

Involving Communities in Developing Coastal Risk Management Frameworks in Western Australia

Report for Peron Naturaliste Partnership, June 2018

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Executive Summary

Local Governments are required to make informed coastal planning and management decisions that need to consider often competing values in areas at current risk or projected future risk. In order to effectively address current and future coastal hazards and risks, coastal planning in Western Australia (State Planning Policy 2.6 – State Coastal Planning [SPP2.6]) requires that a risk management approach be adopted.

A fundamental component of SPP2.6 is to consult and collaborate with the community throughout the coastal hazard risk management and adaptation planning (CHRMAP) process which includes the identification and assessment of community values.

The Peron Naturaliste Partnership (PNP) and the Cities of Bunbury, Rockingham and Busselton in the southwest of Western Australia (WA) developed and implemented a community focused coastal climate change study: Involving Communities in Developing Coastal Risk Management Frameworks in Western Australia.

The Project was guided by the principles and standards that the PNP incorporates into the design and implementation of all its projects. These principles such as protection of the environment and cultural values, integrated coastal zone management and appropriate and meaningful public participation were integrated into this Project.

A key aim of this Project was to gain a better understanding of what communities currently value on the coast and how these values may be impacted as a result of climate change. The PNP believes that without a clear understanding of community coastal values you cannot deliver an effective, comprehensive and responsible CMRMAP strategy.

This Project adopted proven engagement methods, namely community surveys, public information sessions and facilitated workshops, to provide a robust approach to gather accurate and reliable community data on local coastal values at Bunbury Back Beach, Waikiki Beach and Old Dunsborough Foreshore.

In order to identify the coastal values, an innovative coastal values framework for classification was developed for this Project to disambiguate the term ‘values’, being:

- intrinsic natural features, such as clean water or healthy dunal vegetation;
- built assets, including the infrastructure added by governments as well as commercial and residential buildings, that take advantage of the intrinsic natural features;
- uses of the coast, that is, the many ways that the coast’s qualities and assets are deployed; and
- benefits, that is, how the uses of the coast bring well-being to coastal users.

The outcomes of this Project indicate that the levels of awareness and understanding in the community of coastal processes, impacts of climate change and potential adaptation pathways were raised and social learning was demonstrated. The PNP and the Cities of Bunbury, Rockingham and Busselton have gained a better understanding of community coastal values and have a better appreciation of what adaptation options the community may accept in their local areas.

A summary of the key results of the beach user surveys and scenario planning workshops identified that:

- environmental features such as clean water, vegetated dunes, native trees and animals were of most importance;
- public safety, public facilities, facilities for active recreation and indigenous and other cultural sites were other assets and qualities of high importance to many;
- private residences adjacent to the beach were not important to the majority;
- the most popular uses of the sites were walking/running, swimming and spending time with family and friends;
- visiting the beach/foreshore provides numerous benefits to lifestyle, physical and mental health and wellbeing, as well as being a place for spiritual/cultural connection;
- the consequences of climate change will result in a loss of valuable assets and features and will thus have negative impacts on the uses and benefits; and
- to manage coastal hazards there was strong support for fencing dunes/revegetation, preventing further development in hazardous areas and planned retreat and minimal support for doing nothing.

The Project identified a number of key learnings that could be adopted in future CHRMAP's or in independent coastal values studies. It is recommended that:

- the results of this Project inform the Cities of Busselton and Rockingham CHRMAPs, Koombana Bay CHRMAP and future City of Bunbury CHRMAP;
- the coastal values framework for classification that was developed for this Project be utilised in future coastal community values studies including CHRMAPs;
- the engagement framework developed for this Project be considered as a means to involve the community in CHRMAPs to assist in identifying coastal values, determining consequences, identifying and evaluating risks and adaptation planning and evaluation. The framework identifies multiple points where the community needs to be informed (through the information sessions and workshops), consulted (beach user surveys and workshops) and involved (workshops);
- media and marketing teams of local government/expertise be engaged early to assist in promoting the Project;

- Information Sessions be conducted at the beginning of the CHRMAP in prominent locations and/or at existing events, with the aim to raise awareness via displays and direct face to face contact;
- the beach user survey utilised in this Project be shortened to include only key questions. This will not impact the outcomes and will assist in maximizing numbers completing the survey;
- coastal value surveys be conducted online and, to minimise resources (human and financial), in person at local government events, via letter box drops and/or with rates notices;
- Information Booths should be considered as a means to engage the community and undertake face to face surveys;
- schools/colleges be contacted directly to encourage teachers to conduct the coastal value surveys in classrooms and seek their involvement in workshops;
- to gain a wide representation of the community at workshops, key stakeholders and community groups/members be targeted; and
- workshops be held during the CHRMAP 'risk assessment' phase to identify/verify coastal values and assist in evaluating consequences and risks and in the 'adaptation planning' phase to assist in assessing potential adaption pathways.

In conclusion, the three engagement methods adopted for this Project demonstrated that this integrated approach can be used to address the requirements of a CHRMAP to raise community awareness, identify and assess coastal values and broadly identify potential adaptation options that maintain the identified coastal values and are acceptable to the community.

This Project received funding assistance from the Western Australian Planning Commission Coastal Management Plan Assistance Program.

1. Introduction

The Peron-Naturaliste Partnership (PNP) is an incorporated collaboration of nine local governments between Cape Peron and Cape Naturaliste in the southwest of Western Australia (WA): Bunbury, Busselton, Capel, Dardanup, Harvey, Mandurah, Murray, Rockingham and Waroona. The coastal areas of the PNP region are dynamic and include a number of cities and towns that have been identified as being at notable risk from the impacts of climate change (Damara, 2012). In recognition of the vulnerability of this coastline the PNP was formed to take a regional and integrated planning and management approach to address coastal climate change.

Local governments are required to make informed coastal planning and management decisions that need to consider often competing values in areas at current risk or projected to be at risk in the future. To effectively address current and future coastal hazards and risks, coastal planning in Western Australia (State Planning Policy 2.6 - State Coastal Planning [SPP2.6]) requires that a risk management approach be adopted (Western Australian Planning Commission, 2013). A fundamental component of SPP2.6 is consultation with the community throughout the Coastal Hazard Risk Management and Adaptation Planning (CHRMAP) process which includes the identification and assessment of community values. It has been recognised in projects including those undertaken by the PNP, such as Developing Flexible Adaptation Options for the Peron Naturaliste Coastal Region of Western Australia (Damara 2012, Acil Tasman 2012) and Harvey Coastal Hazard Risk Management and Adaptation Plan (Damara, 2016), that the community as a key stakeholder, indeed *the* key stakeholder, has not been effectively engaged in coastal hazard risk management and adaptation planning.

The PNP with funding from the Western Australian Planning Commission (WAPC) Coastal Management Plan Assistance Program designed and delivered a community focused coastal climate change study: Involving Communities in Developing Coastal Risk Management Frameworks in Western Australia (the Project).

The Project was undertaken in key coastal sites in the Cities of Rockingham, Bunbury and Busselton respectively, namely Waikiki Beach, Bunbury Back Beach and Old Dunsborough Foreshore and was guided by the following principles (PNP Strategic Plan 2016 – 2019) that the PNP has adopted to inform the development and implementation of strategies and actions.

- Protection of the environment and cultural values.
- Integrated planning and decision making based on principles of the precautionary principle and Integrated Coastal Zone Management.
- Sustainable use of coastal and estuarine resources.
- Appropriate and meaningful public participation.
- The priority for public expenditure is public benefit; public expenditure should cost-effectively achieve the best practical long-term outcomes.

- Adopt a risk management approach to address potential adverse impacts of coastal hazards.
- Adopt adaptive and flexible adaption pathways to make allowances for increasing risks over time and / or to accommodate uncertainty.
- Maintain and improve safe public access to beaches and support sustainable recreational activities in coastal and estuarine environments.

1.1. Objectives

The primary objectives of this Project are:

1. To identify community coastal values and investigate how these could be affected by the impacts of climate change, explicitly coastal erosion and inundation.
2. To explore how specific engagement practices including social learning can enhance understanding and knowledge uptake of coastal climate change in the community; and
3. To demonstrate how community values of the coast can be incorporated into coastal hazard risk management and adaptation planning.

The first objective was the subject of coastal surveys and workshops. In consultation with the relevant local governments and the research literature, specific questions were generated in order to respond to this objective:

- What are the uses (direct, indirect, existence) that the community has for the coastal study area?
- What are the benefits that these uses bring to the community?
- What are the environmental qualities and built assets and that enable these uses and benefits and what condition of assets is acceptable?
- How much do beach users know about climate impact and how concerned are they?
- What amenity would be lost if this beach was eroded and how concerned are beach users about these losses?
- How can coastal managers better identify and address conflicting coastal values?

1.2. Theory and Literature

The literature review (Appendix A) was guided by the objectives of this project, including the identification of community coastal values and how these would be impacted by climate change, and was used to help formulate the beach user surveys and development of the scenario planning workshop exercises.

The review included a review of social and environmental values assessments undertaken in the PNP region and further afield. The literature points to the need to improve our practical understanding of how community values can improve adaptation planning processes. Approaches can include both qualitative and quantitative methods, including participatory approaches. Furthermore, the literature indicates that social

learning is an important process in increasing the level of understanding of the community and, thereby, its meaningful contribution to decision-making.

Traditional approaches to coasts have been engineering-based, with expectations that technical solutions can be found to well-understood problems. Although these expectations have in fact rarely been met, climate change has added a further level of uncertainty and complexity to the challenge of coastal sustainability. Coastal adaptation to sea level rise is an issue of significance in southwest WA. The State Coastal Planning Policy (SPP2.6) and its guidelines represent a governance framework for coastal adaptation, as described above that seeks to respond to these challenges. However, as the Policy and its guidelines exist in a larger context of rapid change, an approach is needed 'on the ground' that is adaptive, exploratory and learning-oriented. This includes shared social, policy and sustainability learning for communities, governments and scientists. High order learning requires interaction among different perspectives and is well supported by deliberation. A deliberative workshop exposes participants to each other's perceptions and ideas, and can contribute to the sharing of values, ideas, tacit information and co-production of new knowledge.

An organisation like PNP can contribute to effective sharing of values and co-production of knowledge by enabling four key processes: convening (bringing stakeholders together face-to-face), translation (of complex information across 'cultural' and language boundaries), mediation (of conflict through procedural fairness) and collaboration through reasoned dialogue. These processes help support the salience, credibility and legitimacy of outcomes.

The processes to identify and collect social values and co-produce knowledge can form the basis of a coastal hazard risk management and adaptation planning framework.

2. Methodology

2.1. Coastal Values Framework

In the present project, coastal values were taken to include a wide range of qualitative values. An innovative framework for classification was developed to clarify the term 'coastal values'. The new framework is based on properties (natural features and built assets) and attributes (uses and benefits) of the coast. It is designed to elicit and expand participants' perspectives and descriptors of their coastal values. It can then be used to organise and analyse the results.

In this framework, the fundamental or first order values are the 'Natural Features' of the environment, namely the ocean ecosystem, the beach (including the intertidal zone), the dunes with its ecosystem and/or the foreshore with its ecosystem which is often highly modified for human use.

The second order values are 'Built Assets'. These may be built by governments or by residents. To some extent Built Assets all depend on, impact on, take advantage of or add value to the first order values, the natural environment. For the purposes of coastal adaptation, built assets include infrastructure such as access and parking (e.g., roads, paths, boat ramps, carparks), picnic/play areas, ablution blocks, cafes and recreation enterprises (e.g., surfboard hire), utilities (e.g., sewage and power).

The third order values are 'Uses'. Uses are derived from both the first and second order values, that is, from the Natural Features and the Built Assets. Uses include active uses such as boating or fishing, and/or passive uses such as 'just being there' or observing nature. Active and passive uses primarily involve interacting with Natural Features or Built Assets. Social uses are primarily about human interactions that occur in relation to an Environmental Feature or Built Asset. Some uses depend on access to more developed built assets than others, e.g., playground compared with footpath. At a minimum, most active or passive uses of a beach or foreshore depend on the public being able to access them through a built asset such a road or parking area.

The fourth order values are 'Benefits'. These are derived from the 'Uses' of the coast. Benefits reflect the ways that 'Uses' enhance the physical, mental, spiritual, financial, social, or cultural wellbeing and experiences of coastal visitors.

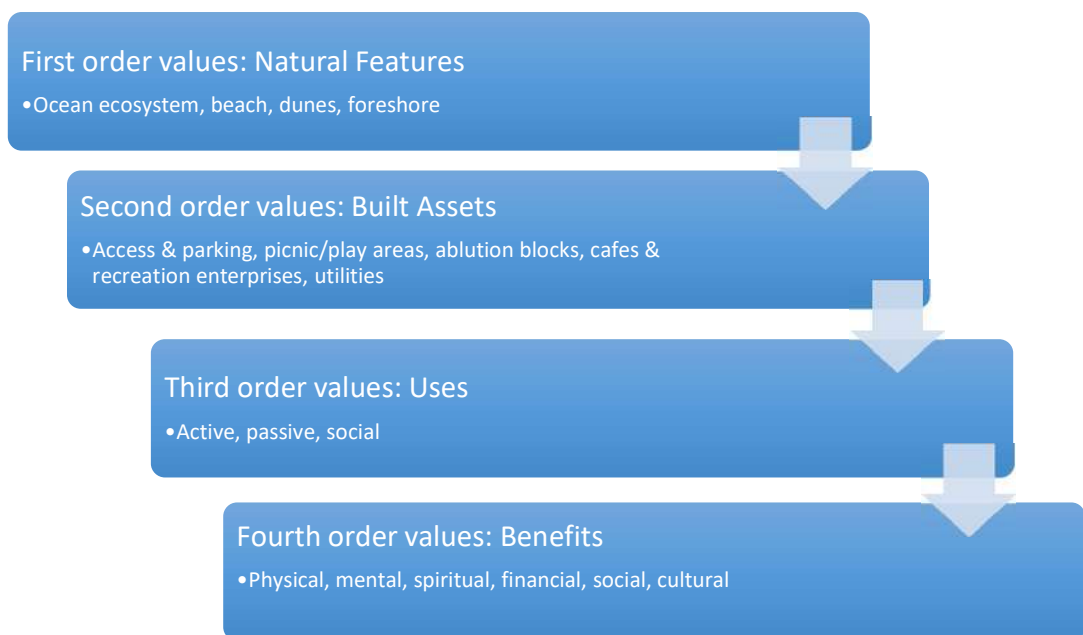


Figure 1: Coastal values framework

2.2. Community and Stakeholder Engagement Strategy

The Community and Stakeholder Engagement Strategy was guided by the *PNP Communication Strategy 2016 – 2019* that has adopted the International Association for Public Participation standards for community engagement and participation.

The community engagement for the project was developed as a process where each stage built on the preceding stage. Information sessions were designed primarily to *inform* the community. They introduce the community to the key issues of coastal adaptation and explain the project aims and timeline. They also provide an opportunity for the public to comment on or raise questions about the project. Coastal surveys were undertaken primarily to *consult* with the community in order to collect information about how they value the coast and understand the impacts of climate change on the coast. The scenario workshops were designed to *involve* the community and foster social learning. They build on information gained in the information sessions and coastal surveys. Scenario planning workshops using participatory Google Earth mapping can improve the engagement of community, the governance of the coast, and the management of coastal assets. The workshops elicit tacit knowledge and enable community, decision-makers, scientists and managers to deliberate fairly, often creating new knowledge together. The maps provide a spatially explicit visual focus that improves cognition. The workshops can thus improve the legitimacy of coastal adaptation decisions.

These three engagement techniques were developed and designed to sit together as a structured package that was rolled out the timeline of the project. The techniques are explained in further detail below.

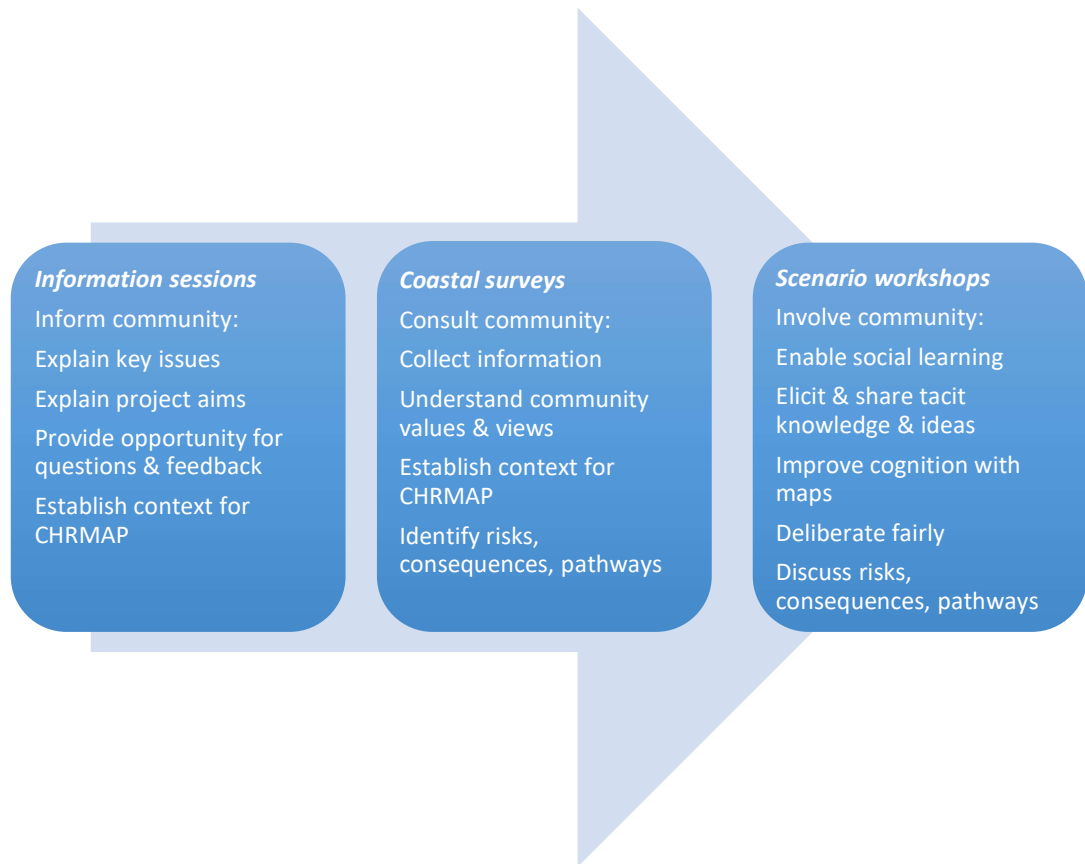


Figure 2: Community engagement techniques

To guide the delivery of the Project a Community and Stakeholder Engagement Strategy was developed. This 'living document' was updated as the Project progressed (Appendix B). The general approach of the strategy was to engage the community as early and fully as possible. A comprehensive list of stakeholders that included individual community members, business, not for profits, schools/colleges and community groups was identified and contacted. This list was updated as required.

Interviews with Traditional Owners were also conducted in Bunbury and Rockingham, but due to unforeseen circumstances was not conducted in Busselton. The outcomes of these interviews informed the development of a coastal hazard risk management and adaptation planning framework.

2.3. Study Areas

The study areas were at the 'beach-scale'.

Bunbury Back Beach - City of Bunbury

The City of Bunbury currently has a population of approximately 33,000. Thirty percent of dwellings are within a five minute walk (300m) of the coastline and/or waterways and all dwellings are within a five kilometre radius of the coastline and/or waterways (City of Bunbury Strategic Community Plan 2018–2028). The Project study area is from Wyalup-Rocky Point to Pandal Street and includes ablutions, showers, access stairs, car parks, surf club, café, grassed foreshore area and residential and commercial buildings. Significant coastal management has been undertaken, including construction of a



seawall.

Figure 3: Bunbury Back Beach – from Wyalup-Rocky Point to Pandal Street, Bunbury. Red line is 0.9m sea level rise scenario [high] (Damara WA, 2012).

Waikiki Beach - City of Rockingham

The City of Rockingham is nearly 260 km² and currently has a population of approximately 140,000, which is expected to grow beyond 175,000 in the next ten years (City of Rockingham, Sustainability Snapshot Report 2017). Waikiki beach is one of Rockingham's major beaches along the City's 37 km stretch of coastline. The Project study area is from Donald Drive to Short Street and includes ablutions, showers, access ramp, car park, basketball court, playground, BBQ's, picnic shelters, grassed foreshore area, a memorial and residential and commercial buildings. It is identified by the WA Government as a coastal vulnerability hotspot, which has required significant management including construction of a buried seawall and sand nourishment.



Figure 4: Waikiki Beach - from Donald Drive to Short Street, Waikiki. Red line is 0.9m sea level rise scenario [high] (Damara WA, 2012).

Old Dunsborough Foreshore - City of Busselton

The City of Busselton covers an area of 1,454 km² and has a current population around 36,000 (City of Busselton Strategic Community Plan 2017). The study area is from Curtis Bay in Meelup Regional Park to Beach Road and includes ablutions, showers, boat ramp, car parks, grassed foreshore area, conservation reserve and residential buildings.

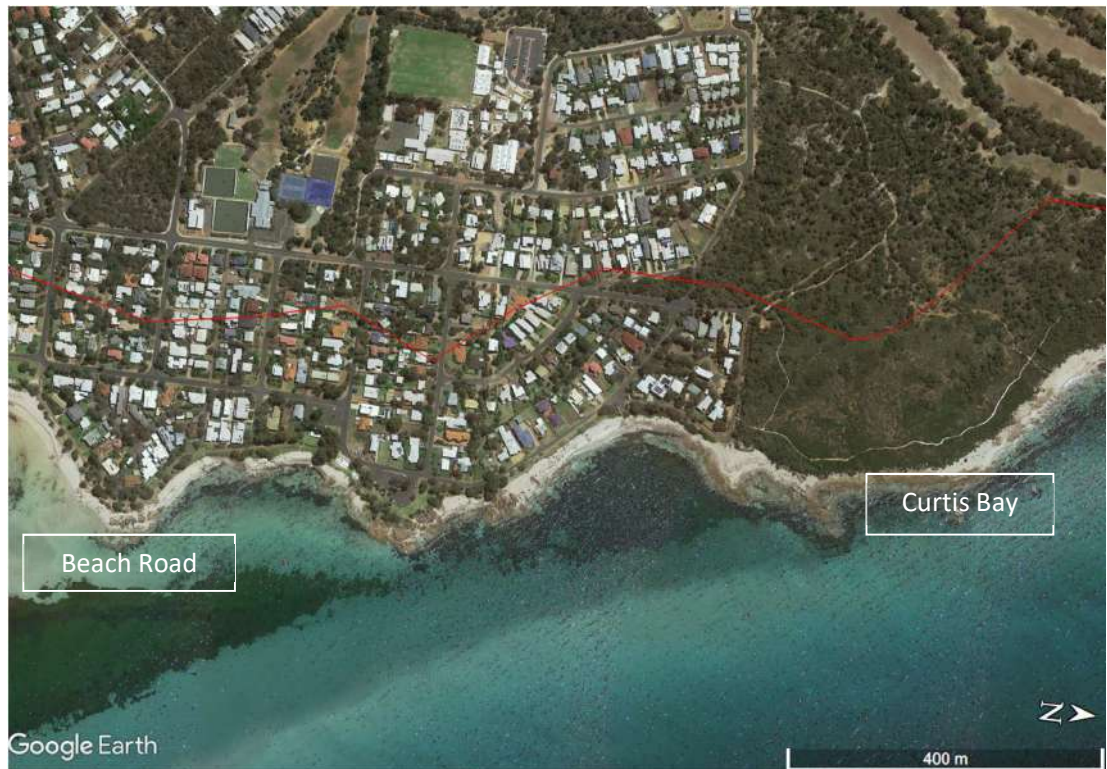


Figure 5: Old Dunsborough Foreshore from Curtis Bay in Meelup Regional Park to Beach Road, Dunsborough. Red line is 0.9m sea level rise scenario [high] (Damara WA, 2012).

2.4. Information Sessions

Information sessions were held at all three local governments to promote the Project and raise awareness of coastal climate change issues and management. These 1.5 hour sessions were designed to raise awareness of coastal values, hazards and risks with the community and stakeholders. They were advertised widely to the general public via media releases in local newspapers, on noticeboards and on the PNP website. A Welcome to Country by Traditional Owners (excluding Busselton) preceded presentations made by the PNP, Research Masters student, relevant local government, WAPC, Department of Transport and in Bunbury and Busselton, the South West Catchment Council. These presentations provided an overview of the Project, the PNP,

coastal processes and issues, state and local government policy settings and approaches to coastal management and adaptation. Before and after surveys were also undertaken to assess how much participants had learned at the information sessions.

2.5. Beach User Surveys

The Beach User Survey (Appendix C) was developed in consultation with the local governments to address the gaps in research and literature and to answer the research questions relevant to objective one (see Section 1.1 – Objectives). Two survey methods were adopted: face to face and online (using the same survey questions). They were both promoted via media releases, PNP and local government websites and direct contact.

The face to face surveys were undertaken by walking up to pseudo-random respondents at the beach and delivering a questionnaire or providing a handout that included a link to the online survey. To ensure that a wide demographic of beach users had the opportunity to participate, face to face surveys were delivered at different days and times over the survey period from September 2017 to April 2018. An objective was to survey beach users in all seasons. Unfortunately due to unforeseeable delays, including a delay in appointing the consultant, the winter surveys could not be undertaken. The face to face surveys were undertaken by PNP Officers with assistance from volunteers at Old Dunsborough Foreshore and local government officers in Bunbury. To complement the face to face surveys, PNP set up an Information Booth at Bunbury Back Beach on two occasions for approximately four hours on each occasion. The booth provided beach users an opportunity to complete a survey, discuss issues, provide qualitative comments and stories (as did the face to face surveys) and view information and examples of coastal adaptation. As an incentive, free passes to Dolphin Discovery Centre were also provided.

An online survey was also developed and promoted using Survey Monkey. The online survey contained the same questions as the face-to-face survey. Stakeholders in the study areas such as businesses, NGO's, schools and community groups were contacted via email and invited to complete the online survey. Two signs at each site were also erected providing brief information and a link to the online survey. A letterbox drop of approximately 100 letters was undertaken in the Waikiki Beach study area. The letter provided an overview of the Project and directed people to the online survey. A copy of the letter is provided as Appendix D.

2.6. Demographics

To assess if the beach users survey dataset is representative of the broader Local government populations, an analysis was undertaken to compare the age profiles and gender of respondents completing the beach user surveys with the populations of the relevant local government areas.

As can be seen in Figures 5, 6 and 7, there are differences, but the demographics of the beach user survey are generally representative of the local government populations across all three sites. There is an under representation in the under 18 category, but this was expected as the survey was not designed for children and it was anticipated that schools would assist with delivering the surveys. Other notable differences include an under representation in the 18 – 20 category in Bunbury and Waikiki, but an over representation in Dunsborough. This over representation in Dunsborough could reflect that anecdotally more young people seem to be actively engaged in social and environmental issues in this community. There is also an over representation in the middle age categories across all sites. These differences could reflect the demographics of those that go to the beach and/or completed the survey. This result is not dissimilar to community surveys on other matters undertaken by local governments and could suggest that middle age community members are more likely to complete surveys.

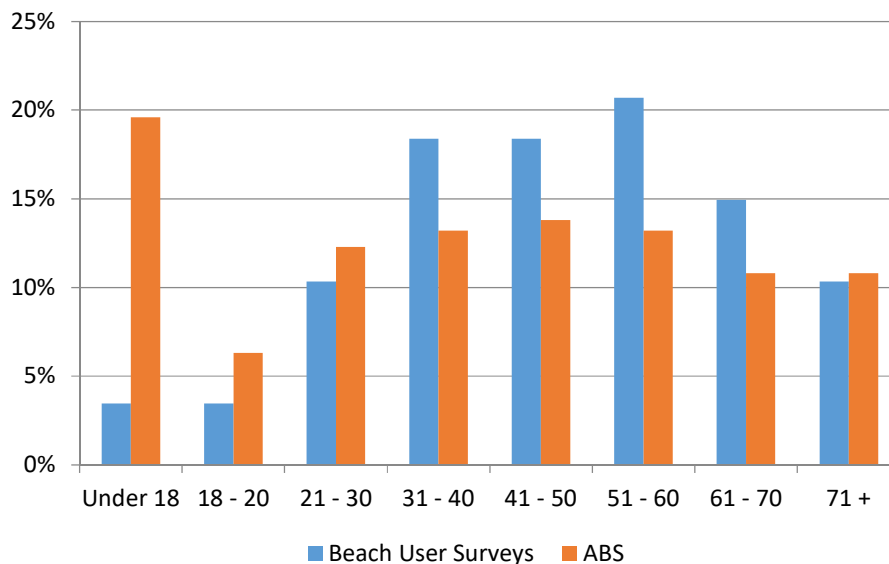


Figure 6: Bunbury Back Beach comparison by age of ABS data and beach user surveys (n=87)

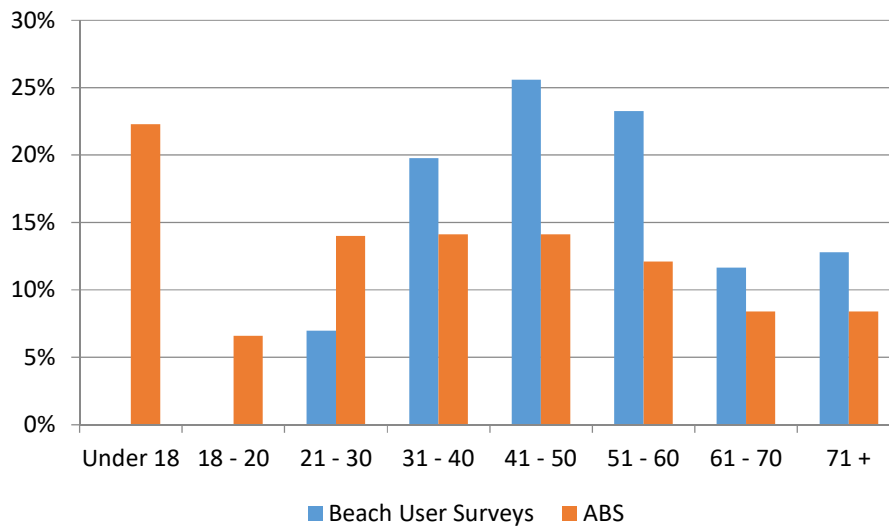


Figure 7: Waikiki Beach comparison by age of ABS data and beach user surveys (n=87)

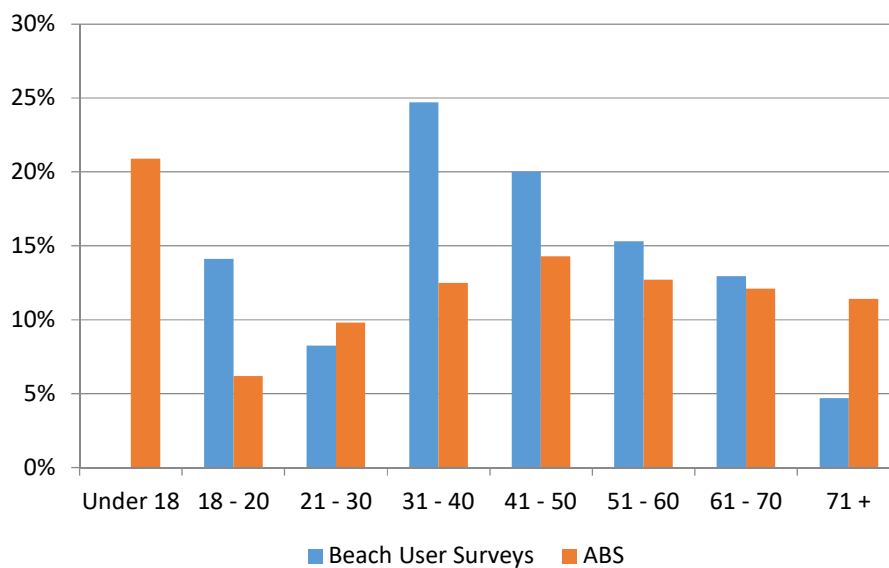


Figure 8: Old Dunsborough Foreshore comparison by age of ABS data and beach user surveys (n=85)

Note: Australian Bureau of Statistics (ABS) age brackets were amended slightly to align with the age categories in the beach user survey.

In regards to gender (Figure 8), more females than males completed the survey. This result reflects the ABS data showing a larger proportion of females than males in all three sites. However a discrepancy between the beach user survey and ABS data in the female/male ratio is notable in Bunbury and Waikiki: a disproportionately large number of females completed the survey. There is no such discrepancy at Old

Dunsborough Foreshore. A reason for the higher number of females completing the survey in Bunbury and Waikiki could be attributed to more surveys being completed online in these areas, and females may be more likely to take part in an online survey.

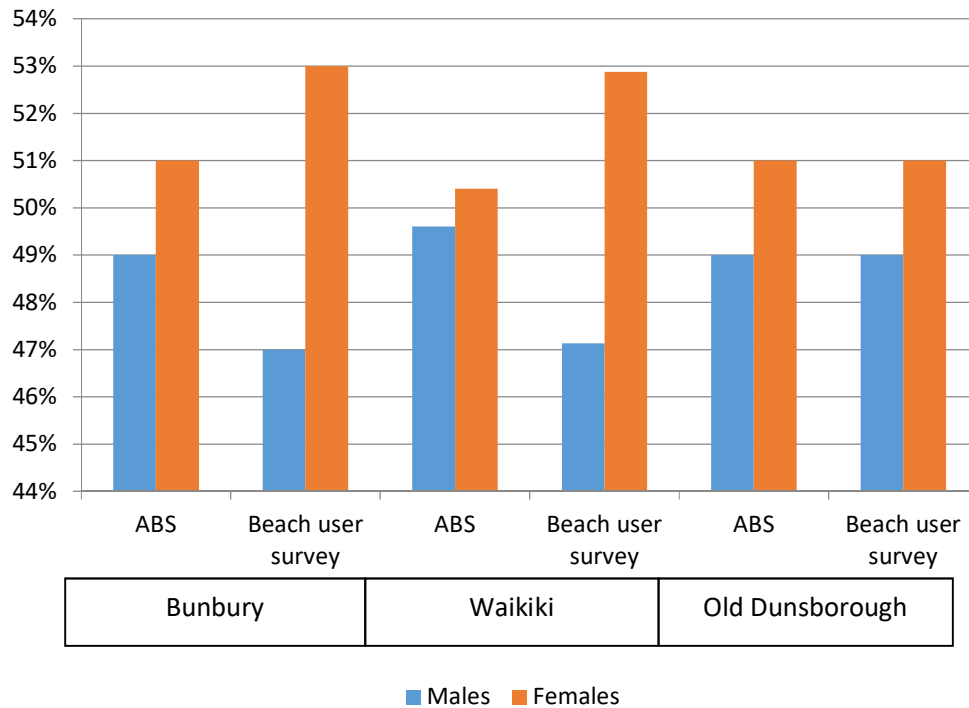


Figure 9: Gender differences between ABS data and completed surveys and by location

In regards to where respondents who completed the beach user surveys reside, Figure 9 shows if they live in/near the study area, in the wider local area, in the Local Government area or outside of the Local Government area. As can be seen there is range of responses across a wide geographical area for all three sites, which illustrates that the survey reached community members who did not live in the immediate vicinity.

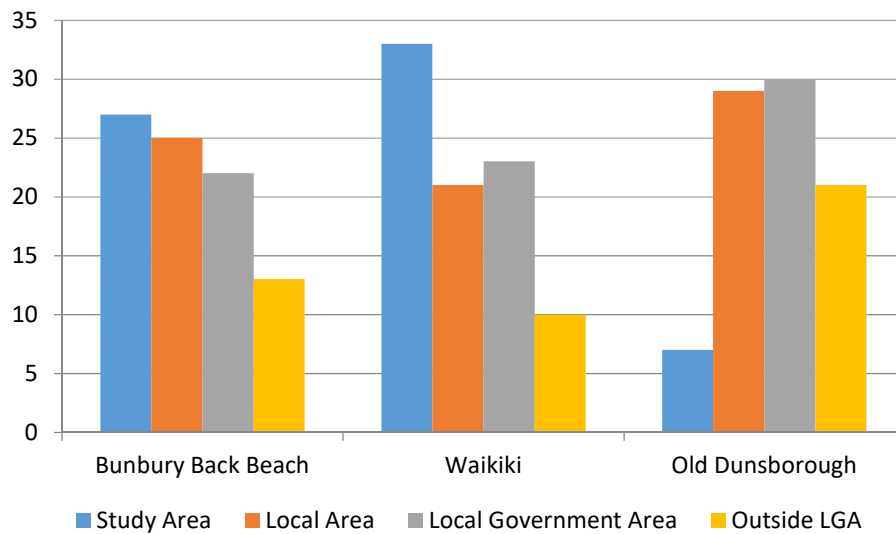


Figure 10: where respondents who completed the beach user surveys

2.7. Scenario Planning Workshops

Scenario planning workshops have been delivered in Mandurah and Busselton in the past and have proven to be successful. A key output of these past workshops was the identification of environmental, social and economic hotspots. The outcomes of the workshop held in Busselton are outlined in the Busselton Coastal Adaptation Community Awareness Plan (Booth & Cox, 2013). One benefit of scenario planning workshops such as these is the ability to modify the methodology and scope to meet the required objectives and desired outcomes, which in the case of this Project was to gain an understanding of how the community values the coast.

The scenario planning workshops built on the information sessions and beach user surveys. The first aim of the workshops was to improve shared understanding of coastal values through community engagement. A second aim was to show how this understanding can improve coastal risk management and adaptation planning. One half-day workshop was held at each of the three study areas.

A Welcome to Country by Traditional Owners (excluding Busselton) preceded presentations made by the PNP, Production Function, Research Masters student (who assisted the consultants, Production Function), relevant local government and WAPC (excluding Busselton). The presentations provided context for the day and included an overview of the Project, preliminary results of the beach user surveys and state and local government policy settings and approaches to coastal management and adaptation. Before and after surveys were also undertaken to assess: the impacts of the workshops on the levels of knowledge and concern among the participants; and, the attitudes of the participants towards roles of stakeholders in coastal adaptation.

Participants were seated in three groups of approximately four to six community members and stakeholders, with a laptop loaded with Google Earth (with hazard maps of the study area) and physical A1 maps of the site. Each group had a facilitator who had a background and expertise in climate change adaptation. Their key role was to lead the discussion among participants and to communicate with the scribe. The scribes were experienced and/or instructed with the Google Earth mapping tool. 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. A Google Earth template of Folders and Placemarks with appropriate icons was developed for specific use in the workshops to make the recording and analysis processes easier.

The scenario selected used a sea level rise of 0.9m, with no expected timeframe provided. This scenario was informed by the 2110 erosion (high) line from *Coastal Hazard Mapping for Economic Analysis of Climate Change Adaptation in the Peron-Naturaliste Region* (Damara WA, 2012).

The first group mapping exercise focused on identifying and prioritizing consequences.

1. Discuss how you as individuals **use** this site and how do you **benefit** from those uses.
2. What are your top **3 priority uses and benefits** for this site (e.g., use = walking; benefit = fitness)? Locate these on the map (GE).
3. What are the **physical consequences of 0.9 m sea level rise to your site** if we do not respond to climate hazards (e.g., loss of beach, road access)? Locate these on the map (GE).
4. What are the **impacts on your uses and benefits** identified at the sites for 0.9m sea level rise (e.g., can't walk anymore; lose fitness). Locate these on the map (GE).

The second group mapping exercise focused on adaptation actions.

1. For each of your group's 3 priority uses and benefits, identify **what natural features and built assets need to be maintained** to provide for these (e.g., accessible beach). Locate these on the map (GE).
2. Consider the adaptation options and **identify practical actions for adaptation** at your Old Dunsborough Beach sites (e.g., soft protection of dunes with revegetation). Locate these on the map (GE).

3. **Identify roles** that should be taken by individuals, communities, local and state governments (e.g., community involvement in local government organised planting days)?
4. How do we **resource the adaptation actions**? Who should pay? Ratepayers? Contributions from State/Federal governments?

Note: Google Earth activities are marked [GE].

Recruitment of workshop participants was carried out primarily by the PNP with assistance from relevant local governments. Participants that provided contact details to attend the workshops in the beach user survey and Information Session surveys were also invited to the workshops. Direct invites were sent to key stakeholders at each site and those community members who had indicated an interest at the Information Sessions or in the beach user surveys. Approximately 150 letters were sent to random street addresses in Bunbury and 300 in Busselton. The workshop was also promoted via media releases, PNP website and on the City of Rockingham Facebook page.

3. Results and Discussion

3.1. Information Sessions

The information sessions were held at Busselton on 12/9/2017, Bunbury on 14/9/2017 and Rockingham on 11/10/2017. A summary of results from the before and after surveys is set out below. A copy of the Busselton and Bunbury survey is provided as Appendix E. It needs to be noted that the Rockingham survey was shortened because a number of the same questions were asked in the beach user survey, and to encourage people to complete all of the survey questions.

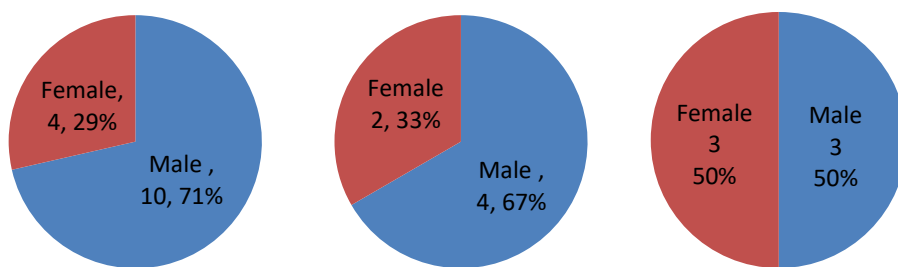


Figure 11: Busselton (Old Dunsborough), Bunbury (Back Beach) & Rockingham (Waikiki) Information Session – attendance numbers by gender.

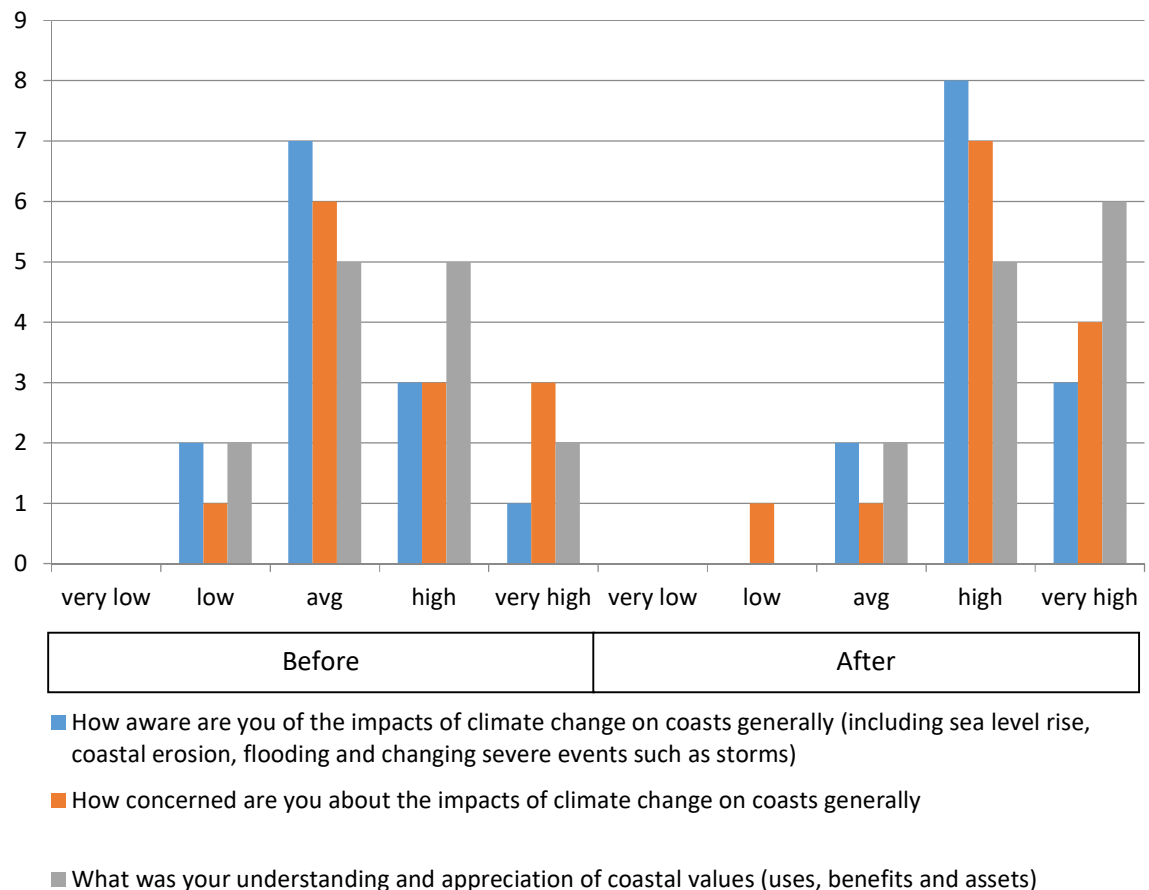


Figure 12: Busselton information session survey question responses (Old Dunsborough) relating to changes (before and after workshop) in understanding and appreciation of coastal values, awareness and concern of impacts of climate change on coasts.

Attendance numbers were relatively low at all three sessions (but comparable to similar events) and as such the results may not be representative of the community at large. The discussions based on these results need to be read in this light. The low numbers in attendance could be due to the Project not including the entire coast and being limited to an individual beach. The timing of events is always an issue and may have been a contributing factor in this project. Also, local governments are often undertaking community engagement on various matters at any one time, which can result in low attendance and participation. Low numbers may also have been due to the format of information sessions which are primarily designed to provide information rather than to provide platforms for the community to voice their opinions.

Attendees were asked to rate any changes in their levels of understanding and appreciation of coastal values and awareness and concern of impacts of climate change on coasts. An increase was observed across all three questions at the Busselton session. No notable change was noted in Rockingham responses. At the Bunbury session, the 'after' component of the survey was not completed by all attendees and therefore the results to this question are not useful. Based on results of the Busselton

session it could be said that there is benefit in these types of events to raise levels of understanding and awareness in the community.

In relation to the assets and qualities that respondents think should be maintained so that they can continue to be enjoyed on the coast, the highest level of importance noted by Busselton and Bunbury participants was for *clean undisturbed beaches, healthy vegetation, protected dunes and foreshore areas to walk and fish etc.*, followed by *access to the beach*. *Places to safely launch recreational boats* was marked as being of least importance. This question was not included in Rockingham survey to encourage participants to complete the survey and avoid duplication of questions in the beach user survey.

The same question was asked before and after the information session regarding the *best options to adapt to coastal hazards (such as erosion and flooding) now and into the future* to identify any changes in attendees opinions that may have occurred, potentially as a result of being made more aware of coastal processes and adaptation approaches. Figure 12 shows the results from the Busselton session.

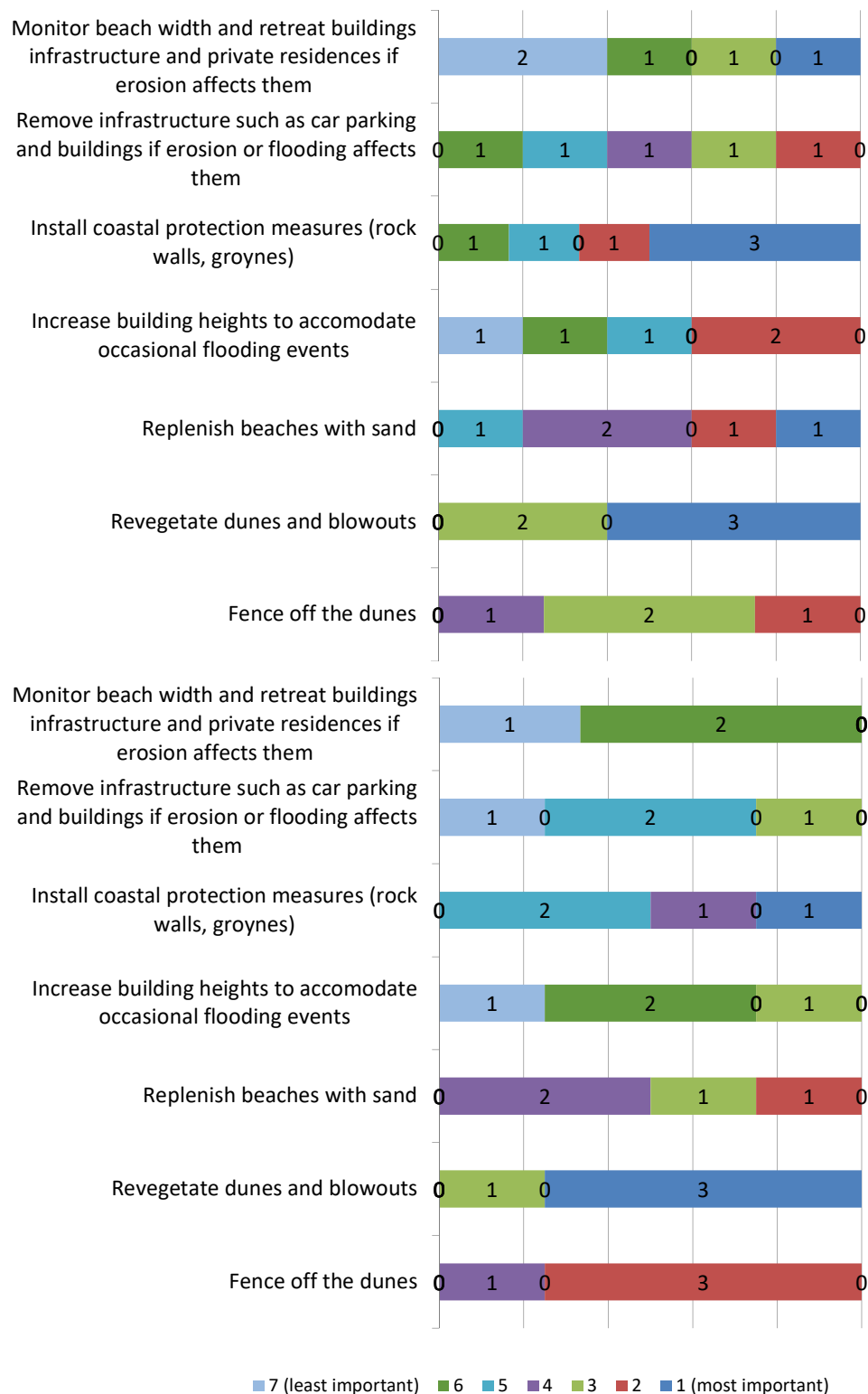


Figure 13: Busselton survey question responses (before – top; after – bottom) regarding the best options to adapt to coastal hazards (such as erosion and flooding) now and into the future

Most notably, there was an increase in the perceived importance of fencing off dunes and decrease in the perceived importance of monitoring and installing coastal protection. This could indicate that as a result of raising awareness and understanding, people's views on types of coastal adaptation options can change. For example, after being made aware of the potential negative impacts of hard coastal protection measures, some people may prefer softer protection options such as fencing off dunes. The Bunbury results were not included as the 'after' surveys were not completed by many and these questions were not included in the Rockingham survey.

3.2. Beach User Surveys

The beach user surveys commenced in October 2017 and concluded in April 2018. They thus included the seasons of spring, summer and autumn. The surveys comprised of 31 questions. In total, 87 surveys were completed at Bunbury Back Beach, 87 at Waikiki Beach and 88 at Dunsborough Foreshore. Of these, 19 were face to face at Bunbury Back Beach, 6 at Waikiki Beach and 27 at Old Dunsborough Foreshore.

Online and Face to Face Survey Differences

When comparing the online results to the face to face results overall there were no notable difference in the results, but there were some interesting differences that are outlined following.

- More face to face respondents (69%) indicated that were renting in Old Dunsborough compared to the online responses (12%).
- In Old Dunsborough, more face to face respondents (27%) indicated that they visit the beach/foreshore (seasonally i.e. in the summer holidays) as compared to online responses (8%). This could be due to more tourists on the beach in the Old Dunsborough area.
- In Bunbury, more face to face (47%) respondents had limited awareness of the general impacts of climate change compared to online (7%).
- In Waikiki, more people indicated that they had observed notable changes at the beach in the face to face as compared to online surveys. This could be due to low face to face responses (6) or to people in the face to face surveys being at the beach more often.

Seasonal Differences

There were no remarkable seasonal differences in trends across the three sites. There was one noteworthy difference at Waikiki where more respondents strongly agreed in February 2018 that it was important to them that they live close to this beach as compared to the other months (October 2017 to April 2018). This could reflect the benefits of living close to the beach during what is typically the hottest month of the year.

Following is a summary of key results from the survey that combines the face to face and online surveys. The result of all survey questions has been provided to the relevant local governments.

Proximity to Beach

In relation to how close respondents live to the beach (Figure 13), there was a wide spread of responses across the three sites, with most living between a couple of streets back from the beach/foreshore to between about one and ten kilometres. The smallest cohort in Bunbury and Waikiki was those living greater than 10km away and in Dunsborough those directly adjacent. This could reflect that Bunbury and Waikiki are more 'local beaches' as compared to Old Dunsborough, which is more of a 'regional beach' that people drive to or visit whilst on holidays.

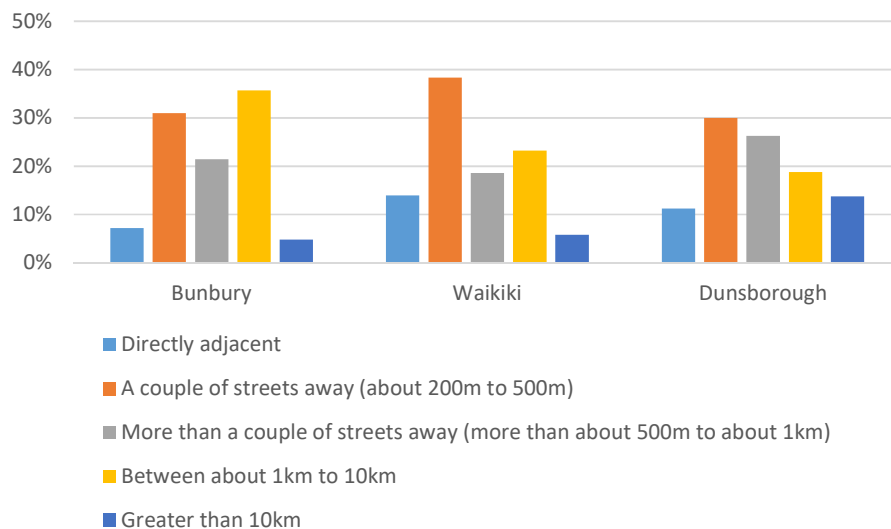


Figure 14: Responses for survey question regarding how close to the beach they live (n=250).

A comparison of the responses from those that live **directly adjacent** to the beach/foreshore to **all** responses reveals several differences, as set out below. It should be noted that the responses from those living directly adjacent were relatively few (Bunbury – 6, Waikiki – 12 and Dunsborough – 9).

Bunbury

- In regards to the importance of assets and features of the beach/foreshore, the responses from those living directly adjacent to the beach placed higher importance on: *public safety* (~67%) compared to all responses (~36%); and *private residences adjacent to beach* (~50% as compared to ~8%).
- In regards to options to manage coastal hazards, those living directly adjacent were: more against *placing notifications on titles* (~25% [strongly against] as compared to approximately ~6%); and not supportive of *removing infrastructure if hazards impacts them* (0% [strongly support] as compared to ~26%).

Waikiki

- In regards to the importance of assets and features of the beach/foreshore, the responses from those directly adjacent to the beach placed more importance on *private residences adjacent to beach* (~55% [high importance] as compared to ~13%).
- In regards to options to manage coastal hazards those adjacent to the beach, those adjacent were: more supportive of *installing coastal protection* (~30% [strongly support] as compared to ~11%); and more against *placing notifications on titles* (~36% [strongly against] as compared to ~6%).

Dunstable

- In regards to the importance of assets and features of the beach/foreshore, the responses from those directly adjacent to the beach placed more importance on: *public safety* (~60% [high importance] as compared to ~33%); and *private residences adjacent to beach* (~60% [high importance] as compared to ~8%).
- In regards to options to manage coastal hazards, there were some noteworthy differences between those adjacent to the beach and all responses. For example: the vast majority of responses from those directly adjacent were strongly against *doing nothing* (compared to ~33% for all responses); more were against *placing notifications on titles* (40% [strongly against] as compared to ~6%); more were against *sand replenishment* (60% [strongly against] as compared to ~10%); more were against *removing infrastructure if hazards impact them* (~40% [strongly against] as compared to ~4%); and more were against *installing coastal protection* (~40% [strongly against] as compared to ~14%).

Many of the differences noted above are not surprising given that those living directly adjacent to the beach/foreshore have homes at potential risk and as such would place greater importance on these assets and the subsequent (economic and non-economic) benefits and in the selection of management options.

Importance of Living Close to Beach

Regarding why it is important to live close to the beach and what the benefits are, the following word clouds were generated from the online surveys. The size of the text reflects the number of times the word was cited by respondents.

As can be seen in Figures 14, 15 and 16, there were common themes across the three sites. It is interesting to note that these themes align with the classification framework developed for this Project to identify coastal values. Features such as the beach and natural environment were prominent as were the uses of the coast such as swimming and walking and the physical, mental and spiritual benefits provided by the coast. Interestingly, built assets were not mentioned to any great extent. This would suggest that the natural intrinsic values of the coast are of more importance and provide more benefits than the built assets.



Figure 15: Importance and benefits of living close to the beach at Bunbury Back Beach (n = 59).



environment old area mental
beautiful part park picnics
properties play boat sense activities
being beauty looking Calming kids
relaxation Easy enjoy nice love
reason lifestyle paddletime track
Dunsborough social biology great boating going
trail alongwith Regional surfing many paddling
go kayaking place safe relaxing days important
coast health Cape close
away dogs beach local walks
take well values strong sea foot walk
fishing parks completely open lessons
outdoors able here all ocean while bbq
waters most use foreshore ramp
dog supports trails location
swimming along recreational
coastal pristine
exercise Meelup well-being natural
recreation Because
child access

WordItOut

Main Beach Activities

The main activities at the beach are shown in Figure 17. Results are similar across the three sites. Walking/running, swimming and time with family/friends were the highest ranking activities across all sites. These activities (uses) correspond with the importance of living close to the beach illustrated above. Boating/jet skiing was the lowest ranking activity although more respondents undertook this activity at Dunsborough, more than likely due to the location of the boat ramp at this site.

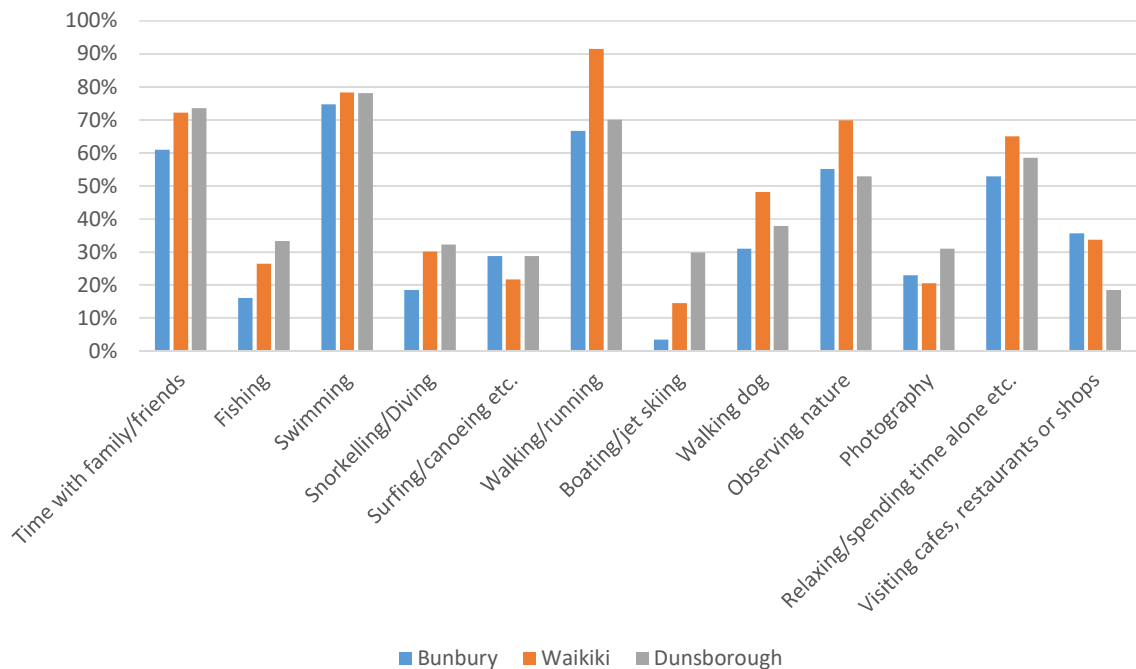


Figure 18: Main activities undertaken at the beach (n = 257).

Benefits to Lifestyle, Health and/or Wellbeing

In terms of the importance of visiting the beach/foreshore to benefiting lifestyle, health and/or wellbeing, the results were similar across all sites. Mental/emotional health benefits ranked as being of highest importance to approximately 60% or respondents across the sites, physical benefits was of highest importance to about 50% and spiritual/cultural about 30%. The results indicate that the beach/foreshore provides benefits across the board and is an important place for physical/mental health for the majority and has spiritual and cultural benefits for many. These responses align with the answers provided to the importance of living close to the beach question (Figures 14, 15 and 16).

Importance of Assets and Features

In regards to the importance of assets and features of the beach/foreshore, across the three sites (Figures 18, 19 and 20); *environmental qualities such as clean water, vegetated dunes, native trees and animals* were identified as being most important. *Public safety, public facilities, facilities for active recreation* and *Indigenous and other cultural sites* were also noted as being of high importance to many. *Private residences adjacent to the beach* were identified at all three sites as being not important to many. This could reflect that the majority of respondents did not live directly adjacent to the beach/foreshore. *Restaurants, cafes, tourism ventures* and *access infrastructure* were rated as being of less importance at Old Dunsborough. This could be due to there being no permanent cafes at/or relatively close to Old Dunsborough and this beach/foreshore not being on a major road as is the case in Bunbury and Waikiki.

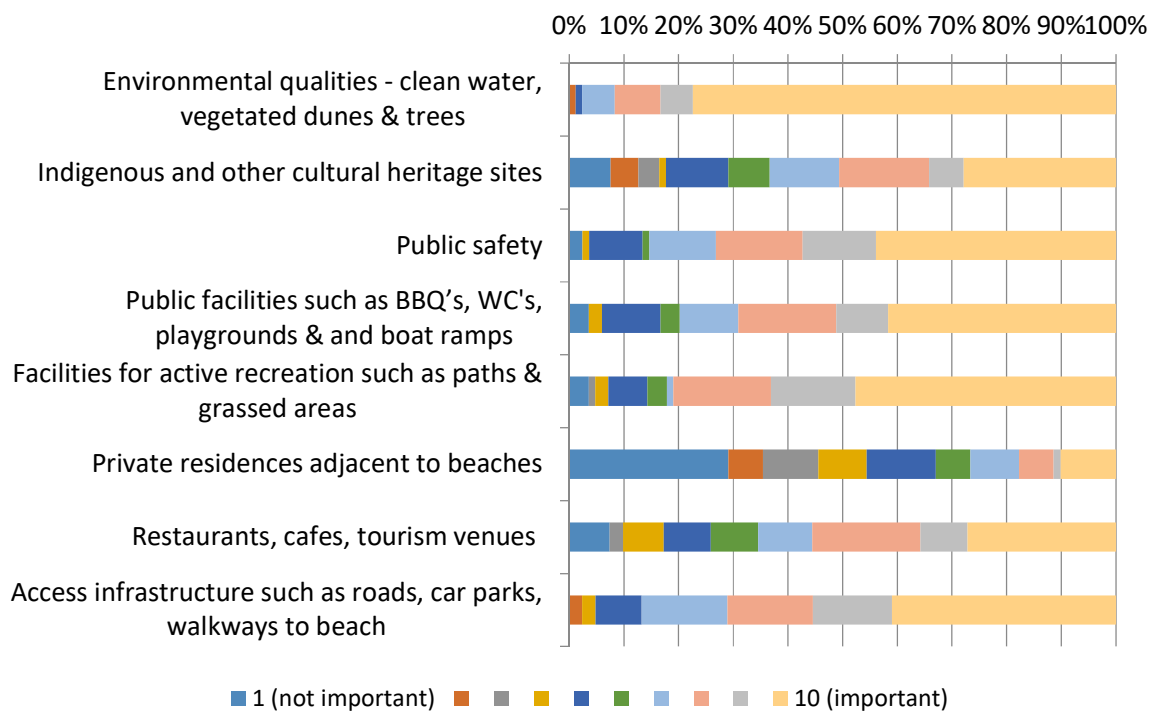


Figure 19: Bunbury responses relating to the importance of assets and features of the beach/foreshore (n = 87).

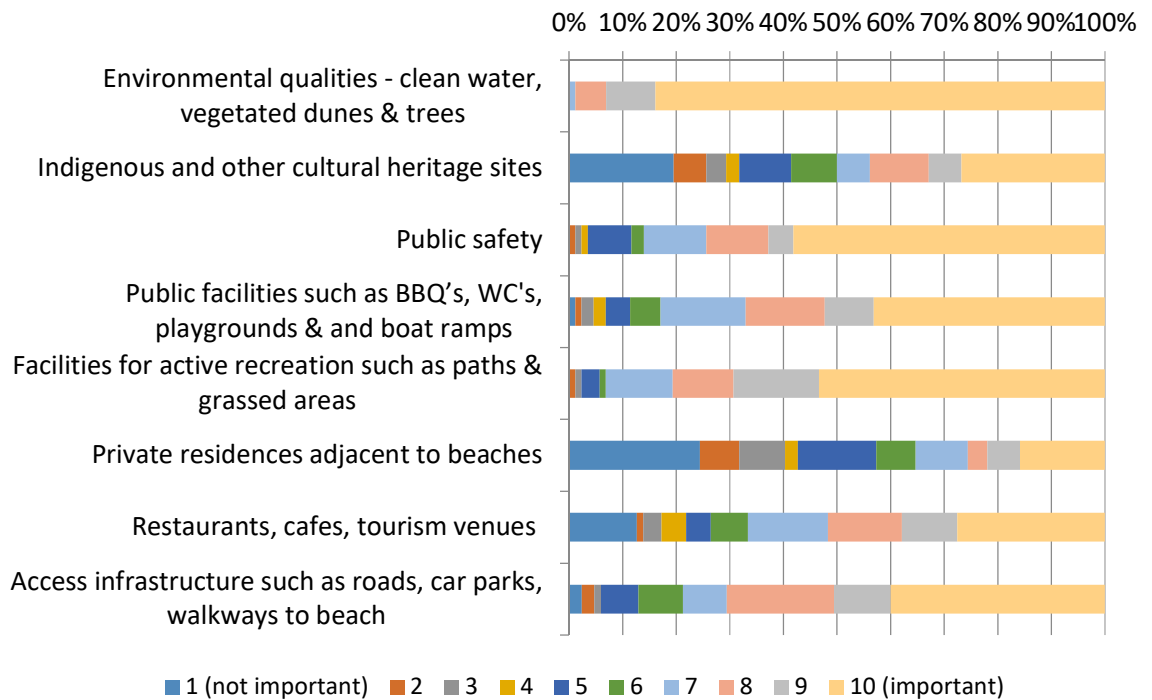


Figure 20: Waikiki responses relating to the importance of assets and features of the beach/foreshore (n = 87).

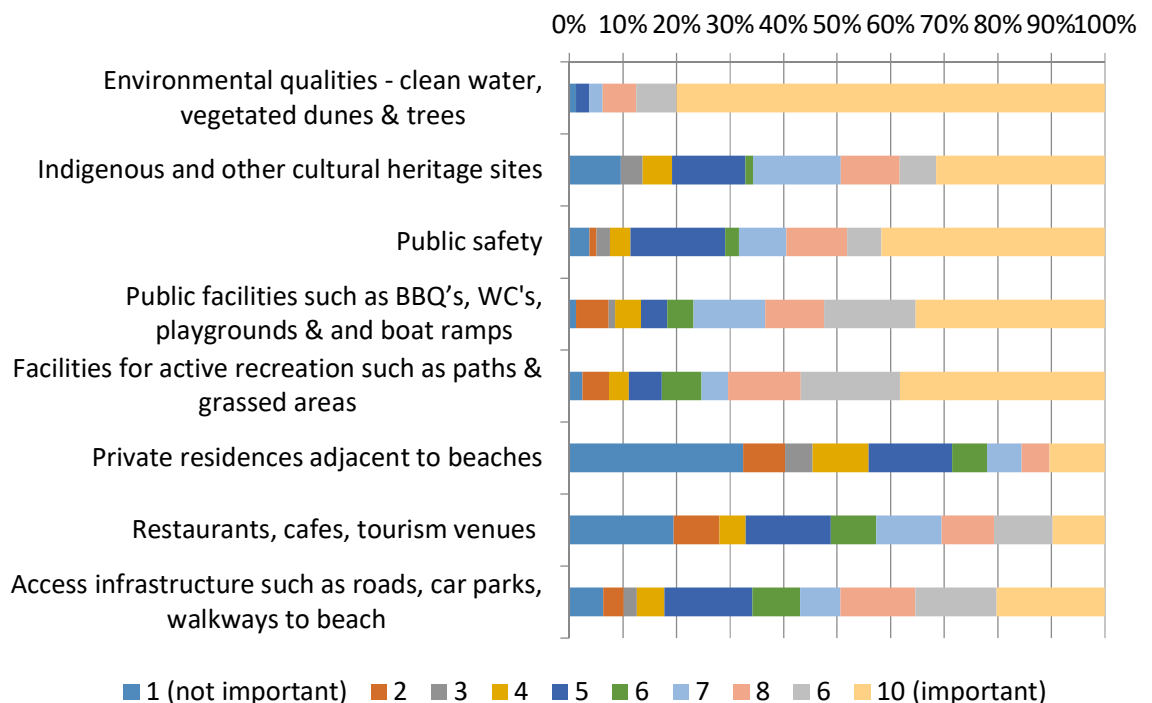


Figure 21: Old Dunsborough responses relating to the importance of assets and features of the beach/foreshore (n = 88).

Changes at Beach/Foreshore

In relation to changes noticed at the beach/foreshore (Figure 21), respondents at Waikiki noticed most changes in regards to *beaches eroding (narrower beach)*, *dune vegetation becoming sparser or under repair* and *infrastructure such as jetty, boat ramp fences, footpaths etc. damaged or affected by storm events*. Flooding was noted as being minor across all three sites.

Some potential explanations for the responses include that a time period was not specified in the question, which could have influenced some responses. Also, coastal monitoring suggests that Old Dunsborough Foreshore has been relatively stable in recent history, but erosion has occurred recently at Waikiki and Bunbury (including major impacts from Cyclone Alby in 1978) that has been actively managed by the local governments. The results of the survey seem to reflect this.

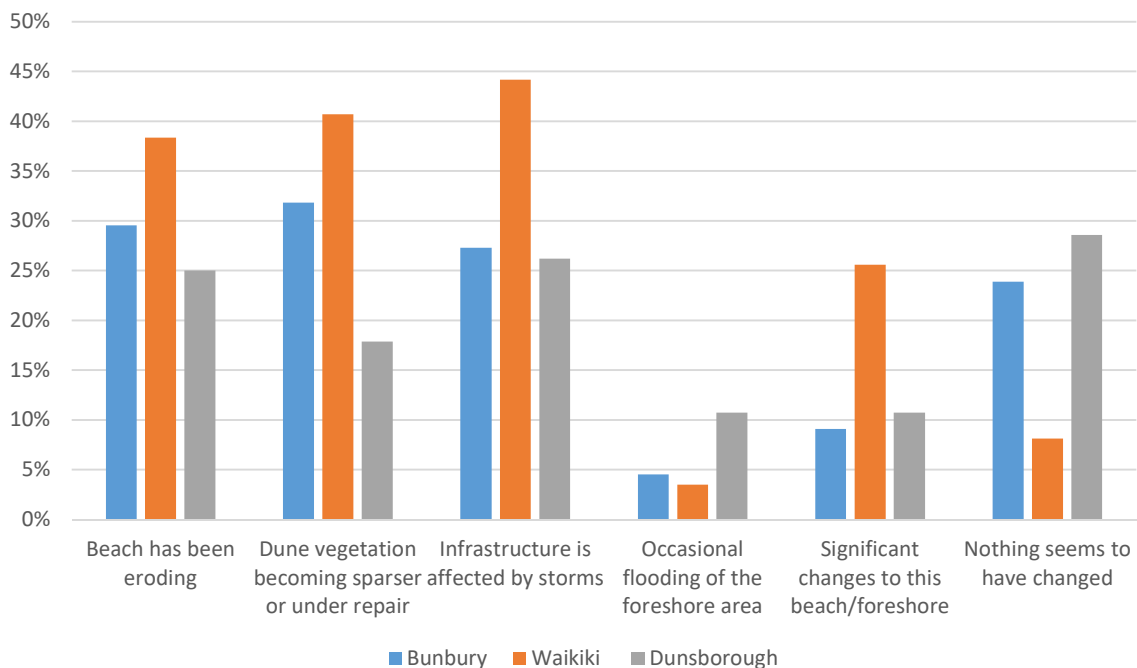


Figure 22: Responses related to observed changes noticed at the beach / foreshore (excluding changes from building and development). Participants could select all relevant answers (n = 255).

Concern about Impacts of Climate Change

In relation to *concern about the impacts of climate change on coasts generally*, the majority of respondents at all 3 sites were concerned. Likewise for *awareness about the general impacts of climate change on coasts*, the majority of respondents were either *aware of general impacts* or *very aware of general and local impacts*. This could reflect the interests of people completing the survey i.e. those with an interest are more likely to complete the survey.

Perception of Erosion

Regarding *perceptions of erosion at beach/foreshore* (Figure 22), the results were similar at all sites. Most respondents believed that erosion was due to a *combination of normal coastal processes and climate change and likely to get worse in the future*. Around 20% of respondents believed that this was *something needing urgent attention by government (all levels)*. A small percentage suggested that this was *nothing to worry about*. There was a minor difference in the Waikiki results with more respondents indicating that erosion of the beach was a combination of normal processes and climate change, likely to get worse in the future and needing urgent attention. Also, fewer respondents at Waikiki suggested that erosion was nothing to worry about. This aligns with the results regarding changes noted at Waikiki beach/foreshore (Figure 21) and could be due to the relatively recent erosion at Waikiki.

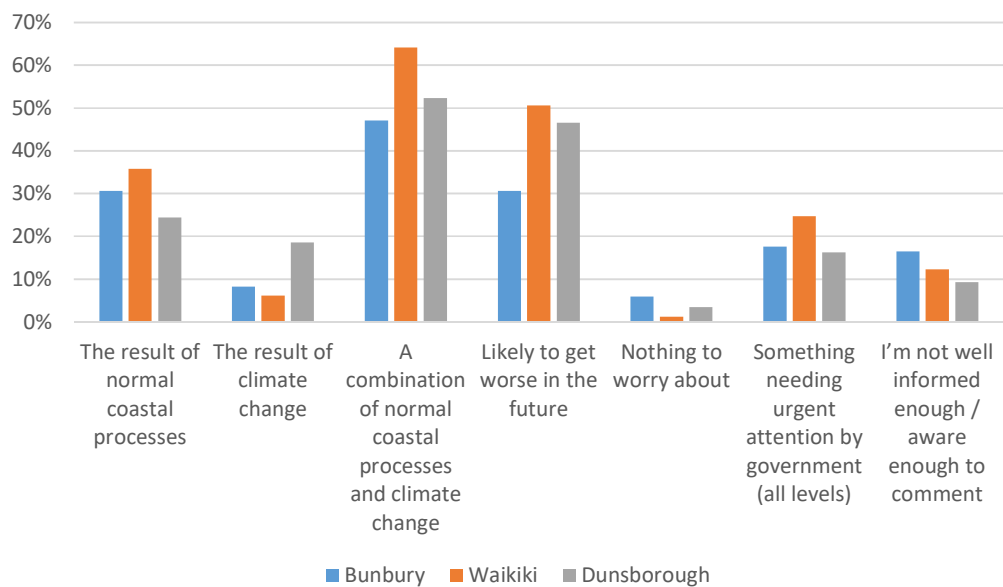


Figure 23: Responses relating to erosion at the beach/foreshore. Participants could select all relevant answers (n = 258).

Concern about Impacts

Regarding *concern about the impacts of erosion, flooding and/or storms impacting their use of the beach/foreshore* (Figure 23), results were similar across the sites: the majority of respondents agreed that there was reason for concern.

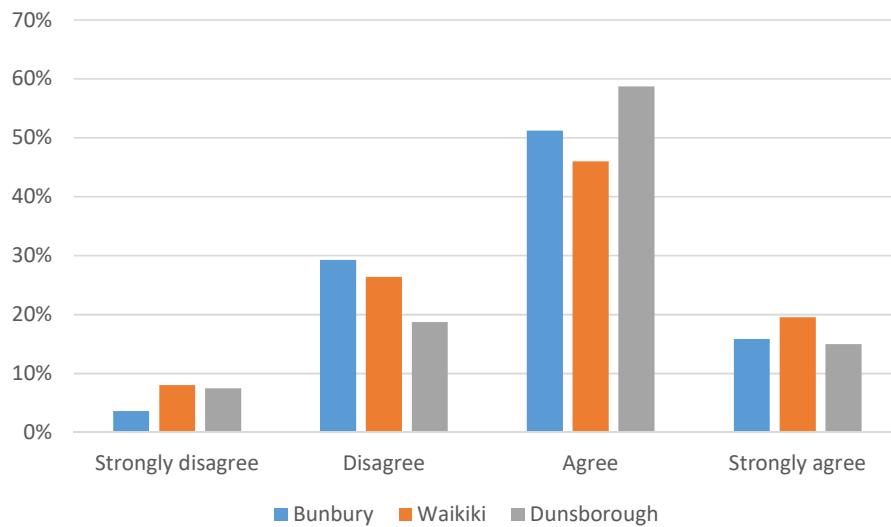


Figure 24: Concern about that the impacts of erosion, flooding and / or storms impacting use of the beach / foreshore (n = 249).

Adaptation Options

In relation to *options needed to manage coastal hazards such as erosion and flooding into the future* (Figures 24, 25 and 26), results were comparable at the three sites with stronger support for *fencing of dunes/revegetation and preventing further development in hazardous areas*. There was more support in Old Dunsborough for *preventing further development in hazardous areas*. All sites were strongly against *doing nothing*. There was not a high level of support for installing hard coastal protection. It is of interest that Bunbury has hard coastal protection structures and Waikiki has a buried seawall and yet respondents were in general not supportive of this approach. This could indicate that some people are not aware of the active management already occurring and a need to raise awareness in the community.

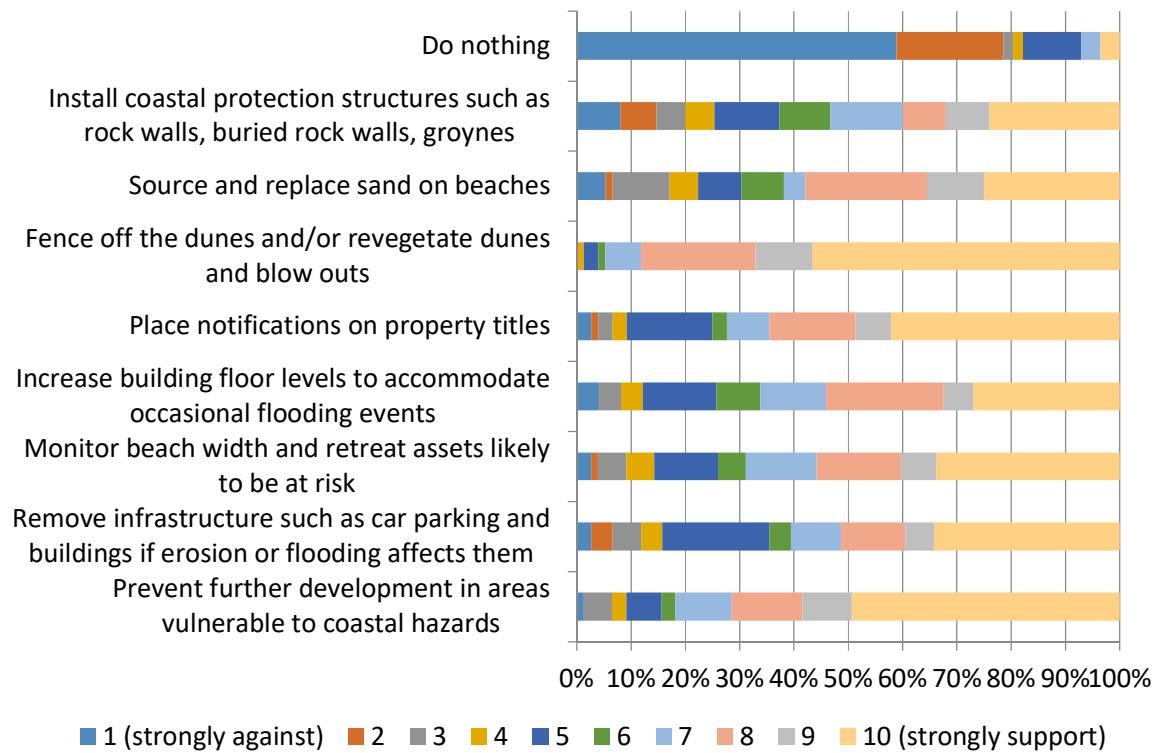


Figure 25: Bunbury - level of support for options to manage coastal hazards such as erosion and flooding into the future (n = 87).

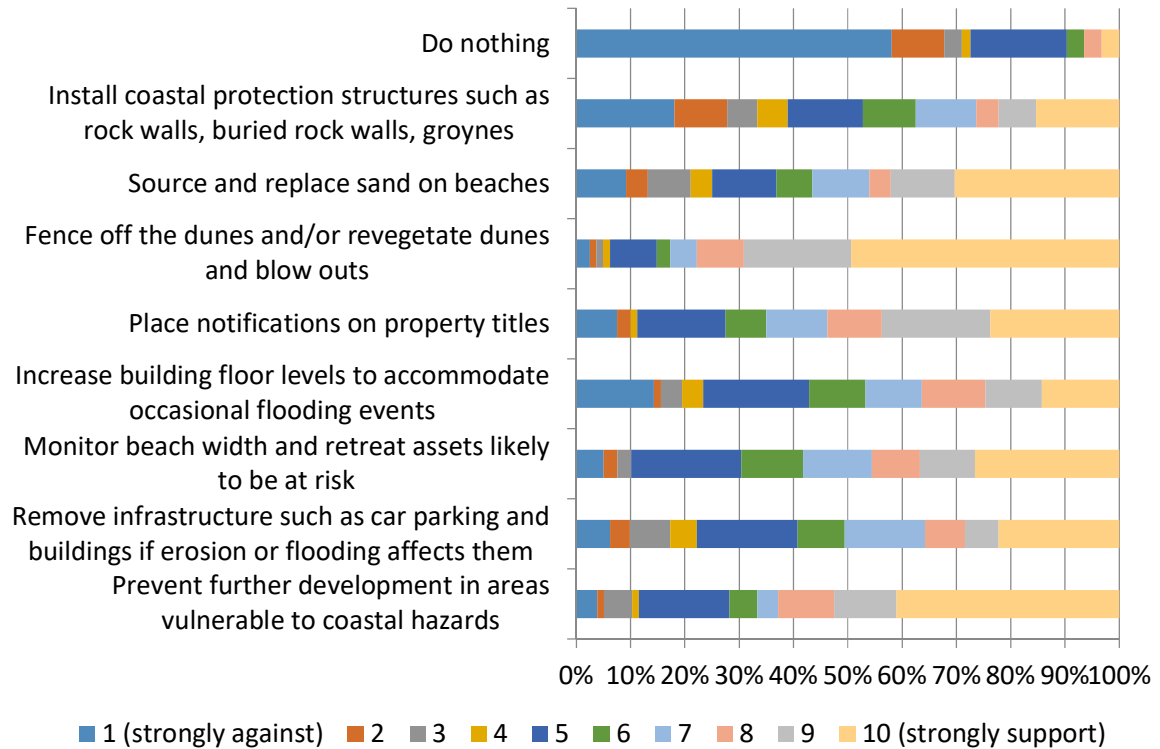


Figure 26: Waikiki - level of support for options to manage coastal hazards such as erosion and flooding into the future (n = 87).

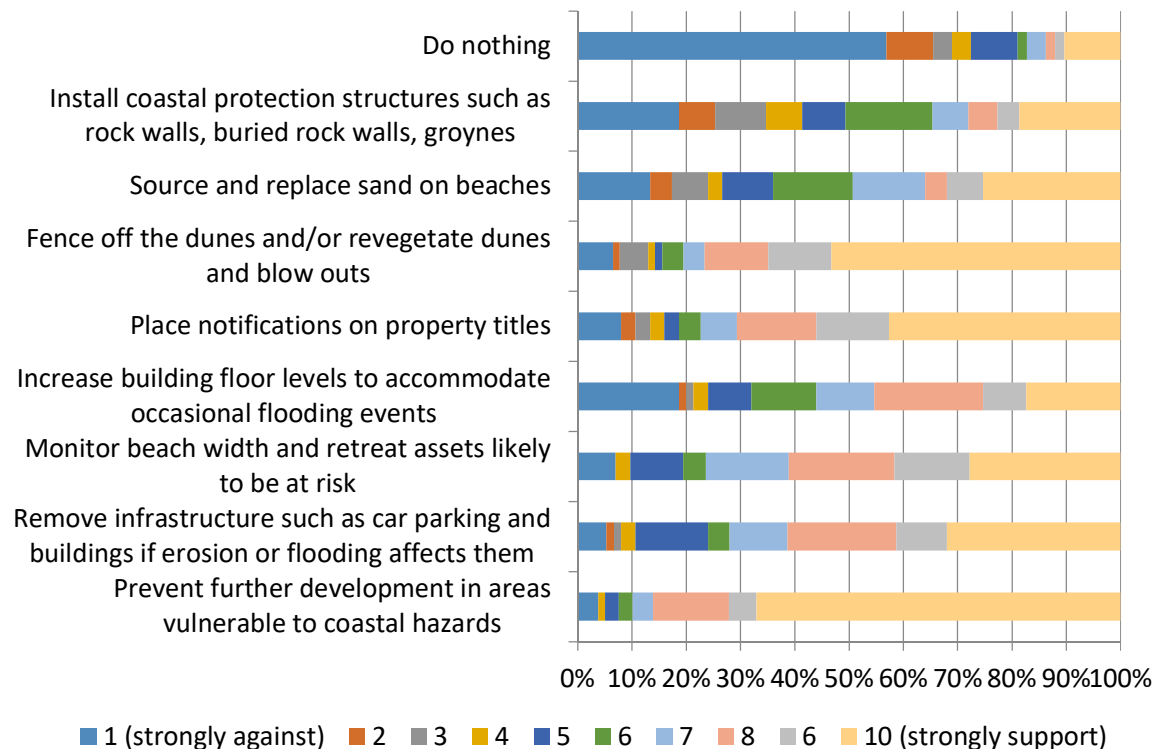


Figure 27: Old Dunsborough - level of support for options to manage coastal hazards such as erosion and flooding into the future (n = 88).

Key Findings

In summary, the results of the surveys were somewhat similar across all three sites. However, Bunbury and Waikiki were more similar in many aspects as compared to Old Dunsborough. This could be due in part to the physical differences at the Old Dunsborough site that included a regional park and assets such as a boat ramp. The results also indicated that more young adults frequent and live in the Old Dunsborough area. Furthermore people travel further to visit Old Dunsborough, a finding that corresponds with its being more of a holiday destination and 'regional beach' than Bunbury and Waikiki. Other key findings are set out below.

- a) In regards to the importance and benefits of living close to the beach, the responses at all three sites were similar. Features such as the natural beach and environment and the physical, mental and spiritual benefits these provided were of greater importance to respondents than were built assets.
- b) The most popular uses at the three sites were walking/running, swimming and spending time with family and friends. More people indicated walking/running in Waikiki (Figure 17), which could be due to the extensive footpath/cycleway and facilities along the foreshore reserve;

- c) The mental/emotional health benefits of visiting the beach/foreshore were of highest importance to the majority of respondents across the sites, followed by physical and spiritual/cultural benefits.
- d) Environmental features such as clean water, vegetated dunes, native trees and animals were of most importance while private residences adjacent to the beach were not important to the majority.
- e) Respondents at Waikiki noticed more changes such as beaches eroding, dune vegetation becoming sparser and damage to infrastructure etc (Figure 21), compared to respondents at other sites. Waikiki Beach is an identified coastal hotspot which has had recent coastal management carried out.
- f) In regard to the management of coastal hazards, respondents at all three sites indicated strong support for fencing dunes/revegetation, preventing further development in hazardous areas and planned retreat and minimal support for doing nothing.

Review of Survey Methodology

In summary, the beach user surveys delivered informative results from the community. The outcomes successfully addressed objective one, being *to identify community coastal values and investigate how these could be affected by the impacts of climate change, explicitly coastal erosion and inundation*.

When comparing the face to face and online surveys, face to face surveys provided participants with an opportunity for further discussion and assisted in meeting key stakeholders, but required significant time and resourcing. The assistance of the volunteers in Old Dunsborough resulted in considerably more face to face surveys being completed and was of great benefit. Furthermore the information booths held at Bunbury were of value as people were able to approach officers to complete a survey, gain further information and enter into discussion. The online surveys were highly beneficial as they delivered the most responses, with the vast majority of people answering most, if not all questions and the process required limited resourcing. The distribution of letters in Waikiki directing them to the online survey could have been a contributing factor for the high level of online responses.

However, the surveys did not gather a comprehensive view of those under 18 and between 18 and 20. In regards to getting youth under 18 to complete the survey, contact was made with schools to have teachers complete the surveys with students.

In regards to what could be improved for future surveys, the survey was taking on average about 15 to 20 minutes to complete. If the length of the survey was reduced to only include those questions that are of primary significance, it would be possible to complete more surveys in a given time period and people would be more likely to complete the survey.

In order to gather feedback from those under 18, contacting schools (and identifying interested teachers) earlier in the process could lead to more surveys being

completed. Also, to gain views from people who may not visit the beach regularly and/or complete online surveys, setting up a booth at local government events and shopping centres could assist. Promoting the survey widely and regularly on local government social media platforms such as Facebook and Twitter could also assist in getting feedback from a broader range of the community, including the younger demographic.

3.3. Scenario Planning Workshops

Attendance

The Bunbury workshop was attended by a total of 22 people (13 being community members) on 4 April 2018, Rockingham was attended by a total of 22 people (14 being community members) on 6 April 2018 and Busselton was attended by a total of 21 people (13 being community members) on 13 April 2018. The results are summarised below.

Priority Uses/Benefits

Table 1 outlines the priority uses/benefits noted by participants at each workshop. Note that the uses and benefits were developed and defined by the participants themselves. The **benefits** column lists the benefits suggested in all workshops. The highlighted cells indicate if the 'use' was identified as a priority for that site. The classification of Uses into the themes Active Recreation, Passive Recreation and Socialising was applied by the authors.

Figures 27 - 30 show the priority uses spatially. While there were some uses that occur along the length of the beach/foreshore, others were more spatially specific. For example, people may have a particular spot for swimming or fishing. This can be seen on the Google Earth maps. A spatially explicit approach is important for planning and management as locations can be identified that are important for particular uses.

Table 1: Priority uses/benefits suggested by workshop participants.

Classification	Use	Identified Benefits	Bunbury	Waikiki	Dunsborough
Active Recreation	Swimming	Physical fitness			
		Mental health			
		Social			
		Environmental connection			
		Swim classes (Bunbury)			
	Walking (paths and beach)	Physical fitness			
		Aesthetic benefits			
		Mental health			
		Social			
		Environmental connection			
		Exercise dog			
	Cycling	Physical fitness			
		Close to sea (sight/smell)			
	Basketball	<i>Not provided</i>			
	Professional training	Fitness and financial			
	Snorkeling	<i>Not provided</i>			
	Sailing	<i>Not provided</i>			
	Surfing/kayaking/SUP	<i>Not provided</i>			
	Boat launching	<i>Not provided</i>			
	Fishing	<i>Not provided</i>			
	Observing nature	Mental health			

Passive Recreation		Spiritual			
		Appreciation			
		Education			
		Shell collecting			
	Solitude	Recharge			
		Just being there			
	Views while driving	Mental health			
	Rest/use facilities	Relaxation			
Socialising	Time with family/friends	Making friends			
		Bonding with family and friends			
		Mental health			
		Feel safe			
		Place to bring tourists			
		Community connection			
		Spiritual			
	Visiting café	<i>Not provided</i>			
	Visiting Surf Club	<i>Not provided</i>			
	Visit seasonal food trucks	Different vibe			
		Financial			

Note: Highlighted cells indicate if the 'use' was identified as a priority for that site.



Figure 28: Bunbury Back Beach priority uses. The surf club and café were highlighted as key assets that supported a number of uses/benefits.



Figure 29: Waikiki Beach (south) priority uses. The BBQ's, picnic areas, access ramp, shaded play areas and basketball court were highlighted as key assets that supported a number of uses/benefits.

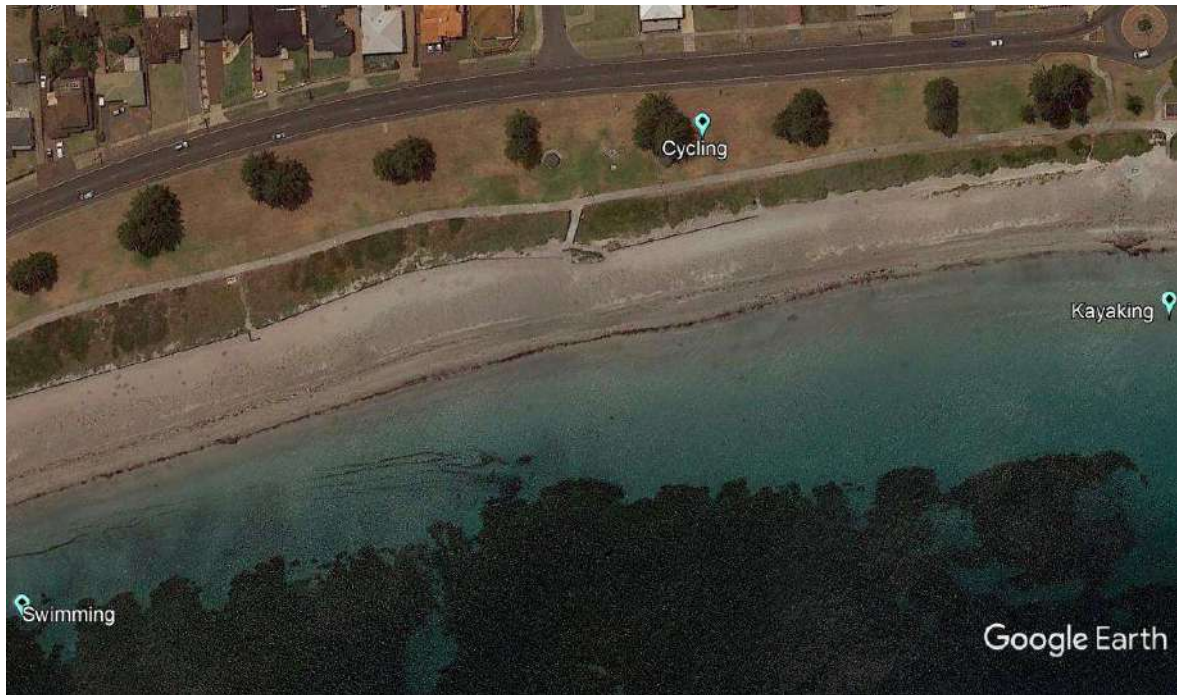


Figure 30: Waikiki Beach (north) priority uses.



Figure 31: Old Dunsborough Foreshore priority uses/benefits. The boat launching area, playground, toilets and Meelup Regional Park were highlighted as key assets that supported a number of uses/benefits.

Consequences of Climate Change

The consequences of climate change to the sites if we do not respond to the climate hazards that were identified by workshop participants are outlined in Table 2. Figures 31, 32 and 33 show consequences spatially.

Table 2: Consequences of climate change.

Classification	Consequences	Bunbury	Waikiki	Dunsborough
Features	Loss of swimming amenity			
	Loss of sandy beach			
	Loss of foreshore reserve			
	Loss of natural environment/habitat			
	Marine intrusion on wetlands/rivers			
Built Assets	Loss of access paths to beach			
	Loss of footpaths/cycle ways			
	Loss of infrastructure (e.g. roads, car parks)			
	Loss of public facilities (e.g. toilets, BBQs etc.)			
	Loss of road/public access			
	Loss of private assets (housing)			
	Increased sand deposition on infrastructure			
	Loss of commercial assets			
	Loss of meeting places			

Note: Highlighted cells indicate if the 'consequence' was identified at the site.

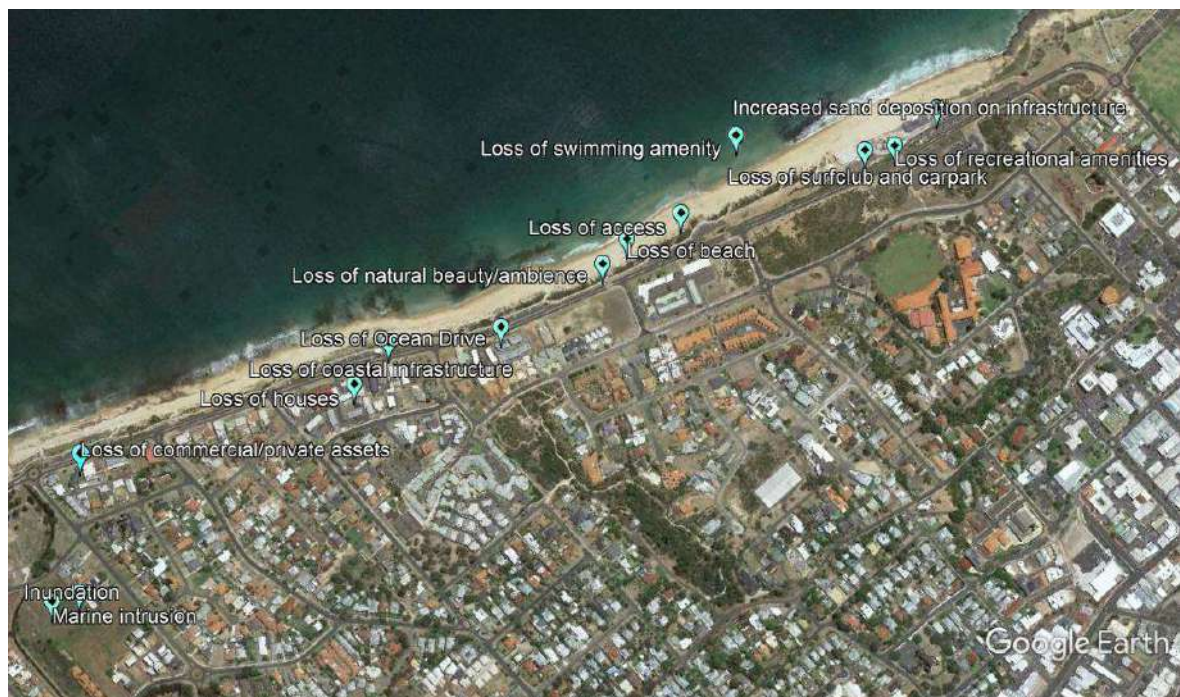


Figure 32: Consequences of climate change at Bunbury Back Beach.



Figure 33: Consequences of climate change at Waikiki Beach.

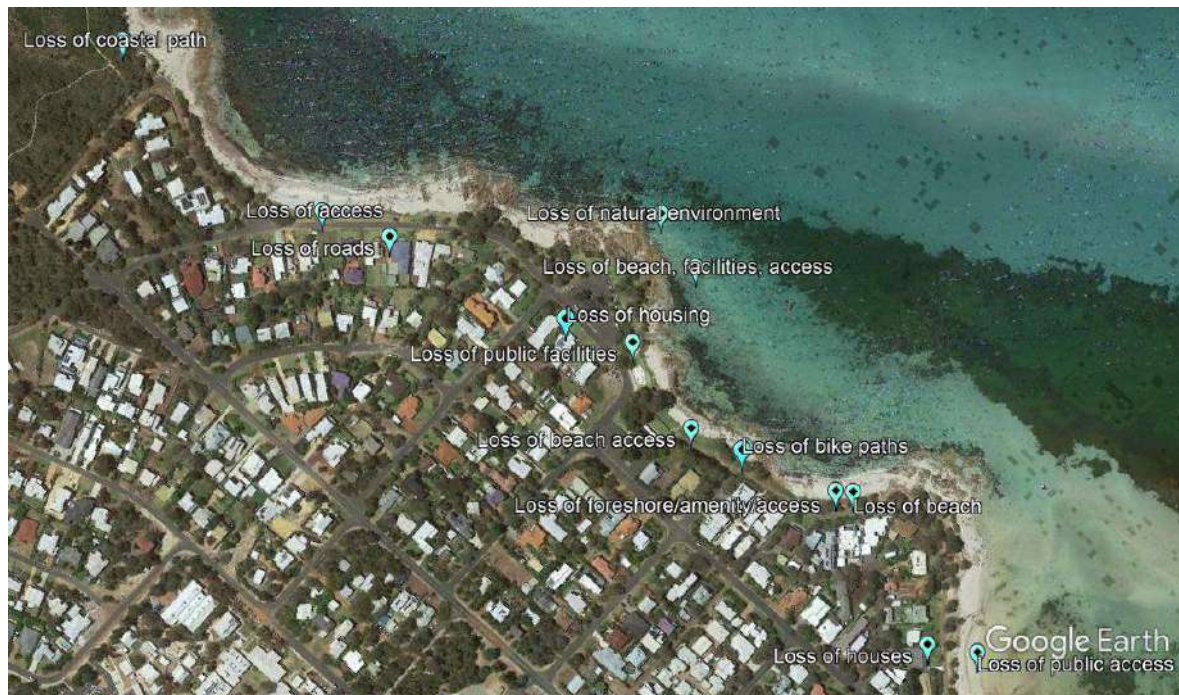


Figure 34: Consequences of climate change at Old Dunsborough Foreshore.

Impacts on the Uses and Benefits

The impacts on the uses and benefits identified at each site with 0.9m sea level rise if no action is taken to address climate change (e.g., can't walk anymore; lose fitness) were mapped. Table 3 summarises these impacts. Note that the highlighted cells indicate a priority 'use' in the corresponding workshop. The benefits column lists the benefits suggested in all workshops.

Table 3: Impacts on uses and benefits.

Classification	Impact on Uses	Benefits lost	Bunbury	Waikiki	Dunsborough
Active Recreation	Cannot swim due to loss of access and change to water safety/quality	Physical fitness			
		Mental health			
		Social			
		Environmental connection			
		Swim classes (Bunbury)			
	Cannot walk due to loss of paths	Physical fitness			
		Aesthetic benefits			
		Mental health			
		Social			
		Environmental connection			
		Exercise dog			
	Cannot cycle due to loss of paths	Physical fitness			
		Close to sea (sight/smell)			
	Cannot undertake water activities	<i>Not provided</i>			
	Cannot fish (water quality etc)	<i>Not provided</i>			
	Cannot launch boat	<i>Not provided</i>			
Passive Recreation		Mental health			
		Spiritual			

	Cannot observe nature as impacts on natural environment	Appreciation			
		Education			
		Shell collecting			
Socialising	Cannot spend time with family/friends due to loss of meeting places / assets	Making friends			
		Bonding with family and friends			
		Mental health			
		Feel safe			
		Place to bring tourists			
		Community connection			
		Spiritual			
	Cannot visit Surf Club	<i>Not provided</i>			

Note: Highlighted cells indicate if the 'impact on uses' was identified at the site.

Further impacts identified in this exercise included: damage to subsurface services, groundwater for irrigation, marine intrusion on wetlands/rivers, contamination of ocean and coastline and subsequent health, business, public safety and economic impacts.

A notable issue identified by Bunbury participants was the potential for conflicting land uses and competition between uses (and stakeholders) of the coast. For example, conflicts between private residences versus public uses and space to locate services and infrastructure.

Features and Built Assets to be Maintained

Natural features and built assets (e.g., accessible beach) that need to be maintained to provide for the identified priority uses and benefits were mapped (Figures 34 - 36).

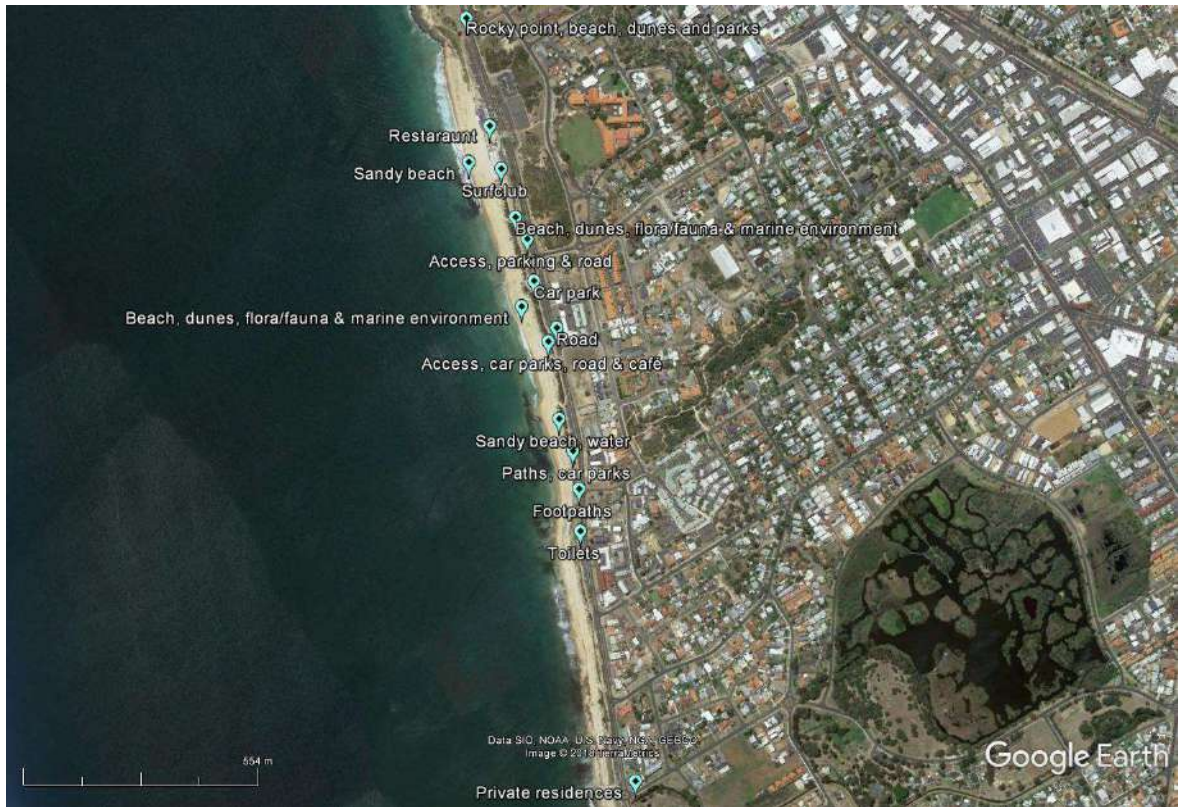


Figure 35: Bunbury Back Beach natural features and built assets identified to be maintained in order to provide for the identified priority uses and benefits.



Figure 36: Waikiki Beach natural features and built assets identified to be maintained to provide for the identified priority uses and benefits.



Figure 37: Old Dunsborough Foreshore natural features and built assets identified to be maintained to provide for the identified priority uses and benefits.

Adaptation Options

The final mapping exercise asked that attendees suggest and locate on the map the actions for adaptation that are likely to be effective and practical at each site (e.g., soft protection of dunes with revegetation). The adaptation hierarchy in SPP2.6 (avoid, planned or managed retreat, accommodate, protect) was considered by participants in this exercise. Note that there was no requirement to prioritise adaptation options and all suggested options are shown in Table 4.

Planned retreat was the only option suggested at all three workshops that could be effective and practical and would allow the identified coastal values (being the features, assets, uses and benefits of the beach/foreshore) to be maintained and enjoyed into the future.

Participants also nominated as important several options beyond the physical planning hierarchy including monitoring, research and community engagement. This result highlights the importance of considering the bigger picture.

Table 4: Suggested adaptation options.

Type	Adaptation Options	Bunbury	Waikiki	Dunsborough
Avoid	No new development in hazard area			
	No development on undeveloped land#			
Retreat	Planned retreat			
Accommodate	Caveat on houses in hazard area			
Protect	Artificial reefs			
	Seawall ^			
	Enhance existing reefs			
	Dune Rehabilitation			

	Sand nourishment			
	Offshore breakwater			
	Natural rock defense			
Monitoring	Beach monitoring (ongoing)			
Research	Soil testing (Friends of Big Swamp)			
	Engineering study (protect pumping station)			
Community Engagement	Community education			

Notes: Highlighted cells indicate if the 'adaptation option' was suggested for the site.
to provide future public shoreline
^Protect road to Hasting St, Bunbury

Other points of interest noted in this exercise included suggestion at the Dunsborough workshop to sacrifice Curtis Bay for Bay View Tce amenity. A recommendation at the Bunbury workshop was to construct an artificial surfing reef. It was noted that this is not an effective adaptation response in itself, but it could be constructed cost effectively as part of other protection measures.

Roles and Who Should Pay

Potential roles that could be taken by individuals, communities', state and local governments were explored. The issue of who should pay was also discussed. A summary of key points raised included:

Retreat

- Planned or managed retreat – local government to action via Council rates or funding mechanisms such as differential rates.

Protect

- Dune nourishment – community groups, schools, environmental groups to action with government support/levy.

Monitoring

- Beach monitoring – community, schools and local governments to action with Local/State/Federal Government funding.

Research

- Assessment to be undertaken to cost retreat options.
- Study to compare cost of retreat versus protection.

Community Engagement

- Awareness raising – environment groups/volunteers to action with local/state/federal government funding.
- Clearly articulated and uniform message to come from governments, scientists, and community leaders on climate change and implications needed.

Costs / Responsibility

- Government to buy back affected land with option to lease back.
- Federal government to pay for disaster relief and fund proactive prevention.
- Insurance industry to play a role in risk education.
- Differential rates to be applied to beach front residents.
- Some costs to be equally distributed as all of the community benefits.
- PNP is a good example of a collaborative approach, should build on this.

A number of other notable points were raised during the workshops, including;

- retreat needs to be considered at some point as protection will not work for long term; and
- there is a need to deal with critical infrastructure.

Key Findings

A summary of the key results of the scenario planning workshops is set out below.

- Priority use and benefits were identified (Table 1) and mapped spatially (Figures 27 – 30) in the workshop. The identified uses were classified into three themes: active recreation, passive recreation and socialising. **Walking/running, swimming, observing nature and spending time with family and friends** were priority common uses across the three sites. The outcomes corresponded with the beach user survey results.
- The consequences of climate change if we do not respond to the climate hazards were identified (Table 2) and mapped (Figures 31 - 33). The results were similar across all sites with, for example loss of swimming amenity, sandy beach, access paths, infrastructure, and meeting places. These consequences were grouped into

themes (that correspond with the framework for classification of coastal values: features, built assets and uses.

- The impacts on the uses and benefits with 0.9m sea level rise if no action is taken to address climate change were identified (Table 3) and mapped. Again, the results were similar across the sites with impacts on active recreation, passive recreation and socialising due to loss of access and changes to water safety/quality, loss of paths and meeting places.
- The natural features and built assets that need to be maintained to provide for the identified priority uses and benefits were mapped (Figures 34 - 36). Results were similar with access, water quality and built assets being identified, although there were local features and assets identified such as Norfolk Pines at Waikiki, sewerage pumping station at old Dunsborough and café at Bunbury.
- Adaptation options to maintain the uses and benefits were recommended. Planned retreat was the only option recommended at all three sites with options to avoid, accommodate and protect also being put forward at the sites. Monitoring, research and community engagement were other options suggested.
- In terms of roles and responsibility, a multitude of stakeholders were recommended including all levels of government, partnerships such as the PNP, the insurance industry and the community.
- With regards to funding options, a common proposal was that the costs should be equally distributed across all those that benefit. It was also suggested that those living adjacent to the beach should pay more as they gain the most (economic) value. Specific suggestions included government purchasing affected land with option to lease back and the application of differential rates.

Before and After Survey

The survey was completed by 13 (3 female, 9 male, 1 did not state) at the Bunbury workshop, 10 (5 female, 5 male) at Rockingham and 10 (6 Female, 4 Male) at Busselton. A copy of the survey is provided as Appendix F.

Attendees were asked before and after the workshop about their *awareness of impacts of climate change on coasts generally (including sea level rise, coastal erosion, flooding and changing severe weather events such as storms* (Figure 37). At all three workshops awareness increased. In regards to *importance of coastal values (i.e., the natural features, built assets, uses and benefits that the coast provides)* to attendees, they were rated as very important before and after all workshops. This would suggest that the workshop was effective in terms of raising awareness of issues with most attendees agreeing or strongly agreeing. This result is evidence of social learning. Furthermore, as a 'participant observer', the author noted that the depth and breadth of conversations around the tables showed that attendees were learning from each other as well as from the specialists. By contrast, the importance of coastal values remained unchanged as a

result of the workshops, which suggests that those in attendance may have already valued the coast highly.

In regards to the *effectiveness of the workshop in terms of: bringing together relevant stakeholders; enabling fairness in participation and conflict resolution; presenting information in an accessible form; and co-producing worthwhile knowledge*, results were similar at the Bunbury and Busselton workshops with most attendees agreeing or strongly agreeing. Compared to these two workshops, at the Rockingham workshop more attendees were unsure of its effectiveness, particularly in regards to bringing together relevant stakeholders. This could be due to the relatively low attendance rate, which was raised by community members at the workshop.

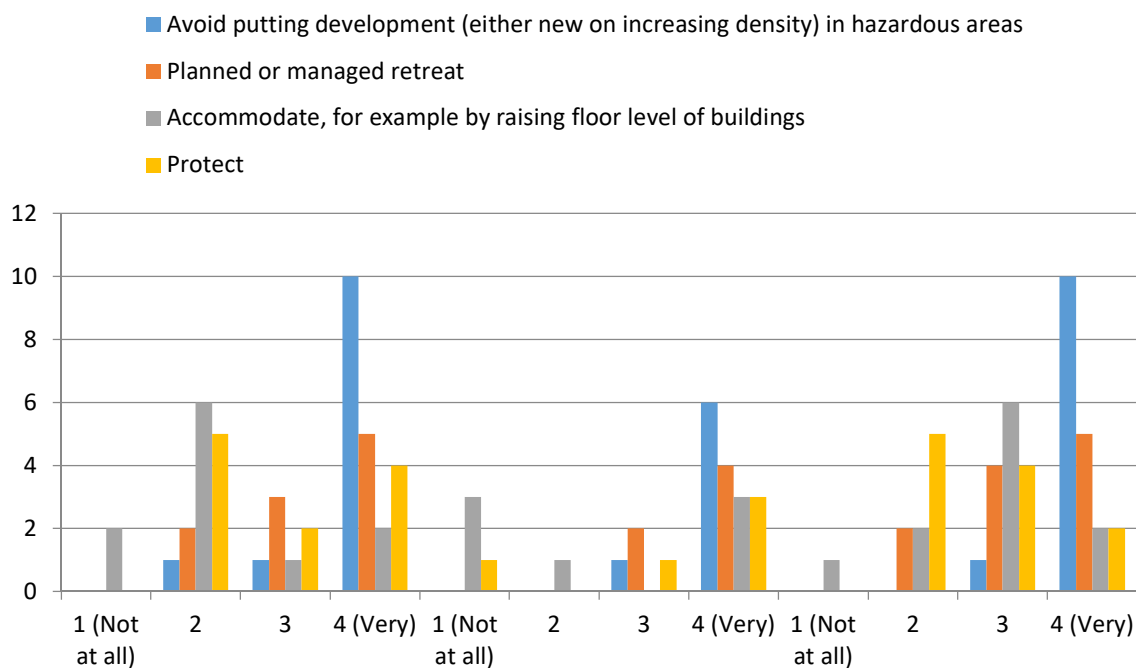


Figure 38: Survey question regarding effectiveness of the workshop in terms of bringing together relevant stakeholders; enabling fairness in participation and conflict resolution; presenting information in an accessible form; and co-producing worthwhile knowledge (n=43)

A question was asked to ascertain the *best ways of resolving regional coastal impacts of climate change and enabling sustainability*. From the options provided there was highest agreement across the three study areas for *governments to take a strong leadership and coordination role* and to *involve a wide range of stakeholders including the community*. At all three workshops there was general disagreement with the proposal to *allow market forces to find the most efficient technological/innovative solutions*. This would indicate that there is more trust in governments taking a leading role with community involvement rather than relying upon markets to take action. Of note, a higher percentage in Busselton compared to Bunbury and Rockingham disagreed with *letting nature take its course and minimise human interventions*. This could suggest that those in Busselton believe that some action needs to be taken, which could be protecting or managed retreat. Combined results for Bunbury, Rockingham and Busselton are provided at Figure 38.

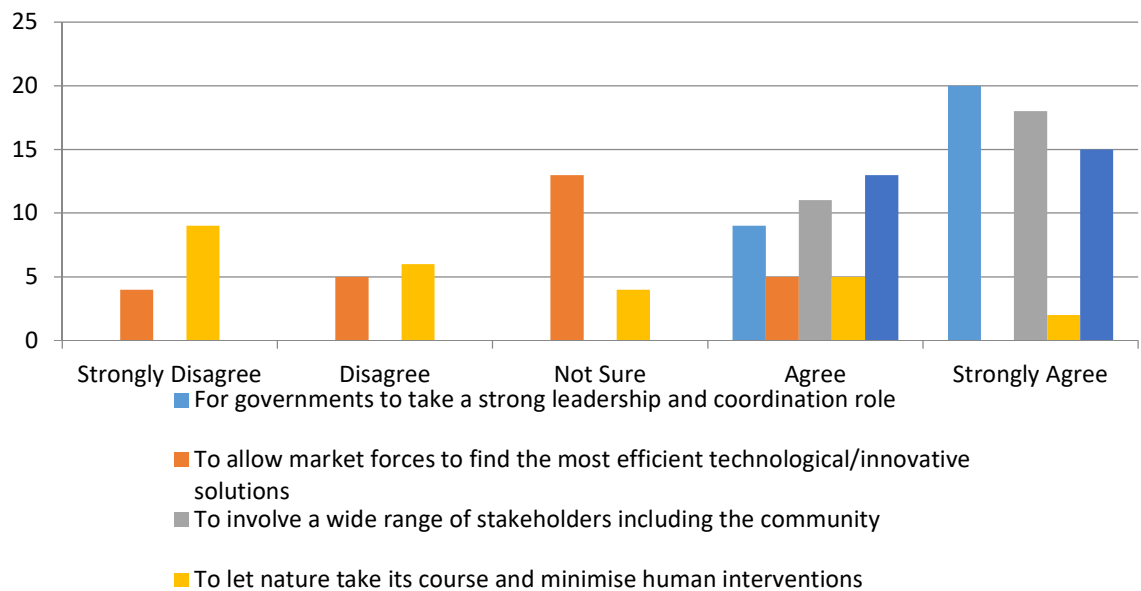


Figure 39: Combined results (Bunbury, Rockingham and Busselton) for survey question regarding the best ways of resolving regional coastal impacts of climate change and enabling sustainability (n=43)

In regards to *level of support for adaptation options to manage coastal hazards such as erosion and flooding into the future*, across all sites there was highest support for *avoiding putting development (either new or increasing density) in hazardous areas* followed by *planned or managed retreat*. In Busselton and Bunbury there were similar numbers supporting and not supporting a *protect* option, but in Rockingham there was more support to protect. *Accommodating by raising floor level of buildings* for example had a mixed response across all the sites, with Bunbury not being as supportive, Busselton being supportive and roughly 50/50 support at Rockingham. The results could suggest that in order to have and maintain a beach and foreshore reserve for the

community, avoiding is the best adaptation option, but planned or managed retreat is supported, when and where required.

There were also several comments provided on the workshops.

- *Thanks for opportunity to be involved. Hope to see and hear and participate in more of these types of sessions.*
- *A very informative & thought provoking afternoon. I am a little disappointed at small number of community members attending.*
- *Very worthwhile process.*
- *Lots of food for thought and action. Thanks heaps.*

Review of Workshop Methodology

The workshop outcomes met objectives one and two in identifying community coastal values and investigate how these could be affected by the impacts of climate change and exploring how specific engagement practices including social learning can enhance understanding and knowledge uptake of coastal climate change in the community. The workshop lead to an increase in understanding of coastal values, identified and demonstrated social learning and created opportunities for community dialogue about values and priorities.

The exercises developed for the workshops effectively addressed the objectives and research questions and feedback from participants suggests that they valued the opportunity and believed the workshop was delivered professionally and efficiently.

The level of stakeholder participation at the workshop that included the DPLC, WAPC, relevant local governments, PNP and Curtin University was sufficient and assisted in the delivery and provision of assistance and advice during the workshop. There was adequate involvement from the community, although it would have been desirable to have representation from youth. Invitations sent to schools and community groups and promotion via social media could assist in getting a broader representation of the community. As this Project was led by the PNP, it was difficult to maximise the networks and expertise of the media and marketing teams in each local government, but this would greatly assist in reaching a broader audience.

Another avenue for maximising the benefit of the workshops in the future would be to add in additional planning overlays to Google Earth, for example the critical infrastructure overlay, to provide more information to the participants on which to base their deliberations.

3.4. Traditional Owner Interviews

Traditional Owners highlighted the fact that the study sites do not exist as isolated beaches but that they are part of a larger interconnected cultural landscape that they have used over the long course of their stewardship of the land and continue to use in the present. Some comments related to their occupation of the coast during the last ice age when sea levels were lower and they obtained the stone chert for their tools from places that are now under water. There was concern about ongoing erosion leading to the discovery and disturbance of their ancestors' remains, and the need to rebury the remains with cultural respect and according to cultural protocol. Coastal managers need to be particularly aware of this significant issue as it is likely to increase in the future.

4. Conclusion

An explanation of how this Project met the three objectives and some key learning are summarised following. It is hoped that the key learnings will be of assistance to other local governments and stakeholders in undertaking value assessments as part of a CHRMAP and/or as independent coastal values studies.

Objective 1: To identify community coastal values and investigate how these could be affected by the impacts of climate change, explicitly coastal erosion and inundation.

Firstly, a new approach with a coastal values framework for classification was developed for this Project to disambiguate the term 'values', being;

- intrinsic natural features, such as a clean water or healthy dunal vegetation;
- built assets, including the infrastructure added by governments as well as commercial and residential buildings, that take advantage of the intrinsic natural features;
- uses of the coast, that is, the many ways that the coast's qualities and assets are deployed; and
- benefits, that is, how the uses of the coast bring well-being to coastal users.

These terms were also used as a basis for understanding how the consequences of climate change would impact on these types of values, and how adaptation could ameliorate these impacts. This approach was used in the development of the survey and exercises for the workshop.

The results of the surveys and the scenario planning workshops identified that:

- **intrinsic environmental features such as clean water, vegetated dunes, native trees and animals were of the highest importance;**
- public safety, public facilities, facilities for active recreation and indigenous and other cultural sites were of high importance to many;
- private residences adjacent to the beach were not important to the majority;

- the most popular uses of the sites were walking/running, swimming and spending time with family and friends;
- visiting the beach/foreshore provides numerous benefits to lifestyle, physical and mental health and wellbeing, as well as being a place for spiritual/cultural connection;
- the consequences of climate change will result in a loss of valuable assets and qualities and will thus have negative impacts on the uses and benefits; and
- to manage coastal hazards there was strong support for fencing dunes/revegetation, preventing further development in hazardous areas and planned retreat and minimal support for doing nothing.

Objective 2: To explore how specific engagement practices including social learning can enhance understanding and knowledge uptake of coastal climate change in the community.

It is important to note that this Project adopted the PNP principles and standards for project design and delivery as outlined in the Strategic Plan 2016 - 2019 and Communication Strategy 2016 -2019 and built upon the work of other projects such as the *Development of a Coastal Community Adaptation Awareness Plan for City of Busselton* project.

In terms of the methodologies of this project, it is important to recognise that they played three different roles and built on each other. Information sessions are primarily about providing information to the public; coastal surveys are about obtaining information from the public; and workshops are about fostering social learning and community dialogue around climate change.

Information Sessions

The information sessions were effective in terms of conveying information and led to increased levels of understanding for many that attended. This suggests that the approach is effective, but there were relatively low number of community members in attendance. This could be due to a number of factors including the Project only being at the 'beach' scale and timing of event. Improved promotion and increasing the scale of the Project could increase levels of attendance.

Beach User Surveys

The beach user surveys were successful in increasing awareness of coastal climate change and in gathering community coastal values data. The survey also gathered significant additional information that is not summarised in this report. Some of this information whilst of benefit to the local governments and the PNP is potentially not essential to identify coastal values. Consequently the beach user survey could be shortened and not impact the effectiveness of the survey objectives and outputs.

There was also considerable time and resourcing required to deliver the face to face beach user surveys, although this method provided participants the opportunity to ask questions and convey further information and stories; by contrast the online survey was an easier way to obtain results but did not provide opportunities to engage respondents in dialogue.

There could have been greater representation from young adults and youth (under 18) and there would be value in gathering data from community members who may not visit the beach regularly. Earlier identification of interested teachers and contact with schools could lead to more surveys being completed. To gain views from a broader range of the

community, promotion at local government events and shopping centres and using social media could assist.

Scenario Planning Workshops

The workshops demonstrated social learning and created opportunities for community dialogue about values and priorities and was effective in identifying coastal values and verifying and deepening the understanding of coastal values identified in the beach user surveys. The use of participatory mapping created a graphic, spatially explicit, shared output, which engaged participants' attention and focused their discussion.

There was considerable time, organisation and resourcing required to deliver the highly structured and facilitated workshops, which provides an opportunity for all participants to have their say and any disagreements to be resolved constructively.

There was a good level of participation from the Department of Planning, Lands and Heritage, WAPC, local government officers and elected representatives, PNP and Curtin University, which added to the legitimacy and information content of the workshops.

Participants at the workshop understood the exercises and appreciated and expressed the significant worth of the non-economic values of the coast. As per the information sessions and beach user surveys, engaging a broad demographic of the community is challenging. Timing of the engagement is important; this was a challenge at times because of parallel local government activities.

Overall, we argue that although some specifics of the methods could be modified such as improving levels of participation and representation, taken as a package the three methods show how community engagement can develop and deepen throughout the duration of a Project.

Objective 3: To demonstrate how community values of the coast can be incorporated into coastal hazard risk management and adaptation planning.

In terms of the approach adopted for this Project and the design and delivery of future CHRMAPs, the following framework (Figure 39) illustrates where community participation and input is required and could inform the relevant stages of the CHRMAP process. As can be seen there are multiple points where the community needs to be informed (through the information sessions and workshops), consulted (beach user surveys and workshops) and involved (workshops). For example, data from the beach user surveys can assist in establishing the context for a CHRMAP and in the identification of risks and adaptation options; and community workshops can be held to assist with the risk assessment process and when determining and evaluating potential adaptation options.

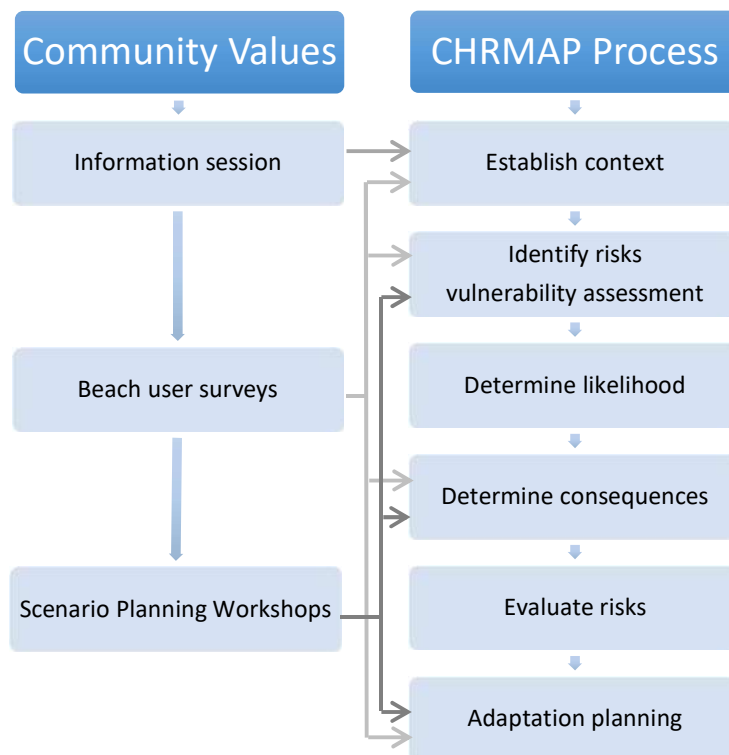


Figure 40: Relationship between the relevant stages of this project to the CHRMAP process as outlined in the WA Government Coastal hazard risk management and adaptation planning guidelines (Western Australian Planning Commission, 2014).

In conclusion, the three engagement methods adopted for this Project demonstrated that this approach can be used to address the requirements of a CHRMAP to raise community awareness, identify and assess coastal values and broadly identify potential adaptation options that maintain the identified coastal values and are acceptable to the community.

Furthermore, this Project is part of a research project that will include the development of three research papers on the beach user surveys, scenario planning workshops and coastal values and the CHRMAP framework. These papers will include further analysis of the results and literature and will be available to the PNP and stakeholders.

5. Recommendations

The Project identified a number of key learnings that could be adopted in future CHRMAP's or in independent coastal values studies. It is recommended that:

- the results of this Project inform the Cities of Busselton and Rockingham CHRMAP, Koombana Bay CHRMAP and future City of Bunbury CHRMAP;

- the coastal values framework for classification that was developed for this Project be utilised in future coastal community values studies including CHRMAPs;
- the engagement framework developed for this Project be considered as a means to involve the community in CHRMAPs to assist in identifying coastal values, determining consequences, identifying and evaluating risks and adaptation planning and evaluation. The framework identifies multiple points where the community needs to be informed (through the information sessions and workshops), consulted (beach user surveys and workshops) and involved (workshops);
- media and marketing teams of local government/expertise be engaged early to assist in promoting the Project;
- Information Sessions be conducted at the beginning of the CHRMAP in prominent locations and/or at existing events, with the aim to raise awareness via displays and direct face to face contact;
- the beach user survey utilised in this Project be shortened to include only key questions. This will not impact the outcomes and will assist in maximizing numbers completing the survey;
- beach user surveys be conducted online and (human and financial) in person at local government events, via letter box drops and/or with rates notices, in order to minimise resources;
- Information Booths should be considered as a means to engage the community and undertake face to face surveys;
- schools/colleges be contacted directly to encourage teachers to conduct the coastal value surveys in classrooms and seek their involvement in workshops;
- to gain a wide representation of the community at workshops, key stakeholders and community groups/members should be targeted; and
- workshops to be held during the CHRMAP 'risk assessment' phase to identify/verify coastal values and assist in evaluating consequences and risks and as an option in the 'adaptation planning' phase to assist in assessing potential adaption pathways.

6. Glossary

Attributes	Aspects of value that are <i>ascribed</i> to the coast.
Benefits	Attributes resulting from the experience of using the coast.
Built assets	Physical properties of the coastal environment that are engineered by humans.
Framework	System of classification used to elicit, organise and analyse ideas.
Natural features	Biophysical properties of the coastal environment that can exist without necessary human intervention.
Properties	Aspects of value that are <i>inherent</i> in the coast.
Uses	Attributes reflecting application or deployment of the coast.
Values	A set of attributes and properties of the coast.

7. Key References

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Additional references can be found in Appendix A.