton and the PNP with a concise overview of places that are considered highly significant by community representatives and a good platform to involve communities in identifying the trigger points that impel action (a platform analogous to undertaking a 'first pass' risk assessment such as Mandurah's LAPP project). We therefore recommend that development and delivery of short-term community awareness actions be tailored for these six hotspots (not ranked in order of priority):

- Busselton Jetty, Observatory and foreshore precinct
- Busselton CBD precinct
- Port Geographe and marina precinct
- Resort Strip and Broadwater
- Dunsborough CBD and foreshore precincts
- Vasse-Wonnerup wetlands and adjacent Tuart remnant forest at Ludlow

A caveat:

CoBusselton and the PNP are mindful that two problems may arise, from a *planning perspective*, if the community awareness program is overly concentrated on these hotspots. Firstly, the hotspots cannot be treated separately from adjoining locales, and to do so risks the ire of residents and business people who may feel ignored or excluded. Secondly, the physical attributes of the coast, and the urban development that sits behind it, does not simply start and stop at these hotspots. Underlying issues will span the management of the whole coast – for example, how to 'manage retreat' or 'accommodate' at a hotspot if it is impacted by an adjoining engineered response?

4.3 'Locals teaching locals'

Encourage the workshop participants to step up into 'locals teaching locals' roles (akin to the

Kids teaching Kids methodology) and become action enablers by sharing their knowledge with peers on fieldtrips, follow-on workshops and other community events, and nurturing other champions. At each hotspot, the consolidated results of the pilot mapping workshop can be presented by these ‘locals teaching locals’ to catalyse wider community awareness and stakeholder engagement. This approach may need to be coupled with an overarching group of ‘paramount locals’ who have interests ranging across all hotspots, to save exhausting people and resources.

4.4 Enhance community awareness of values mapped at the workshop

Ensure that various communities of place, practice and interest are provided with opportunities to gain balanced understandings of the impacts of climate change on social, economic, ecological and cultural values, e.g.

- social and personal sense of place values connected with the sustainability hotspots
- cultural and historical values e.g. of Busselton Jetty and CBD precincts
- economic significance of tourist attractions and services e.g. whale watching
- ecological values of the coastal dunes, Vasse-Wonnerup wetlands and Tuart Forest

Evidently social and economic issues were of greater concern to the workshop participants than ecological and cultural issues. The wetland ecology and values are not well understood although the Vasse-Wonnerup wetland was identified as a hotspot. The CUSP *Interim/Summary Report* (ANNEX 6 pp.24-25) noted that knowledge of biodiversity was largely confined to “charismatic” species such as Western Ringtail Possums, Quenda, Peppermint Trees and the Tuart forest. Initiatives with partner organisations including the South West Catchment Council can address these knowledge gaps e.g. by highlighting the importance of *keystone species* in ecosystems, and their assemblages of interdependent fauna and flora.

Provide communities and stakeholders with the sets of consolidated results from the workshop as starting points to further clarify their views on ‘the things (values) that matter to us’. Facilitate them to rework (redefine, accentuate and prioritise) their lists of social, economic, ecological and cultural concerns, thereby generating further ownership, prior to grappling with the Adaptation Pathways and decision-making options.

4.5 Facilitate clearer understandings of adaptation options and costs

Workshop participants were generally unfamiliar with the meanings of the options in the *coastal decision-making hierarchy*: i.e. avoid, retreat, accommodate, soft protection (e.g. beach nourishment), and hard defense (e.g. sea walls, offshore reefs). The CUSP *Interim/Summary Report on Google Earth Results* noted that the 'accommodation' option is particularly in need of better understanding, since it was "seen as a bit of a novelty/innovative idea" (ANNEX 6 p.25).

People also need to be given better understandings of what 'retreat' and 'beach nourishment' mean. Enable communities to better grasp the high costs of hard defense options such as seawalls and flood levies to protect CBDs and other hotspots with high economic and social value, and economic arguments for retreating in less densely populated areas. These knowledge gaps and 'knowledge limitations' require appropriate action responses e.g. bringing thought leaders to the region to enable communities to get a better handle on how and why 'accommodation' could be a good option in some local contexts.

A key function of local government is to build *local knowledge reservoirs* from community engagement. Use these reservoirs to focus on building readiness and preparedness within the community, in a risk management context. For example, facilitate a specific-purpose workshops that provide detailed knowledge and increased levels of understanding of what these options mean in terms of managing hazards, risks and impacts in the contexts of their identified sustainability hotspots and cherished places.

4.6 Progress a sustainable funding strategy for coastal adaptation options

An encouraging number of workshop participants responded from a social equity standpoint to the Adaptation Pathways for the Busselton Coast questions on 'Who should pay' for engineered responses and 'When should payment occur'? Their responses point towards developing a policy to share costs and "minimize the burden" among all beneficiaries by setting up, early on, a sustainable fund to pay for future engineering works to protect both public and private assets. Some participants suggested an adaptation levee while others suggested dedicating a proportion from rates into a special trust fund. This fund could then be used to leverage matching funds from state and national governments.

A sustainable funding strategy would also contribute to addressing a key concern noted in

the Conclusion to the CUSP *Interim/Summary Report on Google Earth Results*: the "sense of overwhelming potential loss felt by some participants" made it difficult for them to analyse and frame their responses to the Adaptation Pathways questions (ANNEX 6 p.25). A bleak mind frame can become a trap that precludes considerations of potential benefits and low-cost solutions, and brings on negative attitudes of defeatism and paralysis. The potential impacts of climate change need to be handled carefully in facilitated community events and in communications, so that 'doom and gloom' scenarios do not prevail. With this in mind, salient positive statements made by the workshop participants should be communicated widely in the short-term actions – see examples cited in section 6.4. City of Mandurah has adopted Community Based Social Marketing principles for some time, which focus on identifying barriers and benefits and promoting positive behaviors and outcomes.

4.7 Work with proactive thought leaders

Thought leaders in communities of place, interest, knowledge and practice will need to be identified, with respect to each hotspot, to assist in building community awareness. For example:

- i. The Geographe Bay Tourism Association can highlight how the local economy is dependent on coastal and hinterland tourism including visitor numbers to the Ludlow Tuart Forest, farms, wineries and homestays
- ii. Heritage values – identify local heritage/history thought leaders who show interest in a *Stories of Change* project e.g. farmers, fishermen and sailors in connection with the Ship Inn Hotel, where schooners and boats once moored. A key agency for co-funding is the Heritage Council of Western Australia, which is supported by the State Heritage Office <http://www.heritage.wa.gov.au/>
- iii. Indigenous thought leaders - Wayne and Toni Webb's stories of ecological changes they have observed provide indigenous historical perspectives. They describe the coastal strip as once an isthmus separated from the hinterland by the Broadwater and Vasse-Wonnerup estuaries, prior to draining. Approach the Indigenous Heritage Program, WA Film, NITV, the Heritage Council and Department of Aboriginal Affairs, <http://www.daa.wa.gov.au/>- to co-fund an audio-visual project to communicate their stories to regional (and national) communities. These could be broadcast on regional and national television by co-funders and co-producers, and available online.

- iv. Thought leaders and key stakeholders in the water sector such as Bob Humphries in the Water Corporation. Note that the property sector, nationally, is laggardly in comparison to the water sector.
- v. Thought leaders and key stakeholders in the NRM/sustainable ecosystems management sector.

4.8 Gain higher-level stakeholder engagement

- i. Raise awareness of the impacts of Climate Change on the decision-making *mind sets* of key stakeholders such as property managers, investors, and members in the local Chamber of Commerce and Industry, in partnership with the Geographe Bay Tourism Association and the Department of Planning's Regional SW Development Commission (Anna Groves is the key contact), regarding decision making for Busselton CBD, Busselton Jetty and Observatory precinct, Port Geographe and marina, and Dunsborough CBD/foreshore
- ii. Leverage co-funding from state departments and agencies that are directly relevant to the defining social, ecological and economic characteristics of each hotspot

4.9 Instigate an adaptive policy learning team

The CUSP *Interim/Summary Report on Google Earth Results* cautions that the “process of policy learning is not yet well developed in local and state governments: it is a case of learning as we go” (ANNEX 6 p.25). An *adaptive policy learning process* therefore warrants fostering and can be productively focused on shortlisting adaptation options, garnering community support for their implementation, and evaluating intended and emergent outcomes. This work could be undertaken by the Steering Committee team or by a working party comprising professionals and key stakeholders. Each of the below organisations and departments are umbrellas for a broader range of stakeholders and partners:

- Department of Transport, Planning, Environment and Regulation, Water, Aboriginal Affairs, Main Roads
- Tertiary Institutions
- WALGA
- Peel Harvey Catchment Council
- South West Catchment Council
- Australian Government

5. PRACTICAL SHORT-TERM ACTIONS

Phase 1 – 1 to 2 years

The short-term actions suggested below are practical to implement and aimed at maintaining the enthusiasm and momentum among the workshop participants and spreading it to their communities. Co Busselton and the PNP can get on with initiating these actions while funding is sought to undertake detailed engineering hazard and cost studies in the medium term. Communication strategies and media campaigns can be framed to support implementation of the short-term actions e.g.:

- Highlight the social, economic, ecological and cultural concerns identified by community members and stakeholders at the pilot mapping workshop
- Spotlight six ‘hotspots’ identified by the workshop participants
- Initiate ongoing *community conversations* to share and build on the outcomes of the mapping workshop
- Communicate key lessons from the workshop that provide a platform for further adaptive learning at follow-on workshops and in decision-making processes.

5.1 Tie the communication of workshop outcomes with awareness activities

CoBusselton and the PNP can either initiate awareness activities, or link in with community organisations' initiatives, to communicate and build on the pilot mapping workshop outcomes. Opportunities include:

- i. Public information evenings and ‘community conversations’ including:
 - Proposal for a series of ‘Climate Change Adaptation in Geographe Bay’ conversations facilitated by the Busselton Dunsborough Environment Centre (BDEC)
- ii. Social/cultural events such as:
 - ‘Sculptures by the Sea’ exhibition at Dunsborough
 - Bushfire Expo
 - Curtin University Artists Camp and exhibition
 - Jetty and Observatory events
 - Summer by the Sea Events Program
- iii. Fieldtrip(s) for adult locals and their families, led by *thought leaders* and *locals teaching locals*

- iv. Farmers' field days and Carbon Farming outreach and extension activities (in conjunction with SWCC)
- v. Facilitate Stories of Change – gather and reflect on local oral histories. Combine these with indigenous stories of change
- vi. 'We're all in the same boat' tours of the Broadwater and Vasse-Wonnerup estuaries.

5.2 Engage young people

- i. Devise fieldtrips for school students enabling *in situ* studies of 3 to 5 topmost hotspots. Target Years 5-11, and leverage the Kids Teaching Kids conference in Mandurah on 28-29 August to reach high school students
- ii. Consider commissioning a low budget but catchy YouTube clip, 'Dumb ways to Live in the Coastal Zone" analogous to 'Dumb ways to Die'

5.3 Undertake cultural and social mapping

Build on the Google Earth maps generated in the workshop. Undertake cultural mapping of heritage and indigenous values in the hotspots, and social mapping of community assets such as the hospital and sports facilities, to compliment the economic mapping undertaken by ACIL, and ecological mapping undertaken by SWCC and other agencies. These cultural and social mapping projects will contribute important information for Council and communities to collaborate in deciding 'What do we hold on to, and what do we let go'?

5.4 Tailored actions and communication strategies for prioritized hotspots

Take a 'horses for courses' approach, rather than 'one style suits all', to raising community awareness and engaging stakeholders in the prioritized hotspots. Tailored community awareness actions and communication strategies for each of the prioritized hotspots are unpacked below. This nuanced approach:

- speaks to the complexity of climate change adaptation and the need for contextualization in these locales;
- reflects the unique interplays of social, cultural, ecological and economic factors;
- targets different communities and key stakeholders;
- identifies combinations of possible funding /co-funding partners for each hotspot

Utilise workshop participants' salient responses e.g. strikingly clear expressions of their concerns, values, and place identities perceptive anticipations of benefits and costs, and prescient suggestions for pathways and options to move forward, to:

- communicate initial progress in raising community awareness;
- catalyse ongoing *community conversations*; and
- gain better notice of media releases, bulletins and so forth.

Communication techniques may include hard copy handouts at fieldtrips, and A3 blow-ups and visual GIS/GE formats for table/small group discussions at follow-on workshops and community conversations.

i. Busselton Jetty, Observatory and foreshore precinct

'If we lose this, then we don't have a Busselton!' This community concern underscores the rationale to undertake a detailed study of erosion and recession hazard lines and costings for beach nourishment, a sea wall, artificial reef and other hard defense options.

Salient responses from workshop

- '*If we don't have a jetty, we don't have a town!*' - costs and benefits of allowing nature to take its course
- '*As cultural and economic centre for the region, all the stakeholders in the region benefit to some degree*' - principal beneficiaries of engineered coastal protection

ii. Busselton CBD

Salient responses from workshop

- '*Need to develop more visual scientific based information*' – best ways to manage this hotspot: communicate
- '*Opportunity for new design and development / start again*' - best ways to manage this hotspot: accommodate
- '*Evidence is growing so let's plan for it now*' - dealing with ongoing uncertainty

iii. Port Geographe and marina

Salient responses from workshop

- '*Live on the boats*' - best ways to manage this hotspot: accommodate

- '*Port Geographe is dependent on east Busselton protection plan. If there is a decision to build a sea wall, Port Geographe can be included*' - best ways to manage this hotspot: defend

iv. Resort Strip and Broadwater

Salient responses from workshop

- '*Have a mixture of managed retreat and protection*' - best ways to manage this hotspot: overall strategy
- '*Opportunity for new design standards and new type of development*' – costs and benefits of allowing nature to take its course
- '*Loss of social, cultural experience catering to low to middle income visitors*' – costs and benefits of allowing nature to take its course

v. Dunsborough CBD and foreshore

Salient responses from workshop

- '*Dunsborough may at time be isolated resulting from highway inundation*' – Social concern
- '*Difficult to know what the coastline is going to do: [requires] continual vigilance and monitoring...*' - best ways to manage this hotspot
- '*Design adaptation measures that can be incrementally added to over time. Difficult and probably more expensive initially but probably cheaper in the long run. Also has to be continuous. Can't ever stop. If have a regular funding stream this would be easier.*' - best ways to manage this hotspot
- '*Focus on what you do know e.g. historical data on sea level rise*' – dealing with ongoing uncertainty
- '*Opportunity to redesign business centre*' – costs and benefits of allowing nature to take its course

vi. Vasse-Wonnerup wetlands and adjacent remnant Tuart forest

The 'stars align' for focusing on the Vasse-Wonnerup wetlands as a prime sustainability hotspot with a nexus of significant *ecological, social* and *cultural* values including biodiversity, and loss of habitat for endangered species including RAMSAR listed breeding sites. In addition, there are significant economic values and concerns to jointly consider including agricultural production, boating and tourism. This hotspot entails complex

considerations of intersecting coastal change and catchment flow impacts, and consequential catchment management and NRM issues and decision-making.

Salient responses from workshop

- *'Needs a coordinated approach and integrated framework to ensure all of the values are considered'* - best ways to manage this hotspot
- *'No defense – let go back to saline, let nature take its course'* - best ways to manage this hotspot
- *'New ecological communities may evolve'* - costs and benefits of allowing nature to take its course
- *'People don't like to live and recreate around smelly, deteriorated ecological systems'* - best ways to manage this hotspot

Funding opportunities

These intersections provide the rationale and impetus for CoBusselton and the PNP to work with the South West Catchment Council to co-fund options studies and a scenario planning workshop using different sea level rise projections for this hotspot. Draw on Blair Darville's workshops slides on threats, rainfall changes, and biodiversity changes.

A key longer-term issue for decision makers will be whether to maintain the wetlands as freshwater ecosystems, created by the installation of floodgates in the 1950s? Or allow natural processes of SLR and saltwater intrusion to return these to their previous ecosystem dynamics as brackish estuaries resulting in 'changes to species configurations' (a salient ecological concern) by removing or deciding not to raise the floodgates?

Adjacent Tuart remnant forest at Ludlow

The unique ecological values of this adjacent endangered ecosystem as the only tall mature Tuart forest in the world, combined with the cultural significant of the uniquely light coloured but very hard timber to pioneer settlers and the forest's economic value as a tourism drawcard that diversifies the coastal attractions of the region, are significant to the community. Focus community awareness and key stakeholder engagement strategies and actions for this sustainability hotspot on this nexus of climate change impacts on the coast and the forest.

Funding opportunities

Funding and co-funding opportunities for this hotspot may include a sponsorship from the Australian Geographic Society for a project to enhance the resilience of this endangered ecological community. If this hotspot also has significance in contributing to catchment functions and values (e.g. soil retention, species diversity), then the South West Catchment Council may also be a co-funder.



Impacts of coastal erosion at Siesta Park, Busselton 3rd September 2013. Image courtesy of Blair Darville, Busselton Dunsborough Environment Centre (BDEC)

6. RECOMMENDED MEDIUM TERM ACTIONS

Phase 2 – 2 to 5 years

These recommended medium-term actions assist in resolving the 2nd central issue: 'How do we - Council and communities - decide what do we hold onto, and what to let go?' They may require culling and reshaping to determine which targets are achievable and affordable, following monitoring and evaluation of implemented short-term actions (refer to the outline of an Evaluation Framework in section 9). Communication strategies and media campaigns can be framed to support implementation of the medium-term actions e.g.:

- Communicate SPP 2.6 and CoBusselton's forthcoming *Local Planning Strategy*
- Communicate the outputs of detailed engineering studies of adaptation options for the coast, and concomitant detailed costing of options.

6.1 Integrate medium term actions with the Local Planning Strategy

The CUSP *Interim/Summary Report on Google Earth Results* highlights *policy learning* and suggests a "focus on the more detailed planning, policy and engineering implications of, for example, what is actually involved in large-scale protection or retreat" (ANNEX 6 p.25). Medium-term actions may also require some reshaping to 'mesh' with the Purpose and Themes in CoBusselton's forthcoming Local Planning Strategy, which is likely to be released within this Phase 2 timeframe. These excerpts from the working draft are noteworthy:

2.0 Purpose

The purpose of this local planning strategy is to: set out the long-term (30 years-plus) planning direction for the District of the City of Busselton; and provide an over-arching, strategic rationale for decisions related to the planning and development of the district...

8.0 Theme 4: Environment and landscape

8.2 Theme 4 strategies

f) Develop a comprehensive, long-term approach to address issues related to coastal erosion and coastal flooding risk.

9.0 Theme 5: Implementation and review

9.2 Theme 5 strategies

d) Develop and implement integrated plans within 5 years of adoption of the strategy as follows –

iii. A comprehensive, long-term coastal adaptation strategy to address issues related to coastal erosion and coastal flooding risk, which is reflected in an integrated way in the local planning scheme, as well as the City's infrastructure and financial planning, and which will protect urban areas from coastal flooding and coastal erosion, or provide for managed retreat from vulnerable areas.

6.2 Commission detailed engineering studies of adaptation options for the coast

This medium term action flows from the concept strategy in the Framework i.e. ‘Facilitate clearer understandings of adaptation options and costs’. Busselton Jetty, Observatory and foreshore precinct, Dunsborough CBD and foreshore, and Port Geographe and marina are obvious focal points but the medium term actions should also foster a wholistic understanding of options and costs along the Busselton coast. Seek co-funding from state and national government departments relevant to each hotspot.

6.3 Concomitant costing of options

In particular, CoBusselton requires studies of:

- a) a costed long-term strategy for the whole coastline e.g. a comprehensive program of ‘soft defense’ options (i.e. geotextile and beach nourishment) vis-à-vis ‘hard defense’ (i.e. sea walls)
- b) costs and benefits of options for ‘managed retreat’ from coastal erosion and ‘accommodation’ of coastal and estuarine inundation

These studies need to be undertaken prior to further engaging communities and stakeholders in meaningful considerations of what they should hold onto, and what they should let go. Local business communities and investment sectors will act to minimize their risks to profits and investments but they won’t act unless/until price signals and/or regulatory signals including land use planning and development control regulations force their hand⁶. CoBusselton and the PNP can play a key role in coupling these signals. Note that high quality hazard lines and options costs underpinned successful community engagement processes in the City of Clarence case study.

6.4 Facilitate specific-purpose workshops to fill information gaps

Iteratively build on the pilot mapping workshop outcomes. Invite experts to address the knowledge gaps revealed in the workshop. Provide detailed information to increase communities’ levels of understanding of what the options in the *coastal decision-making hierarchy* - avoid, retreat, accommodate, soft protection, hard defense - mean to them in terms of managing hazards, risks and impacts. Outputs of the detailed engineering study and the study of costs and benefits options can be related to communities’ identified sustainability hotspots and cherished places.

These follow-on workshops can inform the design of a wider communication campaign to better inform communities of the climate risks that now ‘stare us in the face’ including rising ocean temperatures. Global warming signals for the last decade are stronger in oceans than land surface temperatures and keep foremost in mind that oceans drive climate and weather cycles⁷.

6.5 Facilitate scenario planning workshops based on the detailed studies

Introduce communities to participatory scenario planning methods, to help them get their heads around the complex issues presented in the detailed engineering study and the study of costs and benefits options⁸. Build on preceding workshop outcomes by taking scenario planning participants and thought leaders to further informed considerations of flexible adaptation pathways, in the context of the forthcoming Local Planning Strategy, and management implications.

6.6 Coordinated policy development

Develop a coastal adaptation policy that gets across local planning frameworks and other State legislation that must be reconciled with SPP 2.6. Align with state and national regulatory frameworks to underscore risk minimization in land use planning. And align with national perspectives in Climate Adaptation Outlook: a Proposed National Adaptation Assessment Framework (refer to Appendix E).

6.7 Accompanying professional development actions

- i. Initiate multi-stakeholder professional learning/community of practice events for local and state governments and agencies including Regional Catchment Councils e.g. host an EIANZ Learning to Adapt event or equivalent
- ii. Foster ‘sister Council’ and regional organization relationships including:
 - Mornington Shire Peninsula Council to garner their expertise in facilitating ‘Community Conversations’
 - Hunter and Central Coast Regional Environmental management System (HCCREMs)
 - Southeast Councils Climate Change Alliance (SECCA)

7. POTENTIAL FUTURE STEPS FOR CITY OF BUSSELTON AND PNP

Phase 3 - 5 years onwards

Evaluate the outcomes of Phases 1 and 2 to review this suite of potential future steps, and to identify other potential options that have emerged 'during the journey' towards improved community awareness and stakeholder engagement. Potential future steps could include the following options.

7.1 Develop a Coastal Sustainability Scorecard

Initiate community based monitoring inputs to development by CoBusselton of an online Coastal Sustainability Scorecard and reporting tool, modeled on the project undertaken by Cairns Regional Council – refer to this case study in the ACCARNSI Stage 1 Report: Case Studies of Climate Change Adaptation Tools and Application Processes used by Local Government Practitioners, and the accompanying Portfolio (publicly available to download from the ACCARNSI website <http://www.nccarf.edu.au/settlements---infrastructure/>)

7.2 Involve communities in developing risk management frameworks for hotspots

Pick up on key themes and ideas for engaging communities in building up their disaster resilience (e.g. refer to 'Sharing Responsibility for Implementing the National Strategy for Disaster Resilience (NSDR)': outputs from multi-stakeholder workshop at UNSW, 13 March 2013)

7.3 Work towards resolving social equity issues

Settling discussions on social equity issues at each hotspot will not be easy. We can anticipate some protracted community debates about who is going to pay e.g. for beach nourishment, and when? Nevertheless, this is a discussion that will have to be had many times, in order to move towards optimum resolution. Statements by participants from the pilot mapping workshop provide helpful pointers towards resolutions.

8. OUTLINE OF AN INBUILT MONITORING AND EVALUATION FRAMEWORK

This broad brush outline provides CoBusselton and the PNP with some early guidance on monitoring and evaluating the achievement of intended outcomes of this pilot Plan especially the short-term actions, to identify:

- which have gained the best traction and value for money;
- whether and how *intended* outcomes are being achieved;
- and draw attention to *emerging* outcomes that warrant pursuing.

Key focus areas for the development of a Monitoring and Evaluation Framework for this pilot Plan are likely to include:

- i. Gauge the take-up and understanding of new information and knowledge on coastal hazards, relating to each of the sustainability hotspots, among communities of place, interest and practice.
- ii. How people respond to hazard impacts on areas behind the coastal fringe, notably the Vasse-Wonnerup estuary and wetlands, and the Broadwater.
- iii. Note who is prepared to test prioritised response options on their private or commercial properties and assets. This will be an ‘acid test’ for answers from the private sector to three of the questions posed in the Adaptation Pathways component of the pilot mapping workshop:
 - a) Where we choose to protect the coast with engineered responses, whom are principal beneficiaries of protection?
 - b) Who should pay?
 - c) When should payment occur?
- iv. Quarterly snapshots and interim *real time* reviews of progress – refer to the evaluation methodology described in section 2.

Appendix A: Showcasing three Councils' exemplary approaches to Community Engagement

Approaches to engaging their communities taken by three Councils – City of Clarence in Hobart, City of Port Adelaide Enfield, and Mornington Peninsula Shire Council - are especially relevant to the issues and challenges facing CoBusselton and the PNP. These Councils presented their communities with the best currently available scientific and technical information on coastal climate change impacts, as the basis for generating meaningful considerations of response options and developing trusted relationships. Excerpts are presented below to provide guidance that CoBusselton and the PNP can take on board, and encouragement that you are not journeying alone.

City of Clarence - Integrated Assessment of Climate Change Impacts and Adaptive Responses on Clarence Coasts

This project is unique in its integrated approach incorporating community preferences and risk communication, and its objective to avoid sterilising development in coastal areas. In Phase 1, a Social and Economic Risk Assessment investigated social, cost-benefit and institutional factors. Stakeholders included representatives from the real estate, planning, legal and insurance sectors. In Phase 2, a Scientific/Technical Risk Assessment, detailed spatial mapping of erosion and recession hazard lines, and potential inundation areas, was undertaken by the Water Research Laboratory (WRL) at the University of New South Wales.

In Phase 3, an Integrated Assessment Report proposed next steps including Planning Scheme amendments. In addition to a *Sea Level Rise and Storm Surge* overlay the proposed Planning Scheme Amendments included:

- amendment of the "Subject to Inundation" overlay to include coastal inundation;
- new "Coastal Erosion" overlay.

Key messages communicated to stakeholders and residents

A special edition newsletter *Climate Change Impacts on Clarence Coastal Areas: Sea Level Rise* (2009) communicated key issues from the Integrated Assessment Report. Council was very forthright and addressed areas of concern such as property values, Council's statutory obligations, issues for existing owners and issues regarding development applications. It stipulated that a program of adaptation initiatives will be undertaken subject to funding over the next 25 years but after 2034 *coastal property owners will be expected to bear more of the cost burden*. The newsletter can be accessed via http://www.ccc.tas.gov.au/webdata/resources/files/CCC_News_Special_Edition-FINAL.pdf

Adaptive learning

For the Community, a key learning has been that they can trust their Council to provide a high quality product - hazards maps, reports on local vulnerabilities, Response Activity Plan etc.

City of Port Adelaide Enfield - localised metropolitan flood risk assessment: spatial mapping and risk/adaptation costing

In 2004 the City of Port Adelaide Enfield commissioned a Flood Risk Management Study to identify the seawater and stormwater flooding risks related to future sea level rise and to develop and implement an inter-governmental strategy to address the vulnerable areas of the City. Council is also very aware of existing tidal seawater flood vulnerabilities when king tides occur concurrently with storm events to cause inundation from Port Adelaide River.

The primary outputs of Phase 1 were spatial maps illustrating vulnerability, damage estimates to residential property, preliminary suggestions for measures to reduce vulnerability, and estimated

costings. The issue of releasing information in a study like this is complex. Council considers it has a responsibility to make accessible to the public information regarding *current* flooding risk so that residents can make informed decisions. However as sea level rise projections are based on future scenarios, Council's responsibility or 'duty of care' in regard to publicising results of these studies is less clear, and the use of the information by land owners or developers may be subjective.

Council decided to release all maps to the community and the media as a Phase 1 project output and flagged that it would further investigate adaptation strategies in Phases 2 and 3. The main response from the community was "Good on you, this is something we need to know". The release of the spatial maps did not cause panic in the community and had no recognisable effect on property values. They enabled Council and the community to develop a stronger appreciation for the issues associated with climate change, as they could visualise the direct potential impacts in their area.

Mornington Peninsula Shire Council – *Community Conversations*

http://www.nccarf.edu.au/localgov/map/list?type%5B0%5D=case_study&field_state_tid>All

Over the past decade Mornington Peninsula Shire Council has been preparing for the potential impacts of climate change. Community engagement has underpinned its approach to building resilience. In 2008 Council commenced a series of climate change 'Conversations' with the community, which informed its action plans.

Prior to launching the 'Community Conversations', Council produced an information kit titled "*Climate Change: what are we doing about it*". It presented scientific evidence from a study of the climate change impacts on the Western Port Region, which Council undertook with the South East Councils Climate Change Alliance (SECCA) and CSIRO. This study gave good "street credibility" to the Conversations. This process also worked well because it 'hooked' the community at precisely the right time when interest and concern about climate change impacts was at a peak. Council put a lot of energy into making the Conversations attractive, which paid off. Over 3,000 participants discussed their concerns and identified their barriers to behaviour change.

Moving forward, Council is incorporating these key lessons:

- Leverage community involvement within 6 months of all further Conversations. Be prepared to move quickly to enable the momentum generated at community meetings to be maintained.
- Firmly encourage the community to undertake their own adaptation actions in homes, schools, businesses and other organisations, rather than let Council be the main instigator. This would involve taking on enabling and catalytic roles (similar to Landcare and Coastcare coordinators).
- The majority of participants in the Conversations have been in the over 50s cohort. Tailor communication strategies and engagement activities that are socially inclusive. Embrace social media to attract a younger cohort, with a sharper focus on empowering social networks to initiate their preferred actions.

Appendix B: Developmental Evaluation and Climate Change Adaptation

The *Developmental Evaluation* approach (Patton 2008, 2010; Rogers & Funnell 2011) supports collaborative decision-making enterprises and continuous improvement. It is especially suited for evaluating sustainability and climate change pilot programs. The evaluator plays a key role in facilitating *evaluative thinking* skills among decision-makers and stakeholders. These roles include sense making and reality testing, and providing evaluative feedback to decision makers in *real time*.

The Developmental Evaluation methodology also applies complexity concepts that include *resilience thinking* (Gunderson and Holling 2002), *ecological systems dynamics* (Capra 2005), *recursive logic loops* rather than linear logic, and the *precautionary principle* (Harding et al 2009). These concepts and methods underpin *Social Learning for Sustainability* (Wals et al 2007) and other transdisciplinary approaches to integrated management of ecological-social systems and resources (Harding et al 2009).

There are five applications of the Developmental Evaluation methodology in framing climate change adaptation policies, piloting innovative programs, and scaling-up for wider implementation or full roll out:

Five applications of the Development Evaluation approach:

- i. *Ongoing development* to adapt a policy, strategy, program or another kind of innovation to new conditions or contexts in dynamic systems.
- ii. *Adapting effective principles to a local context*, as ideas and innovations are taken from elsewhere and developed into a new setting by a combination of bottom-up and top-down drivers.
- iii. *Pre-formative development of a potentially broad-impact, scalable innovation*, to a point where it is ready for traditional formative and summative evaluation methods.
- iv. *Major systems change and cross-scale developmental evaluation*, providing feedback on where, how and why an innovation needs adjusting to optimize impact.
- v. *Developing rapid responses to extreme weather events, natural disasters, epidemics and financial meltdowns* – catastrophic bushfires, floods and storm events, prolonged heat waves, earthquakes, tsunamis... (Adapted from Patton 2010: 194-5)

Provisional findings on policy/program implementation strategies are presented to decision-makers in *real-time* i.e. as they emerge and in context rather than waiting for conclusive findings on whether intended outcomes were delivered, from an end-of-program evaluation. Developmental evaluation also contributes to the *formative* stage of evaluating policy/program piloting and scaling up for full delivery. A mandated *summative* evaluation, set within a prescribed timeframe, brings rigour and accountability to the final stage of policy or program review.

Real Time evaluation

"The purpose of real-time reporting is to position the evaluation to inform ongoing decisions and strategy. True real-time reporting requires more than providing feedback at regular intervals. It means giving feedback quickly after a significant event or action occurs... evaluators very literally expect the unexpected and reserve part of their evaluation design for "rapid response research." These methodologies are not planned up front but are designed and implemented as needed to address emerging strategy-related questions." (Heather Wiess, The Harvard Exchange, XIII (1) Spring 2007: pp. 1-3)

Appendix C: What is Social Learning for sustainability and climate change adaptation?

Social learning is concerned with the ways in which different people or communities engage with each other to understand, challenge and influence the direction of social and environmental changes; and how communities understand themselves and their place in a changing world.

These learning processes support communities to adapt their traditions, assumptions, beliefs, systems of social organization and approaches to problem solving in order to deal with external threats including climate change, extreme weather events or global financial crises) and achieve particular objectives.

Social learning for sustainability has gained international recognition as an effective practice-based approach for improving human relations with natural environments (the social-ecological nexus), and contextualizing key challenges including climate change, population growth and natural resource depletion. It is central to adaptive management of natural resources including water catchments and biodiversity conservation.

Sustainability and climate change adaptation ultimately depend on our capacity to learn together and respond to changing circumstances in social-ecological systems of complexity, connectedness, controversy, multiple perspectives, risk and uncertainty (*Pahl-Wostl, Sendzimir et al 2000; Harding et al 2009*).

Climate change adaptation requires transformations in the social, economic, ecological and cultural values that underpin adaptive learning processes; and social learning can play a significant role in supporting those change processes.

Equitable learning partnerships combine expertise from local communities, professionals, and stakeholders with different perspectives and power bases. They are facilitated to meet in forums or *discourse arenas* to shared concerns, resolve conflicts, learn collaboratively and make collective decisions for concerted action.

Two focal points for facilitating social learning are recognition of stakeholder perspectives and negotiation with their interests, concerns and aspirations: What do these people want to know and learn? And how they can best achieve their learning aims? These focal points represent *empowerment* – they mark a shift of power away from experts and external agents deciding what stakeholders should know, and how they should learn (*Wals et al 2007:19*).

Wals, A, (ed) *Social Learning towards a Sustainable World: principles, perspectives, and praxis*, ch 9:181–194, Wageningen Academic Publishers, Netherlands.

Pahl-Wostl, C., Sendzimir, J., Jeffrey, P., Aerts, J., Berkamp, G, and Cross, K. (2007), Managing change toward adaptive water management through social learning, in *Ecology and Society* 12(2): 30. Accessed on August 21st 2008: <http://www.ecologyandsociety.org/vol12/iss2/art30/>

Appendix D: ACCARNSI'S Notes From Post Workshop Debriefing at City of Busselton – 13 July 2013

ACCARNSI's 4 initial issues for discussion (identified prior to debriefing):

1. Clarify Paul's and Joanne's anticipations for the ambit, purpose and outcomes of the Pilot Community Awareness Plan. Key question is 'Where to, for CoBusselton, in the next 12 to 18 months?

2. How best to use the key outputs from the participatory mapping – the hot spots, 'cherished places' and *emerging options* - for:

- iv. informing and guiding Council's and PNP's decision-makers"
- v. leveraging further community awareness of the hot spots and cherished places, and further engagement with emerging options

Example: the Broadwater and Vasse Wanerup wetland is a Ramsar listed breeding site. Should it remain an artificially created freshwater wetland as anticipated future sea levels rise? Or return to its original ecosystem dynamics as a brackish estuary, by removing or deciding not to raise the sluice gates?

3. What further hazard mapping options best suit Council and PNP?

- do we hold off final decisions until detailed hazard maps and costings are produced?
- how can we develop a Pilot Plan to make the community aware and engaged, in the absence of hazard lines on local scale maps that are credibly evidence based, meaningfully costed, and defensible in planning assessment processes and courts?

4. What kinds of 'awareness' do Paul (representing CoBusselton) and Joanne (representing PNP) prefer us to promote? For example, Mornington's *Community Conversations*?

REFLECTIONS, AGREEMENTS AND EMERGENT THEMES/ISSUES

1. Community and key stakeholders clearly need further information on the hierarchy of options in the Draft SPP 2.6.

And they need correlating deeper knowledge/ increased levels of understanding of what these options mean in the contexts of their identified hotspots and cherished places

Ron Cox: People need to be given better understandings of what 'retreat' and 'beach nourishment' mean – and all of the other options in SPP 2.6

2. Unpack and define the identified hotpots and the emerging adaptation pathways.

Structure and communicate the workshop outputs around:

- i. Social learning for sustainability
- ii. Implications for adaptive management options
- iii. Policy learning for decision makers in CoBusselton, PNP, WA Govt departments (James Duggie, Vivienne Panizza, Karl Ilich, Simon Rodgers) and agencies including South west Catchment Council

Paul Needham: I am ultimately interested in developing good public policy, and identifying and applying solutions!

Laura stocker: In follow-on studies and community engagement processes, we could further drill down into:

- costs and benefits of the emerging options
- engineered responses and their relative advantages
- predicted changes in rainfall trends and catchment management issues impacting on the Broadwater and Vasse wetlands

3. Leverage the social learning, energy, enthusiasm and key outputs generated in the workshop.

Acknowledged that the workshop was an intense social learning for sustainability experiences, for all participants. How best to leverage and continue this? Cannot just let the energy and enthusiasm fade away, as if the workshop was a one-off event.

Could sustain the momentum in follow-on processes including:

- i. 'stage 2 workshop' that takes the same set of participants to higher levels of information and deeper awareness of adaptation options and management implications
- ii. fieldtrip enabling *in situ* studies of 3 topmost hotspots

4. Key aims of the Plan for the next 12⁺ months are to take local communities and key stakeholders closest to cherished places and hotspots to the next stages of iterative awareness and adaptive learning/management.

Tie the communication of key workshop outputs and ongoing awareness activities into best social/cultural events including:

- 'Sculptures by the Sea' at Dunsborough
- Bushfire Expo
- Curtin Uni Artists Camp

Foster 'sister Council' and sister regional organization relationships including:

- CoB and Mornington Shire Peninsula Council to garner their expertise in facilitating 'Community Conversations'
- PNP and Hunter and Central Coast Regional Environmental management System (HCCREMs) – refer to Adaptation Good Practice Case Study
- PNP and Southeast Councils Climate Change Alliance (SECCCA) – refer to Adaptation Good Practice Case Study

Appendix E: Aligning with the Climate Adaptation Outlook: a Proposed National Adaptation Assessment Framework (DIICCSRTE, August 2013)

Summary of what good climate change adaptation would look like in the coastal zone

Good drivers of adaption in the coastal zone include:

- mechanisms are in place for jurisdictions to cooperate on promoting good adaptation in the coastal zone
- coastal planning frameworks take a risk management approach, involve the community, are based on adequate underpinning science, clearly articulate values to be protected in the long term, are developed within a strategic planning framework and provide legal protections for decision-makers acting in good faith based on sound science
- codes, standard and guidelines for the design of coastal buildings and other infrastructure assume a changing climate.

The adaptation activities that should be happening now in the coastal zone include:

- taking coastal climate risks (including sea level rise and more intense storm surge) into account in land use planning, development controls and plans for major infrastructure
- identifying 'hot spots' with concentrations of economically, socially and environmentally important assets at risk from rising sea levels and developing collaborative strategies to manage climate change risks to them
- developing the specialised information and skills required to manage climate change risks in the coastal zone.

Good adaptation outcomes will be achieved in the coastal zone if:

- development in the coastal zone provides social, economic and environmental benefits without creating risks from sea level rise and storm surge that are unacceptable to the

ENDNOTES

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⁴ Dyball, R, Brown, V and Keen, M, (2007) 'Towards sustainability: five strands of social learning', in Wals, A, (ed) *Social Learning towards a Sustainable World: principles, perspectives, and praxis*, ch 9:181–194, Wageningen Academic Publishers, Netherlands.

⁵ Wenger, E, (1998) *Communities of Practice: Learning, Meaning, and Identity*, Cambridge University Press, UK.

Wenger, E, "Communities of practice: learning as a social system" *Systems Thinker* <<http://www.co-i-l.com/coil/knowledge-garden/cop/lss.shtml>> Accessed 9 October 2012

⁶ Keynote presentation by Gerry Heuston, business sector representative on the Climate Commission, at EIANZ Learning to Adapt 5, a professional development workshop facilitated at UNSW, 1st August 2013

⁷ Keynote presentation by Kevin Hennessy, CSIRO principal climate change scientist, at EIANZ Learning to Adapt 5, a professional development workshop facilitated at UNSW, 1st August 2013

⁸ [Jones, R. \(2010\) The use of scenarios in adaptation planning: managing risks in simple to complex settings](#)
(Victorian Centre for Climate Change Adaptation Research, Critical Perspectives Working Papers)



CURTIN UNIVERSITY SUSTAINABILITY POLICY INSTITUTE (CUSP) ANNEXES

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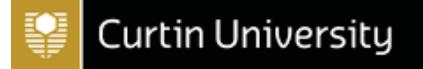
Annex 2: Google Earth participatory mapping workshops (overview)

Annex 3: Google Earth Mapping Workshop – City of Busselton Friday 12 July 2013 (methods and processes)

Annex 4: Workshop Participants Survey Questions

Annex 5: *Report on Community Feedback* about ‘Community Awareness of Coastal Adaptation to Climate Change in Busselton’ Workshop

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Community Awareness of Coastal Adaptation to Climate Change in Busselton

Location: Busselton Council Chambers, 2 Southern Dr, Busselton WA 6280

Workshop presented by: City of Busselton, Peron Naturaliste Partnership, Curtin University and CSIRO Coastal Collaboration Cluster

Our collaborative objective for the day is to develop shared understandings about the impacts of climate change on Busselton's coasts and waterways, and to develop pathways forward. We will use Google Earth to map participants' ideas. The results will contribute to ongoing climate change and adaptation planning by the City of Busselton, Peron Naturaliste Partnership (PNP) and to the research findings of Curtin University and the CSIRO Coastal Collaboration Cluster.

Workshop Program

9am	Registration and surveys
9.15am	Welcome: Mr Paul Needham (City of Busselton)
9.20am	Workshop opening: Dr Laura Stocker (Curtin University)
9.30am	Overview of Busselton's coastal management and adaptation: Mr Paul Needham (City of Busselton)
9.40am	Coastal Management in the South West of Western Australia: Mr Blair Darvill (South West Catchment Council)
9.50am	Indigenous Perspective: Mr Wayne Webb (Wardandi Community Representative)
10am	Workshop process and coastal adaptation principles: Dr Laura Stocker
10.10am	Icebreaker
10.20am	Google Earth participant mapping activity: Places of Importance
10.45am	Plenary
11.00am	Morning tea
11.10am	Specialist talks and visualisations <ul style="list-style-type: none">• Coastal planning and climate change: Dr Garry Middle (WA Planning Commission)• Hazards and impacts of climate change and sea level rise: Mr Karl Ilich (Department of Transport)• Coastal Adaptation Pathways: Mr Craig Perry (PNP)
12.10pm	Panel discussion: Questions and answers
12.30pm	Google Earth participant mapping activity: Concerns
1pm	Lunch
1.30pm	Plenary
2.00pm	Google Earth participant mapping activity: Strategies and Actions
2.45pm	Afternoon tea
3.00pm	Plenary
3.45 pm	Surveys
4.00 pm	Workshop closes: Thank you.

Contact: Associate Professor Laura Stocker, Curtin University Sustainability Policy Institute, phone 9266 9034 or email L.Stocker@curtin.edu.au

or

Angeline Dewson of this office on 9781 0474 or angeline.dewson@busselton.wa.gov.au

Google Earth participatory mapping workshops

A/Prof Laura Stocker, Curtin University Sustainability Policy Institute

Introduction

The aim of the Google Earth workshops is to develop shared understandings about the impacts of climate change on the coast and to develop coastal adaptation pathways for specific locations.

The mapping process helps locate key sustainability ‘hotspots’ that provide a basis for interpretation and discussion. Being graphical, it incorporates diverse knowledge, perception, language and communication capacities. It can be applied at many geographical scales, across time frames, and in a wide variety of situations by a diversity of people with or without conventional literacy skills.

Participants should be seated in six groups of six, each with a facilitator and GE scribe. At each table there will be a laptop loaded with GE and an A1 laminated map of the LG area with four A1 clear plastic transparencies.

The workshop should begin with a Welcome from the Mayor and an Indigenous Elder if possible. This can be followed by an icebreaker about the coast, eg first memory of the local coast.

Workshop stages

The workshops are comprised of four stages:

1. Important places, their attributes and uses

Participants in groups are asked to identify important coastal places, their attributes and uses. On the physical base map they use a series of four plastic overlays to work through, respectively, the ecological, social, cultural and economic uses and attributes of important places in their zone. The definitions of the four layers are:

- Economic Layer: includes places where people earn or spend money; all phases of the life cycle of production/consumption/waste disposal.
- Social Layer: includes places where people meet, ‘belong’, or organise to meet their needs.
- Ecological Layer: includes places that have natural ecosystem values or that protect ecosystems.
- Cultural Layer: includes places of where people make or express meaning.

The scribe then enters this information using the same layers in Google Earth. At the end of this stage, the groups shared their findings in a plenary session.

By placing the four transparent layers on top of each other, or by turning on all four layers in Google Earth, the participants can see that there were certain areas where

there is activity in several of the layers. These areas were designated Sustainability Hotspots and they became the focus of the subsequent mapping exercises.

2. Specialist speakers

We use specialist speakers who can respond explicitly to the workshop frame of sustainability and climate change, from state and local perspectives, and from the coastal and governance angle. Specialists present a series of short talks on sustainability principles, climate change scenarios and likely climate impacts for the local coast. Key climate change trends and projections for the southwest of WA include: warmer and drier conditions, rising sea levels, and more extreme events such as storm high tides. These will also make coasts more vulnerable to erosion and ground water changes.

3. Concerns

At this stage, using the maps and Google Earth at the tables again, participants are guided by a set of questions in which they were asked to identify and discuss any concerns about each hotspot. These questions are:

- What is the impact/threat you are concerned about?
- What is affected?
- Who is affected?
- What changes are irreversible?
- What changes and risks are high priority?

The scribe at each table records participants' responses to the questions in Google Earth, in a new Concerns Layer. The concerns they raise are about climate change and a variety of other pressures. The concerns are derived from specialist talks and from participants own experience as stakeholders.

A spokesperson for each table reports their findings back to a plenary session.

4. Adaptive strategies

At this stage, once again at the tables with maps and Google Earth, participants identify adaptive strategies and actions that could be taken to ameliorate causes of concern at each hotspot. The scribe at each table records the participants' responses in Google Earth, creating a new Adaptive Strategies layer. Adaptive responses can be technical, educational or strategic in nature.

A spokesperson for each table reports their findings back to a plenary session.

In the post-workshop analysis phase, the Google Earth maps from the various groups are collated into a single map. Data are subsequently entered into a relational database using Filemaker Pro for theming and analysis.

Google Earth Mapping Workshop

City of Busselton: Friday 12 July 2013

1) Important Places

For each Placemark, use the name of the place as the Title; then enter the detailed response under Description. Use the designated icon.

- a) **Social Layer** (Red phone icon): Where are the places where people get together, ‘belong’, or organise to meet their needs? Consider the hospital, police station, library, pub, bike racks, bus system, ferry jetty, accommodation, boating, fishing, picnicking and other recreational sites.
- b) **Economic Layer** (Yellow dollar icon): Where are the places where people earn or spend money? Consider all phases of the life cycle of production/consumption/waste disposal; critical infrastructure (sewerage, water, electricity, waste management, transport), shops, ferry terminal, bus tours, farms, tourism destinations/operations.
- c) **Ecological Layer** (Green tree icon): Where are the places that have natural ecosystem values or that protect ecosystems? Consider beaches, bush, recycling plant, wind turbines etc.
- d) **Cultural Layer** (White cup icon): Where are the places of special meaning? Consider Indigenous sites, historical sites, performance areas, museums, galleries, pubs, interpretation.

Some features, say a favourite beach, a recycling station, an Indigenous cultural centre, or a transport hub, will come up under more than one layer. This is an expected, indeed a key, part of the mapping exercise as points to the interaction of multiple types of value and hence towards sustainability. The places that show importance in 3-4 layers we will label **Sustainability Hotspots**. These will be marked with a Yellow sun icon and these hotspots will become the focus of the mapping exercise for the rest of the workshop.

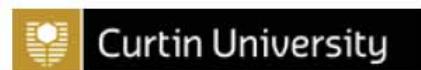
2) Concerns about Impacts of Climate Change on Sustainability Hotspots

Having received information about the impacts of climate change on the Busselton coast, we now deliberate on our **concerns** for the Sustainability Hotspots we mapped in stage 1. For each Hotspot, please consider the following questions:

- a) Social – how will climate change affect our ability to ‘get together’, ‘belong’ and ‘organise to meet our needs’ in Busselton? How will it affect our social lives?
- b) Economic – how will climate change affect our infrastructure? How will it affect people’s ability to make a livelihood? How will it affect land values and property markets?
- c) Ecological – how will climate change affect biodiversity conservation and ecosystem health along the Busselton coast? How will it affect our ability to protect these features?
- d) Cultural – how will climate change affect cultural character?

3) Adaptation Pathways for the Busselton Coast

- a) What are the best ways to manage the sustainability hotspots we have identified along the coast?
- b) What are the costs and benefits of allowing nature to take its course?
- c) Where we choose to protect the coast with engineered responses, whom are principal beneficiaries of protection?
- d) Who should pay?
- e) When should payment occur?
- f) How do we deal with the ongoing process of continual uncertainty about sea level rise, coastal erosion and flooding?



Community Awareness of Coastal Adaptation to Climate Change in Busselton
Location: Busselton Council Chambers, 2 Southern Dr, Busselton WA 6280

Workshop presented by: City of Busselton, Peron Naturaliste Partnership, Curtin University and CSIRO Coastal Collaboration Cluster

Workshop Participants Survey

**Thank you for completing this survey.
The results will contribute to our research and help us assess how well
we presented the workshop.**

Morning Survey

You and the workshop	Comments
What is your main occupation?	
What is your age group (Please circle)	<20 20-29 30-39 40-49 50-59 60-69 70+
What was your motivation for coming to this workshop?	
Sex? (Please circle)	M F
What do you hope to gain from today's workshop?	

Your pre-workshop self-assessment

Questions	Very low	Low	Avg	High	Very High
Please rate your knowledge of the impacts of climate change on the coast.					
What are your specific areas of knowledge?					
Please rate your level of concern about the impacts of climate change on the coast. What are your topmost areas of concern?					

Questions	Very low	Low	Avg	High	Very High
Please rate your level of active involvement in coastal adaptation to climate change? What specific activities have you been involved in, if any?					

Your views about the coast

Do you consider the coastal zone to be: (please tick as many as appropriate)					
Under increasing human pressure		Resilient			
Unpredictable		Adaptive			
Fragile		Able to be protected/managed			

The best way of solving our coastal problems is:	Strongly Disagree	Dis-agree	Not sure	Agree	Strongly Agree
For governments to take a strong leadership and coordination role					
To allow market forces to find the most efficient technological/innovative solutions					
To involve a wide range of stakeholders including the community					
To let nature take its course and minimise human interventions					
To take a sustainability perspective by balancing economic, social and environmental objectives					
To lessen human pressures & change human behaviours					

Your views on climate change (provide specific sources if possible)

My views on climate change are based on:	Strongly Disagree	Dis-agree	Not sure	Agree	Strongly Agree
My political and moral values.....					
My intuitions.....					
Scientific evidence.....					
Workplace ideas.....					
Family ideas.....					

My views on climate change are based on:	Strongly Disagree	Dis-agree	Not sure	Agree	Strongly Agree
Media.....					
Other.....					

Afternoon Survey

You and the workshop	Comments
What activities helped further develop a shared understanding of the impacts of climate change on the coast? Circle: Google Earth mapping? Group discussions? Speakers and panel? Video? Interactive online inundation tool?	
What was the highlight for you?	
What aspects of today's workshop could be improved and how?	

Your post-workshop self-assessment

Questions	Very low	Low	Avg	High	Very High
Please rate your knowledge of the impacts of climate change on the coast, now? What specific new knowledge have you gained?					
Please rate your level of concern about the impacts of climate change on the coast, now? What specific areas of concern have you now?					
What level of active involvement in coastal adaptation to climate change will you have now? What specific strategies and actions might you now focus on?					
Who else should be involved and what should they do?					

Any other comments?

.....

Contact: Assoc Professor Laura Stocker, CUSP, 9266 9034 or
L.Stocker@curtin.edu.au



Report on Community Feedback about 'Community Awareness of Coastal Adaptation to Climate Change in Busselton' Workshop

Workshop presented by: City of Busselton, Peron Naturaliste Partnership, Curtin University and CSIRO Coastal Collaboration Cluster

Date: 12th of July, 2013

Venue: Busselton Council Chambers, 2 Southern Drive, Busselton WA 6280

Report Prepared by Svetla Petrova and Laura Stocker, Curtin University Sustainability Policy Institute

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INTRODUCTION

The **Community Awareness of Coastal Adaptation to Climate Change Workshop** was organized in partnership between the City of Busselton, Peron Naturaliste Partnership, Curtin University and CSIRO Coastal Collaboration Cluster. It was held on 12th of July, 2013 at the City of Busselton Council Chambers. The format of the workshop was a combination of experts' presentations and community mapping exercises.

The workshop is the first of a series of adaptation awareness exercises designed to help build literacy about resilience towards the climate change and sea level rise issues that challenge the city's future planning.

The key objective of the workshop was to develop a shared understanding about the impacts of climate change on Busselton's coast and waterways, and to propose pathways forward. Google Earth was used as a primarily tool to map participants' views about areas of concerns and to capture their ideas for adaptive pathways.

Results will be used to contribute to ongoing climate change and adaptation planning by the City of Busselton, Peron Naturaliste Partnership (PNP) and to the research findings of Curtin University and the CSIRO Coastal Collaboration Cluster

METHODS

Participation and representation

In total, 48 people participated in the workshop. The recruitment of participants was carried out by the City of Busselton and Peron Naturaliste Partnership aiming to secure representation of various stakeholders including community groups, business, landowners, experts, government officials, youth and the broader community. Invitations were send out to 209 organizations and individuals in the Busselton area. Representatives of all stakeholder groups attended the workshop; however there was only one youth representative due to the school holiday period. The complete list of participants is presented in Appendix 1.

Experts' presentations

Seven expert talks were given during the workshop to educate the audience on recent planning and climate change issues. Speakers represented the following organizations:

- City of Busselton (CoB)
- Wardandi Community
- South West Catchment Council (SWCC)
- WA Planning Commission (WAPC)
- Department of Transport (DoT)
- Peron Naturaliste Partnership (PNP)
- Curtin University Sustainability Policy Institute (CUSP)

Participatory mapping exercises

Three mapping activities were carried out during the workshop – (1) identifying places of significance and sustainability hotspots; (2) outlining concerns and (3) adaptive pathways about the sustainability hotspots.

Google Earth was used as the primarily mapping tool for capturing the information during the three mapping sessions. Each table was equipped with a laptop and a bigger screen, so that participants were able to see and control the mapping process. Participants were also provided with a full colour A1 map of the Busselton – Dunsborough foreshore area and transparencies and coloured pens to record the outputs of each mapping activity.

Instructions to participants were provided prior to each of the mapping exercises. Additionally a set of written instructions was available at each table.

Table organization:

Participants were grouped in six groups. Each group comprised of eight people - a facilitator, a scribe and approximately six participants.

- 1) Facilitators were experts and professionals in the area of climate change adaptation and were provided by PNP. Their key role was to lead the discussion among participants and to communicate with the scribe.
- 2) All scribes were experienced with the Google Earth mapping tool and were provided by Curtin University. Their key task was to input the information from the discussion and the drawings on the transparency map layers into the Google Earth tool parallel to group discussions.
- 3) Each participant has been initially allocated to a particular table according to their background and the group they represent.

Participants were encouraged to share and discuss their views on the issues. No consensus was sought at the end of the discussion; it was important that the diversity of the views was captured.

Feedback

The experience of participants from the workshop was measured with a two-stage survey capturing their views before and after the workshop. Survey results are presented in the Survey results section below.

WORKSHOP PROCESS

Workshop Program

9:00am	Registration and surveys
9.15am	Welcome: Cr David Reid (CoB)
9.20am	Workshop opening: Dr Laura Stocker (CUSP)
9.30am	Overview of Busselton's coastal management and adaptation: Mr Paul Needham (CoB)
9.40am	Coastal management in the South West of Western Australia: Mr Blair Darvill (SWCC)
9.50am	Indigenous perspective: Mr Wayne Webb (Wardandi Community Representative)
10:00am	Google Earth participant mapping activity: Places of significance
11.00am	Google Earth participant mapping activity: Identifying hotspots
11.15am	Morning tea
11.25am	Specialist talks and visualisations <ul style="list-style-type: none">• Coastal planning and climate change: Dr Garry Middle (WAPC)• Hazards and impacts of climate change and sea level rise: Mr Karl Ilich (DoT)• Coastal adaptation pathways – hazard mapping: Mr Craig Perry (PNP)
12.15pm	Panel discussion: Questions and answers
12.25pm	Lunch
12.55pm	Google Earth participant mapping activity: Concerns
2.10pm	Afternoon tea
2.20pm	Coastal adaptation ladder: Dr Laura Stocker (CUSP)
2.30pm	Coastal adaptation pathways – costings: Mr Craig Perry (PNP)
2.40pm	Google Earth participant mapping activity: Adaptive pathways
3.40pm	Plenary
3.55 pm	Surveys
4.00 pm	Workshop closes: Thank you

Welcome

Cr David Reid, from the City of Busselton, welcomed participants to the workshop and confirmed Council's commitment to address the impacts of climate change on their coast and waterways. Mr Wayne Webb, representing the Wardandi Community did the welcome to country address and shared his and his people memories about the coast and how it has been changing over the years. Associate Professor Laura Stocker of Curtin University Sustainability Policy Institute (CUSP), acknowledged the traditional custodians of the coast where the workshop was being conducted, and highlighted that Indigenous people had been dealing with climate change for tens of thousands of years.

Overview

Paul Needham, Director of Planning and Development Services at the City of Busselton provided an overview of the changing coast of Geographe Bay between Busselton and Dunsborough and outlined key coastal management and adaptation challenges. Blair Darvill, South West Catchment Council, discussed ecological and social issues for coastal management in the South West of Western Australia.

Google Earth Participant Mapping Activity - Places of significance

Aim: To capture participants' views on the places of significance in the Busselton – Dunsborough foreshore area within four layers - cultural, ecological, economic and social.

Method: Participatory mapping

The four layers of places of significance were defined as follows:

- a. Social Layer (Red phone icon in Google Earth; red colour on the transparency map layer): Where are the places where people get together, 'belong', or organize to meet their needs? Consider the hospital, police station, library, pub, bike racks, bus system, ferry jetty, accommodation, boating, fishing, picnicking and other recreational sites.
- b. Economic Layer (Yellow dollar icon in Google Earth; blue colour on the transparency map layer): Where are the places where people earn or spend money? Consider all phases of the life cycle of production/consumption/waste disposal; critical infrastructure (sewerage, water, electricity, waste management, transport), shops, ferry terminal, bus tours, farms, tourism destinations/operations.
- c. Ecological Layer (Green tree icon in Google Earth; green colour on the transparency map layer): Where are the places that have natural ecosystem values or that protect ecosystems? Consider beaches, bush, recycling plant, wind turbines etc.
- d. Cultural Layer (White cup icon in Google Earth; black colour on the transparency map layer): Where are the places of special meaning? Consider Indigenous sites, historical sites, performance areas, museums, galleries, pubs, interpretation signage.

Outputs: Each table discussed and documented their important places on their transparencies within the cultural, ecological, economic and social layers, which were also captured by the Google Earth scribe using the designated icon within the relevant layer in Google Earth.

Outcomes: This exercise produced clear engagement and thought provoking discussion from participants. It provided a platform for participants to identify a range of places that they considered important and demonstrate a willingness to consider different places of importance for other participants.

Google Earth Participant Mapping Activity - Identifying Sustainability Hotspots

Aim: To identify the sustainability hotspots.

Sustainability hotspots were defined as places that show importance in three or more layers. They were marked with a Yellow sun cup in Google Earth. These hotspots formed the focus for the second and third part of the mapping exercise, identifying concerns and adaptive pathways, carried out in the afternoon.

Method: Participatory mapping

Outputs: Each table discussed and documented their sustainability hotspots on the transparency map layer and the scribe put the information in Google Earth using the designated icon within the relevant layer.

Outcomes: Participants identified the key places for coastal management on which they would concentrate their deliberations for the remainder of the day.

Specialist Talks

Aim: To provide the participants with up-to-date information about coastal planning and climate change, hazards and impacts of climate change and sea level rise and to outline coastal adaptation pathways, and prepare participants for the second mapping exercise – identifying concerns related to the sustainability hotspots.

Method: Experts' presentations

Three experts presented at this session

- Coastal planning and climate change: Dr Garry Middle (WA Planning Commission)
- Hazards and impacts of climate change and sea level rise: Mr Karl Ilich (Department of Transport)
- Coastal adaptation pathways – hazard mapping: Mr Craig Perry (PNP)

The talks were followed by a Q&A time.

Outputs: There were numerous questions from participants seeking clarification and more information about the impacts of climate change and sea level rise on Busselton's coasts and waterways.

Outcomes: The post-workshop surveys indicate that the Speakers and panel discussion was most successful activity that helped to generate shared understandings about the impacts of climate change on Busselton's coasts and waterways.

Google Earth Participant Mapping Activity - Identifying Concerns about Climate Change on Sustainability Hotspots

Aim: To capture participants' concerns about the impact of climate change and sea level rise on the sustainability hotspots

Method: Participatory mapping

For each Hotspot, participants were asked to consider the following questions:

- a. Social – how will climate change affect our ability to 'get together', 'belong' and 'organize to meet our needs' in Busselton? How will it affect our social lives?
- b. Economic – how will climate change affect our infrastructure? How will it affect people's ability to make a livelihood? How will it affect land values and property markets?
- c. Ecological – how will climate change affect biodiversity conservation and ecosystem health along the Busselton coast? How will it affect our ability to protect these features?
- e. Cultural – how will climate change affect cultural character and how we make meaning of our lives?

Outputs: Each table discussed and documented their concerns about the 'hotspots' resulting from climate change or other related pressures on the transparency map layer and the scribe put the information in the Google Earth using 'red exclamation mark' icon.

Outcomes: This exercise produced clear engagement and concern from participants, and appeared to provide a platform for participants to engage with climate change as a reality, and a legitimate planning priority. The post-workshop survey indicates that group discussions was ranked as the second most successful activity that helped to generate shared understandings about the impacts of climate change on Busselton's coasts and waterways.

Google Earth Participant Mapping Activity - Adaptation Pathways for the Busselton Coast

Aim: To engage the participants in a discussion about the possible adaptive pathways for the Busselton coast to address the concerns raised about the Hotspots previously identified and to capture their views about

possible solutions and management mechanisms.

Method: Participatory mapping

For each Hotspot, participants were asked to consider the following questions:

- a. What are the best ways to manage the sustainability hotspots we have identified along the coast?
- b. What are the costs and benefits of allowing nature to take its course?
- c. Where we choose to protect the coast with engineered responses, who are principal beneficiaries of protection?
- d. Who should pay?
- e. When should payment occur?
- f. How do we deal with the ongoing process of continual uncertainty about sea level rise, coastal erosion and flooding?

Outputs: Each table discussed and documented their proposed adaptive pathways about each of the 'hotspots' on the transparency map layer and the scribe put the information in the Google Earth using 'green arrow' icon.

Outcomes: This exercise produced clear engagement from participants, and appeared to provide a platform for participants to engage with climate change as a reality and a legitimate planning priority.

Plenary

At the end of the mapping sessions each table was asked to nominate a speaker and to report back to the whole group on the identified adaptive pathways for one "hotspot" of their choice.

SURVEY RESULTS: PARTICIPANTS' FEEDBACK

Participants were asked to provide their feedback on the workshop execution and their personal experience during the day by filling out a two-stage survey capturing their opinion before and after the workshop. 27 out of 36 questionnaires have been returned. This survey does not include feedback provided by scribes and facilitators as their opinion was captured with another questionnaire.

Highlights from the survey resultsⁱ are presented below.

Demographics

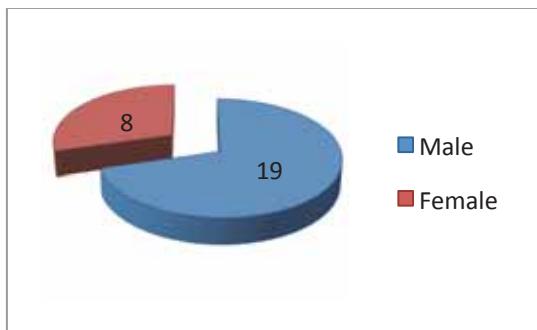


Figure 1. Gender distribution

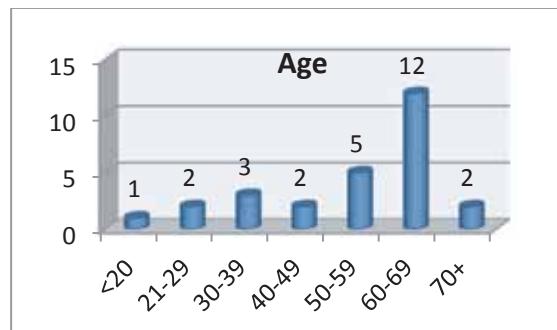


Figure 2. Age groups

The ratio of female/male participation was 30/7. Half of the people who attended the workshop were over the age of sixty years, and there was only one youth representative.

Pre and post workshop self-assessed knowledge, concern and intended/active involvement in climate change and coastal adaptation

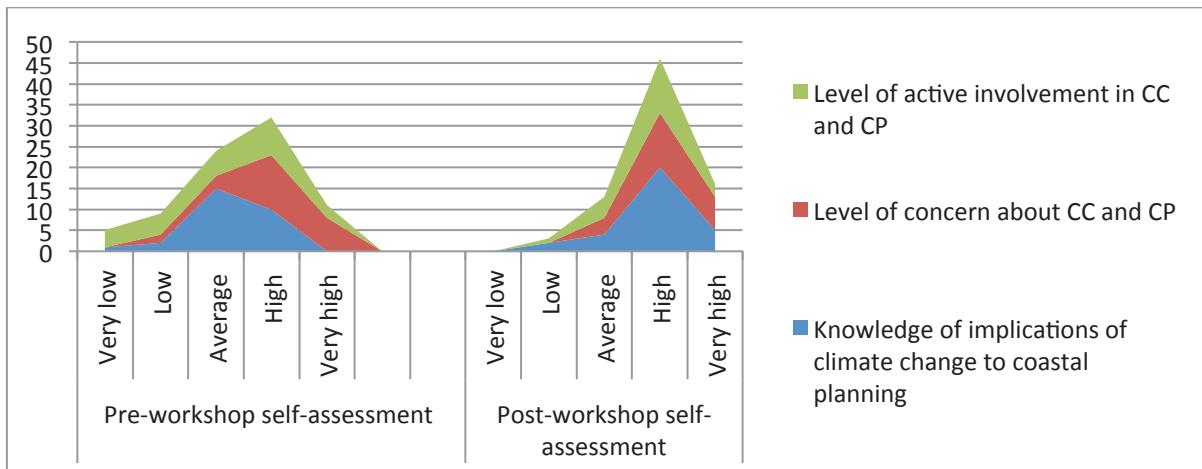


Figure 3. Self-assessment of participants' knowledge, concerns and involvement in climate change - comparative

Figure 3 represents respondents' self-assessment on knowledge, concerns and involvement in climate change and coastal adaptation before and after the workshop. The results indicate improved knowledge of climate change implications to coastal planning after the workshop, shifting from average to high. It is also evident that after the workshop the level of concern about climate change has increased. Respondents also reported higher level of intended involvement in issues related to the problems discussed at the workshop.

ⁱResults are presented in absolute numbers.

Activities that helped further develop a shared understanding of the impacts of climate change on the coast

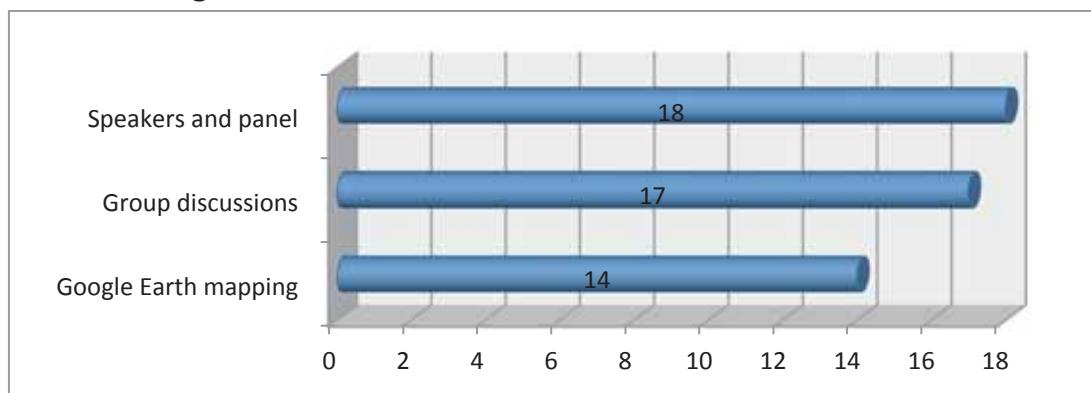


Figure 4. Activities contributing to shared knowledge development

The three main activities of the workshop – speakers and panel, group discussions and the Google Earth mapping helped participants almost equally to develop a shared understanding of the impacts of climate change on the coast. These results mirror the ranking of workshop highlights reported through the survey with experts' talks being the most noted one, followed by the mapping activities.

As a whole people provided very positive feedback on the content and the organization of the workshop and the majority of them expressed their gratitude for being given the opportunity to participate. Below are presented some selected quotations from participants' comments:

Great day – congratulations.

Running of workshop was excellent

Speakers were excellent and informative, group discussions were beneficial.

Thank you for providing the opportunity to be involved.

Congratulations on one effective forum well supported by the State representatives.

Workshop was very productive, no improvement.

Would like to see more of these workshops

Excellent presenters!

Views about the coastal zone

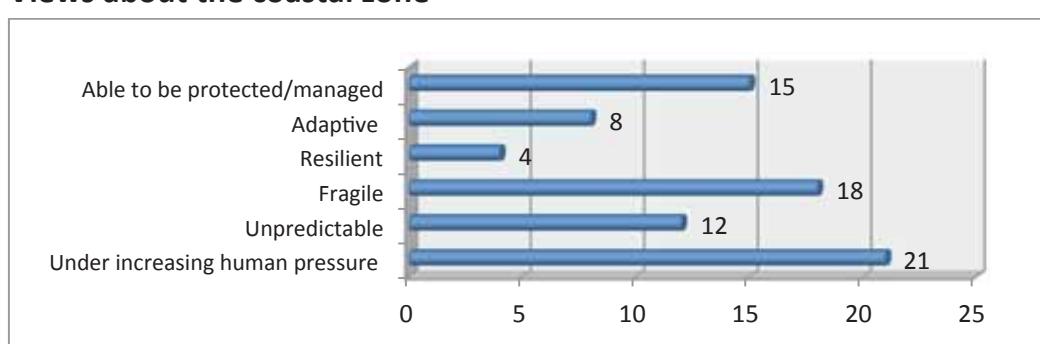


Figure 5. Views about the coastal zone

Close to 80% of the respondents believe that the coast is under increasing human pressure and two thirds think it is fragile and able to be protected or managed.

Best way to solve coastal problems

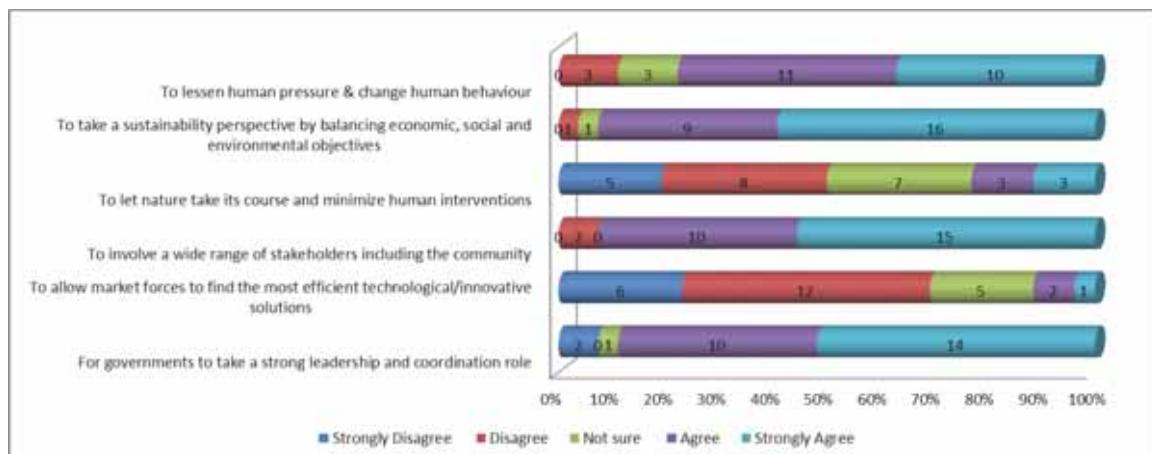


Figure 6. Ways to solve coastal problems

The majority of people believe that the best way to solve coastal problems is to take sustainability perspective by balancing economic, social and environmental objectives. The second most favoured solution suggests the involvement of a wide range of stakeholders, followed by the opinion that governments should take a strong leadership and coordinated role in solving coastal problems. Almost two thirds disagree that solutions to these issues should be left to market forces.

Respondents also expressed their desire to see the following groups and organizations involved in solving climate change related problems:

- State government; Department of Planning, Department of Transport, Climate change unit Department of Environmental Regulations; department of Water;
- Broader community, including youth and school students;
- Emergency services responsible for evacuation plans;
- Experts from overseas with similar problems.

Influences to climate change opinion formation

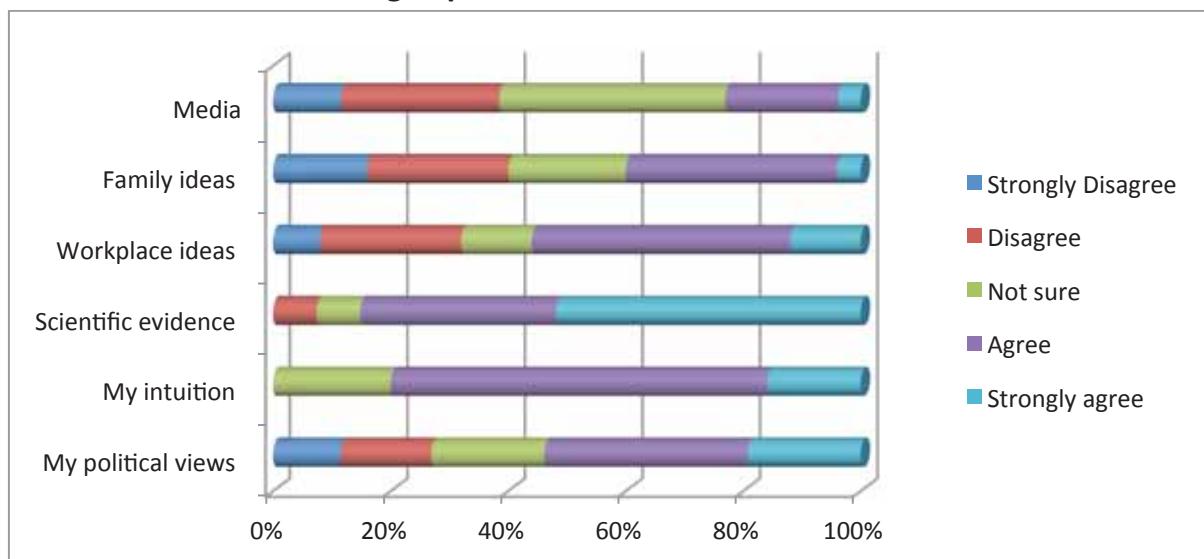


Figure 7. Influences on climate change opinion formation

People form their views on climate change issues based on three main sources – scientific evidence, their intuition and political views. Media appears to be the least popular source of information that influences respondents' opinion formation.

Things to be improved

As noted above the majority of the people were on the opinion that the workshop was excellently organized and run. However, there were a few suggestions:

- Better community representation, including youth representation;
- Larger scale of maps and more transparent layers;
- Access to the presentations and consolidated outcomes;
- More time for discussion with the experts;
- A little bit more information on what groups are to discuss to prepare participants - have some more knowledge on what to be addressed.

CONCLUSION

The **Busselton Community Awareness of Coastal Adaptation to Climate Change Workshop** met the initially set objective to help build literacy and develop a shared understanding about the impacts of climate change on Busselton's coast and water ways. This became evident through the participants' survey (see section 3 of this report), where results demonstrated shift of knowledge from 'average' to 'high'. People also declared higher level of intended involvement in climate change and coastal planning related issues in the post-workshop assessment.

The workshop was assessed by participants as a successful way of engagement that contributes to enhance the knowledge about climate change related issues in their local area. The combination of expert talks, group discussions and mapping exercises seemed to be a successful model for knowledge dissemination, community participation and engagement and community views capture. However, in order to reach larger audience, maximize the view capture and to raise awareness about climate change, a broader community representation is required.

APPENDIX 1 - List of Workshop Participants

Barbara Joan Grinsell	Land owner
Diane Binns	Land owner
Gregg Kendall Marshman	Land owner
Howard William Grinsell	Land owner
Keith Andrew Binns	Land owner
Kerry Joy Mcivor	Land owner
Novacare Busselton Village Pty Ltd	Land owner
Richard James Treasure	Land owner
Robert John Farmer	Land owner
Roger Owen Banks	Land owner
Susan Elizabeth Blond	Land owner
Charmian Terry	Busselton and Districts Residents' Association
Rep #2	Busselton and Districts Residents' Association
Rep #1	Busselton Chamber of Commerce and Industry
Alison Cassanet	Busselton Dunsborough Environmental Centre Inc
David Trescuri	Busselton Dunsborough Environmental Centre Inc
Darryl Green	Busselton Jetty Environment and Conservation Association Inc
Sophie Teede	Busselton Jetty Environment and Conservation Association Inc
Councillor David Reid	City of Busselton
Paul Needham	City of Busselton
Angela Rooney	Curtin University
Brian Peddie	Curtin University
Di Shaw	Curtin University
Goni Bruekers	Curtin University
Jenny Shaw	Curtin University
Laura Stocker	Curtin University
Svetla Petrova	Curtin University
James Duggie	Department of Environment and Conservation
Rob Grove	Department of Main Roads
Garry Middle	Department of Planning / Curtin University
Vivienne Panizza	Department of Planning
Karl Ilich	Department of Transport
DOW Rep #2	Department of Water
Simon Rodgers	Department of Water

Jacqui Happ	Dunsborough Residents' Progress Association
David Kemp	GeoCatch - Volunteer Group
Simon Taylor	Geographe Bay Tourism Association
Clive Johnson	Mandalay Holiday Resort and Tourist Park
Grant Carter	Meelp Regional Park Management Committee
Albert Haak	Meelup Regional Park Management Committee
Craig Perry	Peron Naturaliste Partnership
Jo Ludbrook	Peron Naturaliste Partnership
Phil Tickle	Siesta Park Holiday Resort
Damien Postma	SWCC
Blair Darvill	SWCC
Craig Bohm	SWCC - Coastal Manager
Wayne Webb	Wadandi Custodian
Sam Faulkner-Albanisi	Youth Representative



Interim/Summary Report on Google Earth Results from 'Community Awareness of Coastal Adaptation to Climate Change in Busselton' Workshop

Workshop presented by: City of Busselton, Peron Naturaliste Partnership, Curtin University and CSIRO Coastal Collaboration Cluster

Date: 12th of July, 2013

Venue: Busselton Council Chambers, 2 Southern Drive, Busselton WA 6280

***Report Prepared by Svetla Petrova, Laura Stocker and Gary Burke,
Curtin University Sustainability Policy Institute***

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INTRODUCTION

The **Community Awareness of Coastal Adaptation to Climate Change Workshop** was organised in partnership between the City of Busselton, Peron Naturaliste Partnership, Curtin University and CSIRO Coastal Collaboration Cluster. It was held on 12th of July, 2013 at the City of Busselton Council Chambers. The format of the workshop was a combination of experts' presentations and community mapping exercises.

The workshop is the first of a series of adaptation awareness exercises designed to help build literacy about resilience towards the climate change and sea level rise issues that challenge the city's future planning.

The key objective of the workshop was to develop a shared understanding about the impacts of climate change on Busselton's coast and waterways, and to propose pathways forward. Google Earth was used as a primarily tool to map participants' views about areas of concerns and to capture their ideas for adaptive pathways.

Results will be used to contribute to ongoing climate change and adaptation planning by the City of Busselton, Peron Naturaliste Partnership (PNP) and to the research findings of Curtin University and the CSIRO Coastal Collaboration Cluster.

The results presented in this Interim/Summary report are compiled and sorted raw data. Data from the six tables have been compiled to generate common hotspots which have become the focus of this report. Participants' comments remain visible but have been coarsely categorized to make for easier reading. The results do not represent any kind of consensus but rather a variety of views. This report is primarily descriptive. A subsequent report will focus more on 'meaning' and will be more analytical.

Participation and representation

In total, 48 people participated in the workshop. The recruitment of participants was carried out by the City of Busselton and Peron Naturaliste Partnership aiming to secure representation of various stakeholders including community groups, business, landowners, experts, government officials, youth and the broader community. Invitations were send out to 209 organisations and individuals in the Busselton area. Representatives of all stakeholder groups attended the workshop; however there was only one youth representative due to the school holiday period.

GOOGLE EARTH METHODOLOGY

Three mapping activities were carried out by participants during the workshop – (1) identifying places of significance (2) identifying sustainability hotspots; (2) outlining concerns about the sustainability hotspots; and (3) discussing adaptive pathways for the hotspots.

Participants were provided with a full colour A1 map of the Busselton – Dunsborough foreshore area, transparent overlays and coloured pens to record the outputs of each mapping activity. Participants were encouraged to draw and write on the overlays. Google Earth (GE) was used as a digital mapping tool for summarizing and capturing the information during the three mapping sessions. A GE scribe was responsible for the GE mapping at each table. Each table was equipped with a laptop and a bigger screen, so that participants were able to see and interact with the GE mapping process.

Instructions to participants were provided prior to each of the mapping exercises. Additionally a set of written instructions was available at each table.

Each table was facilitated by an experienced facilitator.

Table organization:

Participants were grouped in six groups. Each group comprised of eight people - a facilitator, a scribe and approximately six participants.

- 1) Facilitators were experts and professionals in the area of climate change adaptation and were provided by PNP. Their key role was to lead the discussion among participants and to communicate with the scribe.
- 2) All scribes were experienced with the Google Earth mapping tool and were provided by Curtin University. Their key task was to input the information from the discussion and the drawings on the

transparency map layers into the Google Earth tool parallel to group discussions.

- 3) Each participant has been initially allocated to a particular table according to their background and the group they represent.

Participants were encouraged to share and discuss their views on the issues. No consensus was sought at the end of the discussion; it was important that the diversity of the views was captured.

Identifying places of significance

Participants were asked to discuss and map places that they consider to be important to them and the community in the Busselton – Dunsborough foreshore area within four layers of sustainability - cultural, ecological, economic and social.

The four layers of sustainability were defined as follows:

- Social Layer (Red phone icon in Google Earth; red colour on the transparency map layer): Where are the places where people get together, ‘belong’, or organise to meet their needs? Consider the hospital, police station, library, pub, bike racks, bus system, ferry jetty, accommodation, boating, fishing, picnicking and other recreational sites.
- Economic Layer (Yellow dollar icon in Google Earth; blue colour on the transparency map layer): Where are the places where people earn or spend money? Consider all phases of the life cycle of production/consumption/waste disposal; critical infrastructure (sewerage, water, electricity, waste management, transport), shops, ferry terminal, bus tours, farms, tourism destinations/operations.
- Ecological Layer (Green tree icon in Google Earth; green colour on the transparency map layer): Where are the places that have natural ecosystem values or that protect ecosystems? Consider beaches, bush, recycling plant, wind turbines etc.
- Cultural Layer (White cup icon in Google Earth; black colour on the transparency map layer): Where are the places of special meaning? Consider Indigenous sites, historical sites, performance areas, museums, galleries, pubs, interpretive signage.

Identifying sustainability hotspots

Considering the places identified within the four layers of sustainability, participants were asked to identify sustainability hotspots. Sustainability hotspots were defined as places that show significance in three or more layers. Hotspots were marked with a Yellow sun cup in Google Earth. These hotspots formed the focus for the second and third part of the mapping exercise, identifying concerns and adaptive pathways, carried out in the afternoon. Each table discussed and documented their sustainability hotspots on the transparency map layer and the scribe put the information in Google Earth using the designated icon within the relevant layer. Participants thus identified the key places for coastal management on which they further concentrated their deliberations regarding concerns and adaptation pathways.

Identifying concerns about climate change on sustainability hotspots

Once the sustainability hotspots were determined, participants deliberated on the concerns about the impact of climate change and sea level rise on the sustainability hotspots

For each hotspot, participants were asked to consider the following questions:

- a. Social – how will climate change affect our ability to ‘get together’, ‘belong’ and ‘organise to meet our needs’ in Busselton? How will it affect our social lives?
- b. Economic – how will climate change affect our infrastructure? How will it affect people’s ability to make a livelihood? How will it affect land values and property markets?
- c. Ecological – how will climate change affect biodiversity conservation and ecosystem health along the Busselton coast? How will it affect our ability to protect these features?
- d. Cultural – how will climate change affect cultural character? How will it affect our heritage? How will it affect how we make meaning in Busselton?

Each table discussed and documented their concerns about the ‘hotspots’ resulting from climate change or

other related pressures on the transparency map layer and the scribe put the information in the Google Earth using 'red exclamation mark' icon.

Identifying adaptation pathways for the Busselton coast

After discussing the concerns related to climate change and sea level rise in the Busselton- Dunsborough area, participants were engaged in a discussion about the possible adaptive pathways for the Busselton – Dunsborough coast to address the concerns raised about the hotspots previously identified and to capture their views about possible solutions and management mechanisms.

For each Hotspot, participants were asked to consider the following questions:

- a. What are the best ways to manage the sustainability hotspots we have identified along the coast?
- b. What are the costs and benefits of allowing nature to take its course?
- c. Where we choose to protect the coast with engineered responses, who are principal beneficiaries of protection?
- d. Who should pay?
- e. When should payment occur?
- f. How do we deal with the ongoing process of continual uncertainty about sea level rise, coastal erosion and flooding?

Each table discussed and documented their proposed adaptive pathways about each of the 'hotspots' on the transparency map layer and the scribe put the information in the Google Earth using 'green arrow' icon.

SUMMARY OF INITIAL RESULTS

Places of significance

The participants in the six discussion tables identified in total 313 places of significance in the Busselton – Dunsborough area. There were 93 places of significance for the economic layer, 84 places of significance for the cultural layer, and 69 and 67 for the social and environmental respectively.

Within the economic layer, marked places were predominantly linked to the tourism and wine industry as well as to property and business development in key areas as the CBDs of both Busselton and Dunsborough and the Light Industrial Areas (LIAs). A consolidated list of places with economic significance is presented in Appendix 1.

The cultural layer represented mainly places linked to the beach and wine cultures as well as to European, Indigenous and environmental heritage more generally. A consolidated list of places with cultural significance is presented in Appendix 1.

The places with social significance represented mainly the social infrastructure in the area, including the beach, sports grounds, hospital, camping, cycling and recreational areas etc. A consolidated list places with social significance is presented in Appendix 1.

The ecological layer covered places of particular importance for the iconic value of the area, including the beaches, wetlands and the specific flora and fauna such as possums, quenda and peppermint trees. A consolidated list places with ecological significance is presented in Appendix 1.

This list in Appendix 1 provides more data supporting the participants' selections of hotspots.

Sustainability hotspots

Thirty five sustainability hotspots in total and 12 common ones were recognised by the participants. Table 1 represents the common sustainability hotspots. Some tables treated larger areas such as Busselton CBD and Busselton Foreshore & Jetty as single hotspots, while other tables split them up. In the results we have presented the 'split' hotspots; hence some of the data are repeated across both 'split' hotspots.

Table 1. Sustainability Hotspots

Sustainability Hotspot	Locations Identified	Participants' Comments
Busselton CBD	Queen/Stanley Street Area	Historic; cultural; economic; Indigenous cultural significance; tourism; buildings; beach amenity
Busselton Foreshore & Jetty	Whole Foreshore & Reserve; Bernard Park	
Ludlow Tuart Forest		Ecological significance; only tall mature Tuart forest in the world; cultural significance; economic significance due to tourism
Vasse Wonnerup Wetlands		Cultural heritage; Indigenous cultural significance; ecological significance; agricultural economic significance

Port Geographe and Marina		
Broadwater/Resort Strip	Siesta Park, Locke Estate, Holy Mile; Abbey Resort Area; Broadwater Resort Area; Holy Mile	Entertainment, beaches, road infrastructure
Toby Inlet		
Quindalup	Beach Front	
Road Link		
Dunsborough CBD	Old Dunsborough, CBD; Town Centre, LIA	To south west, winery region; social, economic significance; access for recreation, tourism, home owners
Dunsborough Foreshore		Cultural, social and economic hub; Indigenous cultural significant site; retail hub; youth recreation; holiday, tourism hub; social meeting place; small to medium businesses
Meelup Regional Park		Primarily social, economic; secondary ecological

Concerns about climate change on sustainability hotspots

Participants discussed and reported their concerns about the impact of climate change and sea level rise on the previously identified sustainability hotspots - (1) Busselton CBD, (2) Busselton Foreshore and Jetty; (3) Vasse Wonnerup Wetlands; (4) Port Geographe and marina; (5) Broadwater/Resort Strip; (6) Toby Inlet; (7) Dunsborough CBD; (8) Dunsborough Foreshore and (9) Meelup Regional Park. Consolidated results for the nine common hotspots are presented below. No comments have been omitted altogether. Where there are numerous comments they are grouped under headings, starting with more general comments and moving to more particular themes. However, no concerns or adaptive pathways were reported for three of the hotspots: Ludlow Tuart Forest, Quindalup beach front and Meelup Regional Park. Therefore no further results are presented for these hotspots.

1. Busselton CBD

Social concerns

Overall social loss

- By 2110 CBD likely to be gone unless something is done to prevent loss
- Life as we know it will not exist anymore
- Catastrophic effect

Loss of social access

- Risk of isolation
- Loss of access to the city during storm events
- Social impacts from flooding and erosion - limitation to access due to inundation
- Loss of public access to beach

Loss of social experience

- People may not want to visit or live in the area as sea level rises
- Impact on the way people live in Busselton

- This will make Busselton less attractive to live in
- Social interaction will be affected
- Disruption to activities around the area
- Loss of lifestyle
- Emotional, reaction, stress for residents and business people will increase

Loss of specific social assets and amenity

- Amount of public open space will be severely reduced
- Recreational space will be reduced
- Busselton foreshore redevelopment will be lost
- Local government offices will be lost
- Sport and tourist facilities go
- Community amenities, toilets etc go
- Residential heavily impacted

Economic concerns

Overall economic loss

- Economic uncertainty and economic disruption
- The main business district will be affected: banks, financial institutions, economic heartland of the area
- Potential loss of viability from CBD
- Losing economic drivers
- Go out of business
- Business district will need to be moved

Loss of infrastructure

- Loss of service infrastructure
- Sewerage, toilets won't work, backup in sewerage system
- No drainage in the area
- Pumping station will be affected
- Housing

Loss of specific industries

- Tourism will be negatively affected
- Losing drawcard for tourism

Loss of economic access, assets and amenity

- Loss of employment
- People will be cut off
- Access and egress will be lost
- Land and building assets will be lost and no insurance as unless have specific insurance as current policies do not cover flooding and erosion from the sea

Economic implications of adaptation

- Cost for protecting assets
- Commercial properties likely to move
- Businesses could go to other side of the Estuary, creating new land use pressures in that area
- Road infrastructure will require more maintenance

Ecological concerns

- Peppermint trees, possums and parks will be lost
- Mitchell Park will be negatively affected: possums and Peppermint trees

Cultural concerns

Overall cultural loss

- Busselton CBD loses current cultural value but may gain other value
- Kids won't know what we had, or be able to stay in the area

Loss of specific cultural sites

- Heritage sites may be damaged or lost if not protected
- Loss of heritage and heritage buildings
- Cultural Precinct Old Fire Station, Artgeo, St Mary Church, Sergeants Quarters and government agencies will be negatively affected.

2. Busselton foreshore and jetty

Social concerns

Overall social loss

- Loss of sun, sand, holiday culture

Loss of social access

- Limited access due to inundation
- Views, access to beach

Loss of social experience

- If beach moves inland, lose estuary & places where people socialise
- Impact on the way people live in Busselton
- Disruption to activities around the area
- Will make Busselton less attractive to live in the area

Loss of specific social assets and amenity

- Loss of assets
- Loss of events
- Loss of lifestyle
- Impact on the observatory
- Loss of walking and cycle way
- Loss of playing fields and outdoor recreational areas

- Loss of Sea Rescue community facility for safety and education
- Loss of playing fields - iron man international event

Economic concerns

Overall economic loss

- Economic uncertainty and economic disruption

Loss of infrastructure

- Storm damage to infrastructure
- Loss of foreshore infrastructure
- Infrastructure at the end of the jetty may go
- Loss of caravan park infrastructure
- Sea Rescue infrastructure loss

Loss of specific industries

- Loss of tourism

Loss of economic access, assets and amenity

- Revenue for the jetty will be lost
- Economic loss from loss of cultural amenity
- Loss of caravan parks
- Sporting associations affected by loss of playing fields

Loss of financial assets

- Investment value

Economic implications of adaptation

- Big cost to save this area
- Cost for protecting assets
- Subsequent loss of agricultural land by erosion and relocated residential areas

Ecological concerns

- Loss of coastline
- Native vegetation and endangered flora lost
- Loss of flora and fauna, biodiversity, loss of coral
- Sea grass area will decrease in extent
- Possible loss of peppermint trees - habitat for possums, deep rooted protection

Cultural concerns

Overall cultural loss

- Change culture of Busselton
- Loss of heritage
- Heritage buildings
- Loss of cultural amenity

Loss of specific cultural sites

- Loss of Pioneer Cemetery
- Loss of historical flood gates
- Historic Aboriginal fishing grounds inundated
- Traditional Aboriginal ecological knowledge lost
- Loss of connection to sense of place
- Barnard Park historic site lost.

3. Vasse Wonnerup wetlands

Social concerns

- Important area for local people and visitors
- The loss of wetlands will affect people's sense of place
- Linking road will be destroyed
- Residential heavily impacted
- Recreational area because of its environmental values: if these values decline recreation will decrease
- Health issues related to mosquitoes

Economic concerns

- Back to 1950's saline scenario, before the floodgates were installed
- Role of the drains in facilitating or control of flooding
- Loss of tourism
- International tourism through bird watchers will be lost
- Adjoining farmland will be negatively affected

Ecological concerns

- RAMSAR wetland, highly important for migratory birds, can affect ecology at a global scale
- Wetland may become more saline - impacting on the birds and other animals
- Increased salinity will have ecological impacts
- Change of species configurations
- Habitats and vegetation destroyed
- Potential loss of habitat for important local endemic species, several already listed as threatened, e.g. possums and skinks

Cultural concerns

- Less cultural value for local and Wadandi people.

4. Port Geographe and marina

Social concerns

- Take away access and amenity
- Loss of housing

Economic concerns

- Marina destroyed
- Go out of business
- Losing economic drivers
- Loss of infrastructure
- Loss of employment
- Loss of investment
- Losing drawcard for tourism
- Loss of service infrastructure

Ecological concerns

- Could become an isthmus

Cultural concerns

- Loses current cultural value but may gain other value
- Kids won't know what we had, or be able to stay in the area.

5. Broadwater/Resort strip

Social concerns

Loss of access

- Access may be constrained because of inundation
- Loss of accessibility
- Access to the beach

Loss of social experience

- Loss of connectivity

Loss of specific social assets and amenity

- Loss of social amenities
- Loss of beach amenity
- Disruption of activities and access
- Resorts, caravan parks and investment properties at risk of erosion
- Hospital impacted
- Loss of holiday accommodation/amenity, group facilities

Economic concerns

Overall economic loss

- Go out of business
- Losing economic drivers
- Loss of employment
- Loss of investment
- Loss of rates and revenue for the city when people move away; Caves Road gone

Loss of infrastructure

- Loss of service infrastructure
- Loss of housing

Loss of economic access, assets and amenity

- Loss of resorts, caravan parks

Loss of financial value

- and investment properties at risk of erosion
- Effect on property values
- From a titling perspective will destroy Strata scheme
- Viability will be impacted. E.g. Abbey Beach impacted, so if lose half of the strata titles - will impact on all of them as 1/300th of whole development
- Concern that Local and State Government caution over planning decisions will cause stagnation of development; Investors likely to go elsewhere.

Loss of specific industry

- Loss of tourism
- Losing drawcard for tourism
- Tourism industry and investments lost
- Losing tourism and economic value

Economic implications for adaptation

- Higher costs for relocating the business

Ecological concerns

- Loss of biodiversity and natural habitat
- Loss of vegetation
- Habitat loss
- Loss of ecological habitat
- Loss of possum and quenda habitat
- Environmental problems

Cultural concerns

- Loss of cultural meaning
- Loses current cultural value but may gain other value
- Aboriginal heritage sites
- History associated with Siesta Park.

6. Toby Inlet

Social concerns

- Short term disaster from storm surges
- Health - mosquito problem

Ecological concerns

- Link between Toby's & ocean is opened significantly and therefore loss of ecological values

- Increased salinity and will have ecological impacts
- Change of species configurations

Economic concerns

- Role of the drains in facilitating or control of flooding.

7. Road link

Social concerns

- Threatened transport linkage between two main regional centre - Busselton and Dunsborough
- Isolation of Dunsborough

Economic concerns

- Ability to transport goods and services will be negatively affected
- Access to one of the main industries, tourism, will be negatively affected
- Removal and disposal of road material if road is eroded or relocated

Ecological concerns

- May need to think about where a new road link would go

Cultural concerns

- May need to think about where a new road link would go, which may impact on farmland, residential etc.

8. Dunsborough CBD

Dunsborough is higher, hillier and at less risk than Busselton.

Social concerns

- Dunsborough may at times be isolated resulting from highway inundation
- Loss of houses, road, beach
- Many frontage properties will be lost
- Recreational activity lost or compromised
- Recreational fishing under threat
- Loss of beach amenity

Economic concerns

Loss of economic and financial value

- Property value
- Value of properties will diminish, ability to sell will diminish
- Loss of rates and revenue for the city when people move away
- Resort, holiday accommodation and investment properties at risk of erosion

Loss of specific industry

- Would lose its tourism value
- Less tourists visiting
- Tourism industry and Investments lost

Loss of economic access

- Loss of access to roads

Ecological concerns

- Peppermint Groves in Dunsborough significant and would be negatively affected
- Significant flora and fauna Western Ringtail Possum, Quenda/bandicoot, Black Cockatoos, mixed woodland - jarrah, marri and peppermint
- Possums
- Blythe Reserve may be lost

Cultural concerns

- Will affect sense of belonging
- Loss of identity
- Loss of the Bakery as a cultural centre
- Local people, fishing and surfing communities would be affected
- Burial site and artefacts would be threatened.

9. Dunsborough foreshore

Dunsborough is not as vulnerable as Busselton on the West side.

Social concerns

- Lose access and amenity

Economic concerns

- Losing economic drivers
- Loss of infrastructure
- Loss of employment
- Loss of investment
- Losing drawcard for tourism

Ecological concerns

- Loss of significant sea grass meadow

Cultural

- Loses current cultural value but may gain other value

Adaptation pathways for the Busselton coast

The following adaptation pathways for the Busselton- Dunsborough coast were proposed by the participants. Participants' comments are presented below with limited manipulation or editing. No adaptation pathways were discussed for the road link hotspot. Participants' suggestions for best ways to manage sustainability hotspots have arranged roughly according to the coastal decision-making hierarchy: avoid, retreat, accommodate, soft protection, hard defence. This arrangement does not represent the participants' priorities but is merely a means of organising the data according to a known framework for the purposes of readability. Where participants have made educational and communication suggestions, these have been placed at the top of the 'hierarchy'.

1. Busselton CBD

What are the best ways to manage the sustainability hotspots we have identified along the coast?

Communicate

- Need to develop more visual scientific based information; use a number of public forums; education

Avoid

- Avoid putting infrastructure and concentration of amenities and infrastructure in the same spot [as before]
- No more sprawl, low level hi-rise, develop up

Retreat

- Protect some areas (like the CBD) and retreat others

Accommodate

- New buildings accommodate by having movable or raised type dwellings; leave jetty as is; replace public open space lost in other areas; opportunity for new design and development / start again

Protect (soft)

- Beach sea nourishment where possible is more palatable than sea walls; it maintains the amenity of the beach and is more aesthetically pleasing

Defend (hard)

- Hard defence probably necessary; however feasibility has to be considered with respect to erosion of neighbouring areas
- Protect that section; the western area - best option is to protect (all agree except one person) - build a wall along the area; change drainage to protect urban areas

What are the costs and benefits of allowing nature to take its course?

Benefits

- No benefits to allow nature to take its course
- Benefits vary depending on commercial vs residential investment and properties

Costs

- Busselton gone; significant change to Busselton; loss of all cultural, social, economic and ecological aspects and amenities
- Wipes out the economy of the district
- Losing business centre/economic generator
- Creating fear of investment / or staying in Busselton

- Losing development and recent investment
- Losing social focal point
- Losing cultural centre; losing heritage

Where we choose to protect the coast with engineered responses, who are principal beneficiaries of protection?

Regional stakeholders

- Locals, and western Australian regular visitors
- As cultural and economic centre for the region, all the stakeholders within the regions benefit to some degree

Busselton community

- Entire community will benefit from protection
- Everyone in Busselton for the foreshore and the jetty; businesses and residents for the west end; the high school

Specific groups

- Sense of place for those for who see Busselton as special; tourists can go elsewhere

Who should pay?

Shared costs / mixed

- Everyone should contribute
- Levy, too soon to decide who contributes
- Different stakeholders all have different risks (local, state, federal)
- Public benefit in open space and commercial sector private benefit
- Have different mechanisms and different time frames

Governments

Federal, state and local governments in various combinations

- Coastal defences' costs should be borne by a range of governments (state and federal) as is benefit to State
- Combination of state and local
- State and federal government (the community through its taxes) for the CBD and the jetty
- For the resort area - there could be some sort of levy in terms of taxes (everybody pays, the whole community); introduce special area levy

Role of federal government

- Perhaps federal government?
- Federal government can't walk away from some responsibility

Role of state government

- State government
- Could involve levies with trust funds as have time before many of these protections have to be out in place. – E.g. S. Australia environment levy pays for nourishment costs
- May be strongly biased to local benefit, should be component that is shared across State community

- Role of State Government may be to help manage the institutional arrangements for the whole of the adaptation process and oversee what happens in the local Governments around the State

Role of local government

- Shire will never have money to take from ratepayers
- If there were groynes and sea walls to protect CBD, likely local Government would pay
- 0.25 % rate increase directed to a fund for future protection works
- Have to be careful with levies. Busselton Shire had levy for historical building, didn't build and had already spent the money!!
- Need to be able to trust local government to spend the money in the right way
- Requires due diligence - if don't manage asset effectively can't get insurance

When should payment occur?

- Already have some protection in place
- Sufficient information in place to plan now
- Start paying now (increase rates now); minimise the burden as soon as you can

How do we deal with the ongoing process of continual uncertainty about sea level rise, coastal erosion and flooding?

- Communication with community is integral to dealing with uncertainty, need to understand risks and gaps in knowledge
- Scenario planning with different levels of sea level rise
- Decisions should not be deferred
- Evidence is growing so let's plan for it now.

2. Busselton foreshore and jetty

What are the best ways to manage the sustainability hotspots we have identified along the coast?

Overall strategies

- Innovative thinking: manage impact of natural processes: e.g. pop in an artificial reef; different approaches to development: hi-rise (medium etc. based on views/substructure) vs no more coastal sprawl; innovative building approaches; strategic identification & purchase of suitable development land; development and relocation as required to new frameworks
- Introduce planning mechanism for avoidance now & new development concepts (funded locally) L.C. to develop defence & retreat strategy. Once done, funding option to begin; Australian government to lead the process
- Divide into four sections (key residential of Busselton & Dunsborough defended, let rest go)
- Designing adaptation mechanisms as required, thinking ahead, thinking of benefits/potential
- Maintain and upgrade when necessary

Avoid

- Avoid putting infrastructure and concentration of amenities and infrastructure in the same spot

Retreat

- Relocation after demonstrated policies on avoidance put in place

Accommodate

- Redevelopment in risk area: additional costs on developer. Optional development concepts such as floating/stilt houses; shorter term lease-hold

Protect (soft)

- Bernard park - Beach renourishment; beach revegetation; Work with the existing East Foreshore Management Plan; Not such a priority as the CBD; One of the iconic parts of the foreshore

Defend (hard)

- Build a defence line, protect it with a sea wall from the jetty heading west, to beyond the hospital; include flood structure/mitigation gates
- Major infrastructure needs defending or relocating (especially in consideration of a traumatic event e.g. WWTD, hospital and roads, move these first)
- Protect that section; the western area - best option is to protect (all agree except one person) - build a wall along the area; change a drainage to protect urban areas
- Defence (general revenue federal) after demonstrated effectiveness of relocation

What are the costs and benefits of allowing nature to take its course?

Benefits

- Less cost to allow nature to take its course

Costs

- Busselton Jetty - Keep it for 100 years. If we don't have the jetty, we don't have a town.
- Social interaction within community would be lost
- Lose social infrastructure
- Lose main public open space on the foreshore
- Recreational amenity will be lost
- Loss of historical and recreational fishing
- Loss of International Iron Man Event
- Lose ecological value of iconic threatened and endangered flora and fauna

Where we choose to protect the coast with engineered responses, who are principal beneficiaries of protection?

Regional stakeholders

- As cultural and economic centre for the region, all the stakeholders within the regions benefit to some degree
- Major infrastructure: all residents, tourists, holiday makers, coastal dwellers

Busselton community

- Local community
- Entire community will benefit from protection
- Everyone in Busselton for the foreshore and the jetty

Specific local groups

- Possibly the wealthy, millionaire's mile
- Businesses and residents for the west end; the high school International sports community through Iron Man Event; Coast Care volunteers
- Benefits vary depending on commercial vs residential investment and properties.

Who should pay?

Possible models

1. General revenue/taxation alone (all citizens bear the cost)
2. Mixed: some differential rates (who benefits pays)
3. Specific tax equivalent to carbon tax, portion of carbon tax itself, tax equivalent to road toll or Rottnest tax - entrance to area specific tax

Shared costs / mixed

- Owner contributors, community, city, state government and hopefully, federal government...shared costs
- Private assets (specific tax)
- Have different mechanisms and different time frames

Governments

Federal, State and Local Governments in various combinations

- Coastal defences' costs should be borne by a range of Governments (State and Federal) as is benefit to State
- State and federal government (the community through its taxes) for the CBD and the jetty
- Public assets/infrastructure protected/moved (general revenue)
- Perhaps federal government?
- State/Fed. Currently is funded through tourists and local funding
- Local community, local government; State government
- For the resort area- there could be some sort of levy in terms of taxes (everybody pays, the whole community); introduce special area levy
- May be strongly biased to local benefit, should be component that is shared across State community

Role of State Government

- Role of State Government may be to help manage the institutional arrangements for the whole of the adaptation process and oversee what happens in the local Governments around the State
- Shire will never have money; could involve levies with trust funds as have time before many of these protections have to be put in place – e.g. S. Australia environment levy pays for nourishment costs
- If there were groynes and sea walls to protect CBD, likely local Government would pay

Role of Local Government

- Shire will never have money; could involve levies with trust funds as have time before many of these protections have to be put in place – e.g. S. Australia environment levy pays for nourishment costs
- If there were groynes and sea walls to protect CBD, likely local Government would pay
- To take from ratepayers

When should payment occur?

- Start paying now (increase rates now) minimise the burden as soon as you can

- Immediate and continual
- Minimal costs.

3. Vasse Wonnerup wetlands

What are the best ways to manage the sustainability hotspots we have identified along the coast?

- Needs a coordinated approach and integrated framework to ensure all of the values are considered
- Engineering solutions don't work on environmental assets
- Need to build resilience in ecological communities
- People don't like to live and recreate around smelly, deteriorated ecological systems
- No defence - let go back to saline, let nature take its course

What are the costs and benefits of allowing nature to take its course?

- New ecological communities may evolve
- May have different types of birds visiting
- RAMSAR wetlands would be changed and may lose its status

4. Port Geographe and marina

What are the best ways to manage the sustainability hotspots we have identified along the coast?

Retreat

- Set land aside for the retreat in more suitable areas
- Lose only boating facility - valuable facility
- Let the wetland become inundated with salt water

Accommodate

- Movable housing
- Pontoons
- Live on the boats
- Tenants might have to pay for dredging

Defend

- Marina - perhaps could be a collective commercial decision
- Improving walls etc.; pull out the groynes
- Engineering response - currently there is a groyne that will be built. Who is paying? We are. State Government has funding for rebuild of \$27Million for reconfiguring. This is current. Flood mitigation at the back
- Port Geographe is dependent on East Busselton protection plan. If there is a decision to build a sea wall, Port Geographe can be included within this wall

What are the costs and benefits of allowing nature to take its course?

Benefits

- Avoid cost of maintenance and infrastructure

Costs

- Loss of access

- 550 blocks for sale - all owned by the banks and can't sell

Where we choose to protect the coast with engineered responses, who are principal beneficiaries of protection?

- Public/private benefit

Who should pay?

- Owner funded/ neighbour contribution

5. Broadwater/resort strip

What are the best ways to manage the sustainability hotspots we have identified along the coast?

Overall strategy

- Have a mixture of managed retreat and protections

Avoid

- Avoid new developments

Retreat

- Less dense areas, would probably retreat
- Let the foreshore let go and retreat - creating a small island/isthmus
- Retreat and relocate

Accommodate

- Accommodate: strict building code for new buildings; for flexible and mobile (removable) buildings

Defend (hard)

- Where there are enough resorts may protect: tourism and lots of buses
- May protect the coastal amenity: cycle way, which goes for kms

What are the costs and benefits of allowing nature to take its course?

Benefits

- Allowing the natural process is economical; if private investors want to try and protect, the government should let them
- Opportunity for new design standards and new type of development

Costs

- Loss of social, cultural and ecological values
 - Loss of place and amenities
 - Loss of social, cultural experience catering to low to middle income visitors
 - Four generations of heritage (sic)
- Loss of tourism dollars; loss of accommodation and kick on effects (multiplier); loss of employment; less tourists

Where we choose to protect the coast with engineered responses, who are principal beneficiaries of protection?

- The leaseholders will be the beneficiaries; broader public in terms of environmental value - e.g. protection of species and Aboriginal sites

- Would need guidelines that would prioritise the community values (discussed earlier) to inform investment for adaptation
- Consider public vs private benefit

Who should pay?

Shared costs / mixed

- Owner funded/ neighbour contribution
- Tourism - the tourists, commercial groups, stakeholders; the affected landowners
- At own decision or risk rather than being told what to do

Governments

- National disaster levy
 - Talked about but not enacted; difficult to do as few Governments have 30 year plans
 - If pay into a levy - should you then get protected?
- If there was a planned roll back with a need for new access and infrastructure may require State to take over public land
 - The state governments and shire will look at it after 21 years in terms of adaption or retreat (2031)
 - Buildings old but up to Shire standards (passed), no new approvals for buildings

When should payment occur?

- Start paying now

6. Toby Inlet

- No defence - let go back to saline, let nature take its course

7. Dunsborough CBD

What are the best ways to manage the sustainability hotspots we have identified along the coast?

- Difficult to know what the coastline is going to do: continual vigilance and monitoring of what the coastline is actually doing
- Design adaptation measures that can be incrementally added to over time. Difficult and probably more expensive initially but probably cheaper in the long run. Also has to be continuous. Can't ever stop. If have a regular funding stream this would be easier.
- Mixed approach as have some protection and some 'rocky bits'
 - Create mitigation strategies
 - Accommodate
 - Coastal engineering solutions required as some areas can be protected and others may not
 - Use natural protections and enlarge
 - Defend Dunsborough town (a rock wall)
 - Need to consider 'over-topping' where waves come over rocks and protection

Where we choose to protect the coast with engineered responses, who are principal beneficiaries of protection?

- Main beneficiaries for Broadwater and Dunsborough are private owners then whole region
- As is a tourist town others benefit than those living in the area

Who should pay?

- Incentives (generic for all hotspots):
 - Could look at trade-offs as incentives
 - If leasing land could increase the lease length
 - A rate reduction as another incentive; if too heavily taxed (food already cost a lot in region) - people will just leave the town
- A bit like superannuation: how can the fund get a return? For example if protect a community facility - how can a benefit be obtained?

When should payment occur?

- Funding needs to start immediately - but management is an issue

How do we deal with the ongoing process of continual uncertainty about sea level rise, coastal erosion and flooding?

- Generic for all hotspots
- Focus on what you do know e.g. with historical data on sea level rise
- Know this is going to happen - can plan for the events
- Increased intensity and severity of storm events, short term flooding and erosion
- Don't really know what will happen as a big storm could take out HUGE amount

8. Dunsborough foreshore

What are the best ways to manage the sustainability hotspots we have identified along the coast?

- Accommodate approach - e.g. stilts, wheels
- Replace public open space lost in other areas

What are the costs and benefits of allowing nature to take its course?

Benefits

- Opportunity to redesign business centre

Costs

- Loss of cultural social and recreational amenity and activity

Where we choose to protect the coast with engineered responses, who are principal beneficiaries of protection?

- Public users of beach etc. benefit
- Businesses, tourists benefits, everyone

Who should pay?

- City of Busselton (principle of public benefit/public purse vs private benefit/private purse)

CONCLUSIONS

The process generated a group of hotspots commonly regarded as significant places by the participants. Concerns covered a wide range of social, economic, ecological and cultural issues. It was clear that social and economic issues were of greatest concern to participants, with ecological and cultural issues somewhat less significant. It was also clear from the comments that the level of literacy around these layers was a lot lower for most participants. For example, very little mention was made of biodiversity other charismatic species such as possums, quenda and peppermints. The sense of place, belonging and identity associated with key hotspots

was very strong. The corresponding sense of overwhelming potential loss felt by some participants made it hard for them to analyse their responses more systematically. Suggested adaptation pathways covered the full gamut of options including strategic approaches; the need for communication and education; and responses from all parts of the coastal adaptation hierarchy. The desirability of some sort of defence for key sites such as the Busselton CBD was widely felt. However, some participants also stated that less densely populated areas could be allowed to retreat, with accommodation being seen as a bit of a novelty/innovative idea.

Overall the participants were well able to understand and respond constructively to the wealth of scientific and planning information presented on the day. There was a spirit of collaboration and very little conflict at the tables. However, the results to date show the need for greater sustainability, policy and social learning around coastal adaptation. Sustainability learning is about the interactions among the four layers and the additional complexity and uncertainty created by climate change impacts. This type of learning is extremely challenging but will enable decision-makers, the community and professionals to reframe their thinking away from simplistic, one-off technical solutions towards long term, adaptive, holistic suites of options. Policy learning could focus on the more detailed planning, policy and engineering implications of, for example, what is actually involved in large-scale protection or retreat. This process of policy learning is not yet well developed in local and state governments: it is a case of learning as we go. This process could be undertaken by a working party of key stakeholders in the City of Busselton, PNP, the Wardan Centre, SW Development Commission, SW Catchment Council and the Departments of Water, Planning and Transport. Social learning is about building literacy in the broader community about coastal adaptation processes and options.

Future coastal adaptation mapping could focus on key hotspots along the Busselton coast (Philip Booth & Ron Cox personal communication). Complementary community engagement could include:

- Ongoing engagement with participants from the GE workshop and nurturing other coastal adaptation champions
- Community-monitoring and development of coastal sustainability report cards
- Website about Wardandi uses and history of Geographe Bay
- Art exhibition and community cultural development about climate change and coastal adaptation.

This report was a summary/interim report. The next report on this workshop will include a more detailed analysis of the meanings and interpretations made by participants. A kmz layer with all the compiled raw data will also be presented.

Appendix 1 – Places of significance

Economic layer

Location	Placemark
	Airport
	Water Treatment Plant
	Busselton Council Offices
Vasse	Cleared Farming Land
Quindalup	Quindalup Treatment Plant
Dunsborough	Light Industrial Area
Eagle Bay	Xtreme Adventure
Dunsborough	Simmo's Ice-Creamery
Dunsborough	Holiday Homes
Dunsborough	Backpackers
Dunsborough	Naturaliste Charters
Busselton	Whale Watching Charters
Geographe	Port Geographe
Busselton	Busselton Jetty
Dunsborough	Dunsborough Country Club
Quindalup	Quindalup Commercial Fishing
	Southbound Festival
Dunsborough	Skate Park
Dunsborough	Dunsborough CBD
Busselton	Waste Water Treatment Plant
Busselton	Busselton Light Industrial Area
Busselton	Airport
Busselton	Busselton CBD
Busselton	Caravan Park/Accommodation Strip
Busselton	Vasse Shopping Precinct
Busselton	Golden 'Holy' Mile
Siesta Park	Siesta Park Tourist Accommodation
Dunsborough	Wyndham Resort
Dunsborough	Fionnetire(??) Winery
Dunsborough	Palmers Winery
Busselton	Monahan's Shopping Precinct
Busselton	Busselton "A" Shopping Precinct
Busselton	Busselton Jetty
Busselton	Busselton CBD
Busselton	Caravan Park
	Busselton- Dunsborough Road
Broadwater	Water Board Storage And Supply
Dunsborough	Whale Watching Tours
Broadwater	Broadwater Camping And Resorts
Dunsborough	Dunsborough CBD & Shopping Area

Siesta Park	Holy Mile
	Bussell Highway Retail Strip
Busselton	Monaghan's Corner
Busselton	Local Gourmet Produce
Broadwater	Resorts Caravan Parks
Busselton	Airport
Busselton	Auto Hub
	Light Industrial Area
Dunsborough	Dunsborough CBD & LIA
Geographe	Port Geographe
Busselton	Busselton Jetty And Foreshore
Busselton	Busselton CBD
Busselton	Busselton Water Production Sites
	Wyndham Resort
Dunsborough	Dunsborough Enterprise Park
Siesta Park	Siesta Park
Busselton	Cleared Farming Land A
Dunsborough	Dunsborough Resort Strip
Dunsborough	Simmo's Ice-Creamery
Busselton	Monaghan's Corner Retail Precinct
Dunsborough	Palmers Winery
Dunsborough	Boat Ramp
Vasse	Wineries Region
	Regional Road Link
Dunsborough	Dunsborough Town Centre
Broadwater	Resorts
Busselton	Kookaburra Caravan Parks
Busselton	Caravan And Camping Grounds
Dunsborough	Lakes Golf Course
	Ex-Cape
Dunsborough	Commonage Rd Caravan Park
	Sewerage Works
Siesta Park	Siesta Resort
	4 Season Caravan Park
	Palmers Winery And Restaurant
	Occy's Brewery Newton House
Broadwater	Abbey Resort Area
	Hospital
Geographe	Port Geographe
	Archery Park
Busselton	Busselton Foreshore And Cultural Precinct
	Hotel/ Winery/Pottery
Busselton	Monahans Corner Shops
Dunsborough	Dunbay Foreshore
Vasse	Vasse Shops & Markets
Busselton	Busselton Beach Resort

Busselton	Recreation Centre
Dunsborough	Dunbay Road
Busselton	Light Industrial Area
	Resort Strips

Cultural layer

Location	Placemark
Busselton	Drive In Theatre
Busselton	Busselton CBD
Busselton	Busselton Jetty
Busselton	Old Port Complex
Busselton	Art And Festival Precinct
Busselton	Old Butter Factory Building
Dunsborough	Nyoongar Sites
Eagle bay	Whaling Station
Dunsborough	Greenacres Caravan Park Precinct
Quindalup	Quindalup Police Station
Busselton	Sabina River
Busselton	Sporting Recreation Sites
Busselton	Churchill Park
Busselton	Farming Hinterland
Abbey	Newton House
	Nyoongar Fish Traps
	Nyoongar Vasse Wonnerup
Dunsborough	Dunsborough Foreshore
Wonnerup	Wonnerup Historical House
Broadwater	Broadwater Hotel
	Old Show Grounds
Busselton	Railway Museum
Busselton	School With Theatre
Yalyaup	Sporting Grounds
West Busselton	Old Vasse Town
West Busselton	Hospital
Busselton	Yacht Club
Dunsborough	Castle Bay
Dunsborough	Meelup Reserve
Wonnerup	Wonnerup Historical House
Dunsborough	Dunsborough Playing Fields
Busselton	Timmoothee Vasse
Busselton	Indigenous Burial Site
Busselton	Old Court House
Abbey	Newton House
Wonnerup	Vasse, Wonnerup, Broadwater, Quindalup Wetlands
Wonnerup	Wonnerup Historical House
Busselton	Prospect Villa
Busselton	Old Butter Factory Building
Busselton	Busselton Jetty
Busselton	Old Butter Factory Building
Busselton	Pioneer Cemetery

Quindalup	Quindalup Jetty Site
Busselton	Fairlawn - Cattle Chosen
Bovell	Old Broad Water Farm
Busselton	Busselton Cultural Precinct
Kealy	Aboriginal Reserve
Marybrook	Aboriginal Reserve
Busselton	Old Railway Station
Busselton	Cattle Chosen
Dunsborough	Anglican Church
Dunsborough	Dunsborough Country Club And Community Hall
Busselton	Lockville Historical House
Busselton	Bussell Family Homestead
Busselton	St Mary's Church
Wonnerup	Aboriginal Cultural Fishing Site
Busselton	Old Gaol Historic Town Site
Busselton	Old Fire Station
Busselton	Old Butter Factory Building
Busselton	Cemetery
Wonnerup	Floodgates On The Vasse Wonnerup
Busselton	Busselton Jetty And Foreshore
Ludlow	Ludlow Tuart Forest
Busselton	St Mary's Church
Ludlow	Ludlow Tuart Forest
Siesta Park	Siesta Park
Vasse	Vasse Schoolhouse
Wonnerup	Wonnerup Historical House
Dunsborough	Old Dunsborough Hall
Geographe	Aboriginal Burial Site
Yalyaup	Sporting Grounds
Anniebrook	Old Bunbury Family House
Dunsborough	Indigenous Cultural Heritage Site

Social layer

Location	Placemark
	Dolphin Rd Boat Ramp
	Horse Exercise Area
Broadwater	Holgate Road Social Environment And Beach Access
Marybrook	4 Season Caravan Park
Abbey	Ski Area
Dunsborough	Dunbay Foreshore
Dunsborough	Dunsborough Town Centre
Busselton	Sea Rescue Building
Busselton	Cultural Precinct
Busselton	Main Street Queen Street
Busselton	Busselton Jetty & Foreshore
Busselton	Busselton (Regional) Hospital
Busselton	Oval Open Space
	Resorts
Busselton	Busselton Yacht Club
Busselton	Volunteer Sea Rescue
Dunsborough	Dunsborough Yacht Club
Dunsborough	Dunsborough Golf Club
Dunsborough	Fishing Ramp
Dunsborough	Old Dunsborough Boating Recreation Swimming
Dunsborough	Dunsborough Foreshore
Wonnerup	Forrest Beach
Geographe	Port Geographe
Geographe	Geographe Bay Boat Club
Yalyaup	Sporting Facilities
Busselton	Holy Mile And Siesta Park
West Busselton	Recreation Centre
West Busselton	Hospital
Busselton	Busselton CBD
Busselton	Trotting Track
Dunsborough	Dunsborough Foreshore
Dunsborough	Dunsborough CBD & Quindalup
	Tourist Accommodation B
Busselton	Busselton Foreshore
	Tourist Accommodation A
Busselton	Busselton Jetty
	Mandalay Boat Ramp
	Golf Course Small
Geographe	Port Geographe Marina
	Town Jetty
	Town Foreshore
	Mitchell Park

	Boat Ramp & Sea Rescue
Busselton	Busselton Jetty
West Busselton	Hospital
Wonnerup	Wonnerup Beach
	Marina
	Special Fishing Spots
	Cycle Walk Path
	Seagrasses
Dunsborough	Dunsborough Foreshore
Dunsborough	Meelup Beach
Dunsborough	Queen Street Busselton
Dunsborough	Dunsborough Boat Ramps B
Busselton	Recreation Centre
busselton	Main Beach
Busselton	Busselton Jetty
Dunsborough	Dog Beach
Dunsborough	Old Dunsborough Boat Ramp
Geographe	Geographe Bay Yacht Club And Moorings
Quindalup	Quindalup Boat Ramp
	Ex-Cape
	Youth Hostel
	Abbey Boat Ramp
Siesta Park	Siesta Park
Broadwater	Water Skiing Area
Broadwater	Youth Camp
Broadwater	Harvest Road Swimming Beach
West Busselton	Hospital

Ecological layer

Location	Placemark
	Tuart Forest
Wonnerup	Wonnerup Estuary River Mouth
Geographe	Port Geographe Marina And Groynes
Busselton	Busselton Jetty
	4 Mile Reef
	Plantation
	Manmade Reef
Dunsborough	Dunsborough Lakes
Eagle bay	Meelup Regional Park
	Elmore Road
	Vegetation Within Road Reserve
Marybrook	Seagrasses
	Foreshore Reserve, Whole Of Foreshore
Ludlow	Critical Habitat For Western Ringtail Possum
Wonnerup	Peppermint Trees
Marybrook	Marybrook Waterway
	Toby's Wetland Inlet
Dunsborough	Dunsborough Seagrasses
Dunsborough	Dunsborough Creek
Dunsborough	Mary Park
Vasse	Vasse Warnerup Estuary Systems
Vasse	Vasse Warnerup Estuary Systems B
Wonnerup	Wetlands
	Toby Inlet
Busselton	Beach And Dunes
Broadwater	Broadwater Wetland
Busselton	Seagrass
Broadwater	Broadwater Wetlands
Wonnerup	Vasse Wonnerup Wetlands
	Coastal Bay
	Lock Reserve
Wonnerup	Tuart Forest And Wonnerup House
	Tuart Forest Natural Park
	Quindalup Bar And Dunsborough
Eagle bay	Meelup Reserve
Quindalup	Quindalup Wetland, Toby Inlets
	The Entire Estuary
	Quenda Habitat
	Sabina River
	Abba River
	Fish Habitat And Beaches
Busselton	Busselton Jetty
	The Tuart Forest

	Vegetation With High Values
	Carbunup River
Dunsborough	Toby Inlet And Dunsborough Inlet
	Toby Inlet
	Toby Inlet
	Annie Brook Creek
	Beaches
	Captain Reserve
	Swan Coastal Plain
	Drain
Quindalup	Quindalup Beaches
Dunsborough	Dunbay Foreshore
	Boat Ramp
Broadwater	Travellers Well
	Lock Estate Reserve
Eagle bay	Meelup Reserve
Vasse	Vasse River
Dunsborough	Peron Reserve And Dunsborough Lakes
	The Lock Reserve
	DEC Nature Reserve
	Barnard Park
	Seagrass Meadows
	Seagrass Meadows
	Lower West River
	The Entire Estuary End