Thesis Title: Perceptions of the readiness and preparation of South Australian local coastal councils to cope with sea level rise.

by

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Table of Contents

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I declare that this thesis, which I submit to Flinders University for examination for part-fulfilment of the award of a higher degree of **Master's in Environmental Management,** has been solely composed by myself. Any of the content presented in this document as a result of input or data from other studies, published works of others and related sources that I have consulted during the research have been duly acknowledged so as to ascertain the amount of work that is my own. Furthermore, I took reasonable care to ensure originality of the work hence, to the best of my knowledge, this work does not contravene copyright law, and has not been taken from other sources except where such work has been cited and acknowledged within the text.

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ETHICS APPROVAL

The ethical aspects of this research project have been presented to and approved by the Human Research Ethics Committee of Flinders University (Appendix 3). This research has therefore been carried out in accordance with the requirements of the National Statement on Ethical Conduct in Human Research (2007) produced by the National Health Medical Research Council of Australia.

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Abbreviations

GHG	Greenhouse Gas
LGA SA	Local Government Association of South Australia
IPCC AR5	Intergovernmental Panel for Climate Change Fifth Assessment Report
IPCC SREX	Intergovernmental Panel for Climate Change Special Report on Extreme events
IPCC WGIII	Working Group III of the Intergovernmental Panel on Climate Change
NCCARF	National Climate Change Adaptation Facility
RCP	Representative Concentration Pathway
SLR	Sea Level Rise

List of Figures

List of Boxes

List of Tables

Figure i (a) Collaroy Beach Club - the outside view- ***courtesy of The Beach Club FB***

Figure i (b) Collaroy Beach Club battered by high tides - ***courtesy ABC News: Amanda Hoh (June 2016)***

ABSTRACT

Human induced emissions are driving unprecedented changes in today's climate systems. These changes in climate conditions have accelerated the rise in sea level with projected impacts that threaten the existence of coastal communities and infrastructure. Addressing current and future coastal climate change including sea level rise (SLR) is one key element of coastal management. In South Australia, planning and adaptation decision-making rests with local government (albeit in keeping with state-based regulations and planning instruments). Preparation and readiness of coastal councils to adapt to SLR are important dimensions of coastal management, and to a great extent are executed by local councils. Mayors and council employees in coastal councils have influence over policy and decision-making processes including adaptation measures to address SLR. People's perceptions are shown to be an important factor in shaping attitudes and opinions about SLR and climate change. Divergent perceptions between influential stakeholders in coastal councils may deter efforts and support for policies and strategies for addressing SLR and its impacts.

The principal aim of this study is to establish how Mayors and Council employees perceive coastal councils' preparations and readiness for SLR in South Australia. The study further establishes if there are differences in perception between Mayors and Council employees in regard to SLR as well as establishing level of satisfaction with Councils' preparedness for SLR. To this end, the research question is outlined as: **How do Mayors and Council employees of South Australian coastal councils perceive risk of SLR and councils' preparedness to adapt to impacts from the rising sea level?**

This thesis uses two data sets that were collected prior to the commencement of the study. The data sets included an online survey that attracted responses from 34 Mayors and 117 Council employees from 10 coastal 'regions' of South Australia. Results from the survey reveal that coastal councils are plagued with an array of challenges in their quest to prepare to adapt to SLR despite the existence of institutional structures and a good level of understanding of SLR. These challenges are perceived to be driven by external factors while some are presumably influenced by internal factors such as perception differences between those with influence on policies and decision-making in local councils. There are also differences between Mayors and Council employees with regard to their levels of satisfaction with councils' preparedness for

SLR. Mayors and Council employees perceive coastal councils as ill-prepared for the projected SLR and its impacts.

This research recommends development of a detailed paper about SLR impacts and risk- based information to improve Mayors' and other elected members' understanding of SLR issues. The research further proposes a rigorous engagement between the three tiers of Government to ensure a consistent understanding and systematic approach to dealing with the preparations for SLR. Further research could be undertaken to identify regional or council-specific challenges against the perceived level of preparedness to develop pertinent interventions that could be employed to enhance regional or councils' progress to adapting to SLR.

Chapter 1 – Introduction

1. Chapter 1: Introduction

1.1 Background:

Anthropocene emissions are driving unprecedented changes in today's climate systems (IPCC, 2014b). These adjustments to the average climate conditions have accelerated the rise in sea level. Sea level rise (SLR) has been accepted globally as a climate change-driven phenomenon (Mimura, 2013). Eminent impacts of SLR such as coastal erosion and inundation, threaten the existence of built assets, infrastructure and lives in coastal areas (Burger et al., 2016). Coastal populations are growing rapidly in Australia. Considering that coastal developments are demand driven, the increase in coastal population will continue to drive infrastructure and assets development on the coast thus exacerbating the risk from the effects of the rising sea level and coastal erosion. Current value estimates of assets considered "at risk" from sea level rise amount to billions of dollars (Hallegatte et al., 2013) with the figures projected to continue rising as coastal populations and assets increase.

Adaptation measures are being adopted globally to mitigate the impacts of SLR. However, adaptation measures to SLR are adopted at a steady rate (Adger and Barnett, 2009) despite the high projected rates of future SLR that have captured the world's attention (Mimura, 2013). Accelerated rates of SLR may limit the window of opportunity for adaptation (Adger and Barnett, 2009). As argued by Mimura (2013), an accelerated rise of sea level with storm surges and high waves superposed on it will result in a significant expansion of areas of inundation. Therefore, there is need to employ adaptive coastal management to improve coastal community resilience (Harvey and Smithers, 2018, Clarke et al., 2013). Planning for new developments in these coastal zones should incorporate adaptive measures in the new developments (Button and Harvey, 2015, Azevedo de Almeida and Mostafavi, 2016).

Coastal planners and managers in Australia are faced with challenges in addressing the predicted SLR and its impacts. The complexities of coastal governance (Leitch, 2017a) as well as the intricacies of decision making are the primary challenges that confound adaptation processes at coastal zones. Each of the three tiers of governments have a role to play in planning, policy development and post-policy partnerships, as well as the

operationalisation of plans and policies in these spaces. However, of the three levels of governments, Local Governments are at the coalface of managing coasts and threats from SLR (Button and Harvey, 2015). Ironically, it is argued, that of the three levels of governments, Local Government is the least equipped as well as least prepared to respond to the threat of SLR.

Bearing a legal responsibility to minimise risk of harm to population and property, local councils should set in motion processes to protect life, assets and general infrastructure on the foreshore and tidal areas (NCCARF, 2016). Perceptions and attitudes to SLR from both policy makers and the public are critical in implementation of adaptation strategies. While public perception may drive development or prevent a policy (Brody et al., 2008, Perry et al., 2001), policy makers' risk perception determines the latitude of policy implementation (Yusuf et al., 2014). To determine coastal councils institutional capacity to respond to SLR, it is important to understand policymakers' perceptions of the salience SLR (Yusuf et al., 2014). While there have been a limited number of studies of risk perception among regional coastal populations in regard to sea level rise (Button and Harvey, 2015), there has been no state-wide study of Mayors and local Council employees working for coastal councils in South Australia who represent the public and influence decisions of local government.

This research seeks to examine perceptions about SLR held by Mayors and Council employees working for South Australia's coastal councils. In an attempt to examine perceptions of these key stakeholders who influence decision making, the following research question was derived:

How do Mayors and Council employees of SA coastal councils perceive risk of SLR and councils' preparedness and readiness to adapt to impacts from the rising sea level?

Aims and objectives

In order to investigate the perceptions of Mayors and Council employees on the preparations and readiness of coastal councils in South Australia, the following three aims are addressed in this thesis:

- To establish how Mayors and Council employees perceive Local Government preparations and readiness for SLR in South Australia.
- To establish if there are any perception differences between Mayors and Council employees on SLR.
- To establish Mayors and Council Employees' level of satisfaction with Councils preparedness for SLR.

The major assumption is that, there exist differences in perceptions between Mayors and Council employees of South Australia's coastal councils and that such differences are drawn into and affect the decision-making process where issues of coastal climate change including adaptation to SLR are addressed. Based on the above assumption, this study therefore seeks to address the research question stated above and how perceptions of Mayors and Council employees may affect decisions made by councils in relation to addressing SLR.

Chapter 2 – Literature Review

2 Chapter 2: Literature Review

2.1 Climate change and the coast

Climate change has become an important concern for governments worldwide. Changing climate averages also changes the extreme climatic phenomena such as heat waves, fires, oceanic changes, droughts and floods. The magnitudes and distribution of the extreme events will vary across spatial and temporal spaces. Climate change drives diverse changes in coastal areas impacting both humans and natural systems (IPCC, 2014a). Stressors related to climate change, including biological resource decline and natural hazards (Fischer, 2018), are already being sustained by coastal communities. Sea-level rise (SLR) is one significant effect of climate change at the coastal front (Mimura, 2013, Leitch, 2017a, Yusuf et al., 2014).

Coastal areas are among the world's most vulnerable landscapes to climate change related impacts, including inundation and erosion from SLR (Poulter et al., 2009). According to the IPCC 2007 and 2013 reports, coastal areas are the most vulnerable to climate change-induced effects of rising sea levels. The impacts of SLR will disproportionately affect the highly-populated low-lying areas, including many developing countries (Yusuf et al., 2014, Poulter et al., 2009).

2.2 The rising Sea Level

The inconspicuous changes to climate and sea levels take place over timescales ranging from decades, through centuries and millennia to millions of years (Nott, 2016). According to Nott, (2016), temperature fluctuations of up to 10^{o}C have been recorded over these long timescales, driving sea level oscillations by hundreds of metres. Sea levels have already increased measurably since the 1800s and are expected to continue to rise due to the continued increase in average global temperatures (Ryan et al., 2011, Bernstein et al., 2007, Gehrels and Woodworth, 2013). Sea levels have been relatively stable for the past ~2000 years (up to the start of the recent rise beginning late 19th or early 20th century) (Lambeck et al., 2014, Horton et al., 2014) as shown in **Figure 2.1** below. The recent global SLR is increasing sharply above the relatively stable background rates of the recent past (Church and White, 2011, Gehrels and Woodworth, 2013, IPCC, 2013). Evidence from ice core data (ice cores from glaciers and ice sheets) indicate an unusually stable earth's environment for the past 10 000 years- a period

known to geologists as the Holocene (Steffen et al., 2006). Human civilization arose, developed and thrived under the then stable conditions which instigated accelerated temperature increase from emissions of greenhouse gases (GHG). The stable sea levels of the Holocene period allowed for generations within coastal communities to adjust their livelihoods based on the ecosystem services provided by the coast.

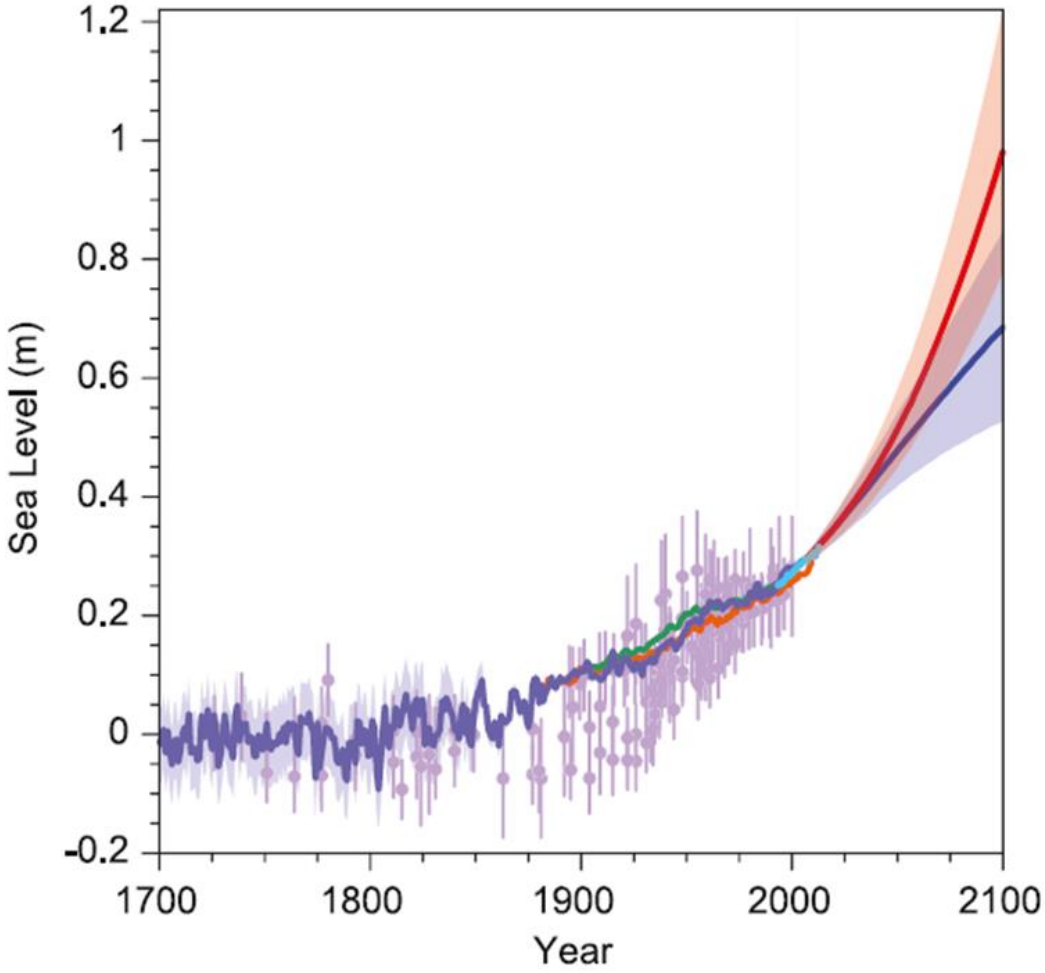

Figure 2.1 Past and future sea-level rise. For the past, proxy data are shown in light purple and tide gauge data in blue. For the future, the IPCC projections for very high emissions (red, RCP8.5 scenario) and very low emissions (blue, RCP2.6 scenario) are shown. *Source: IPCC AR5 Fig. 13.27. p. 81204.*

The Anthropocene which followed the Holocene period brought unparalleled effects to the earth's climate and its natural system. Anthropogenic activities have been associated with increases in atmospheric and ocean temperatures (IPCC, 2013, Mummery et al., 2017). According to the IPCC (2013), the observed warming since the early-20th century has been predominantly linked to human activities and human-induced emissions of greenhouse gases. The IPCC, in its Fifth Assessment Report (IPCC AR5, 2013) indicates that human influence

has significantly contributed to the changes in the natural systems including the increase in atmospheric temperatures which drives changes in the mean global sea level (Mummery et al., 2017). The rise in global mean sea levels is driven by warming atmospheric temperatures of the earth (Church et al., 2016, Mimura, 2013) through thermal expansion and melting of glaciers and ice caps. Walsh et al. (2004) point to the following factors as contributors to future SLR:

- thermal expansion of the oceans caused by warming;
- fresh water from the melting of glaciers and small ice caps,
- the contribution of the large ice caps (Greenland and Antarctica)
- and changes in terrestrial water storage (Walsh et al., 2004)

Church et al, (2016) propose that sea levels change over extensive temporal and spatial scales. The future rates of SLR will be relative to temperature increase- a function of atmospheric GHG concentrations. Various GHG concentration scenarios, also referred to as Representative Concentration Pathways-RCPs (**Figure 2.2** and **Box 2.1**) have been modelled to project possible temperature increase and possible SLR. The RCPs and how they are derived are elaborated in **Box 2.1** below. **Figure 2.2** shows projected anthropogenic CO_2 emissions up to 2100 with the projections indicating a decline in the levels of emissions for all the scenarios beyond 2050. However, it is to be noted that climate change would still occur even when all emissions from human activities suddenly stopped (Nott, 2016) due to forcings from residual processes in heat reservoirs such as oceans which requires several decades to adjust.

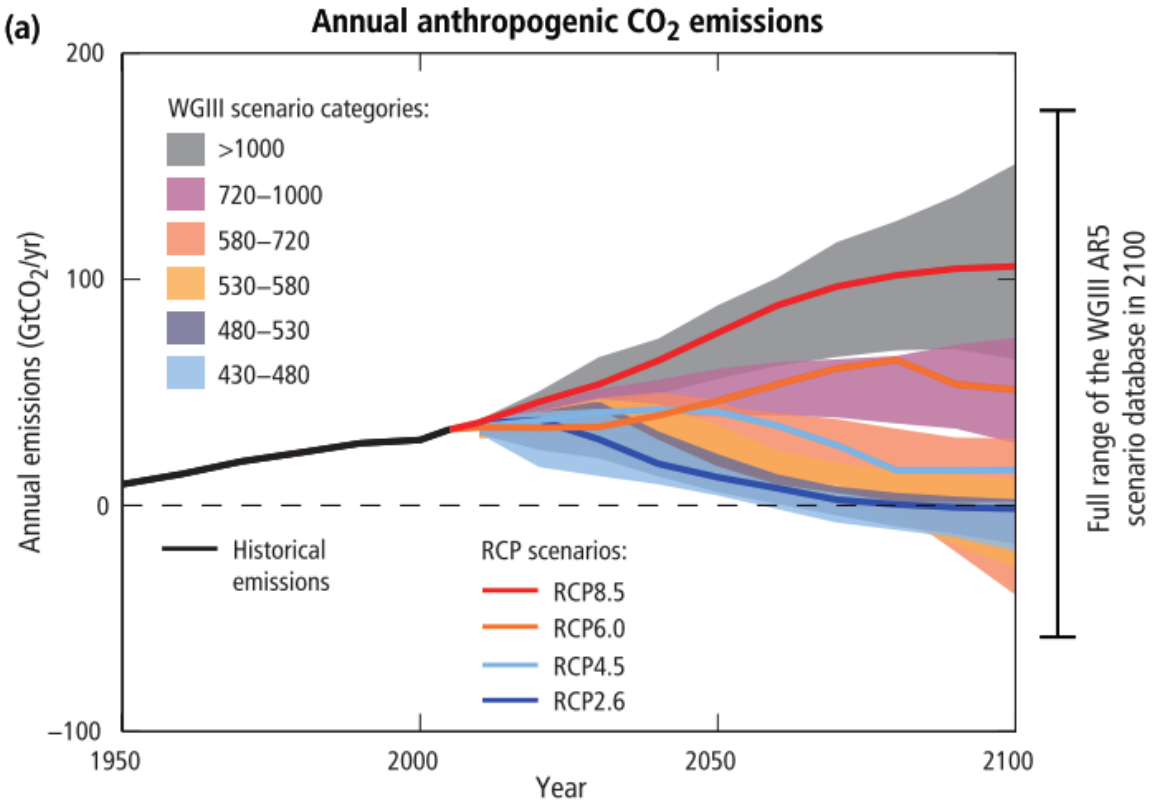

Figure 2.2 Emissions of carbon dioxide (CO2) alone in the Representative Concentration Pathways (RCPs) (lines) and the associated scenario categories used in WGIII (coloured areas show 5 to 95% range). The WGIII scenario categories summarize the wide range of emission scenarios published in the scientific literature and are defined on the basis of CO2-eq concentration levels (in ppm) in 2100. *Source: IPCC AR5 Fig. 3.27. p 26.*

Understanding Representative Concentration Pathways (RCPs)

RCPs were used in the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC 2013) to model possible future climate change. There are four main RCPs used in AR5 and they recognise that the choices we make over such things as energy generation or transport technologies will determine the future concentration of greenhouse gases in the atmosphere. In brief:

• RCP 2.6 involves a switch to renewable energy and low emissions transport systems, with new emissions capture technologies, and limits projected climate changes this century to 1.0 degrees C of temperature rise and 0.4 metres of sea level rise (relative to 1986-2005).

• RCP 4.5 involves a shift to renewable energy and mixed emissions-intensity transport systems, and limits projected climate changes this century to 1.8 degrees C of temperature rise and 0.47 metres of sea level rise (relative to 1986-2005).

• RCP 6.0 involves an increase in renewable energy and mixed emissions-intensity transport systems, and limits projected climate changes this century to 2.2 degrees C of temperature rise and 0.48 metres of sea level rise (relative to 1986-2005).

• RCP 8.5 involves a continuation of fossil-fuel energy generation and transport systems, and results in projected climate changes this century of 3.7 degrees C of temperature rise and 0.63 metres of sea level rise (relative to 1986-2005).

Box 2.1 Representative Concentration Pathways and their respective temperature increase and projected sea level rise by 2090. *Adopted from Mummery et al., (2017) pg. 21.*

The RCP above represent a range of low to high GHG concentration scenarios. By 2100, a global average temperature increase ranging between 2.6 and 4.8°C is predicted for the low and high GHG concentration scenarios respectively. The low GHG concentration scenario which limits warming to <2.6°C is attributed to successful implementation of climate mitigation measures and is projected to bring average SLR of 0.26-0.55m. If GHG emissions continue unabated, a high end with increases of up to 4.8°C above pre-industrial temperatures is projected to bring SLR of 0.5-1.2m by the year 2100 (Horton et al., 2014, Siebentritt, 2016, NCCARF, 2018).

Available scientific data on temperature rise predictions creates an almost certainty and inevitability of SLR despite the uncertainties in the magnitude of the changes. **Figure 2.3** below from Intergovernmental Panel for Climate Change Fifth Assessment Report (IPCC AR5) represents SLR probabilistic projections for the low and high GHG concentrations scenarios

up to the year 2100. Figure 2.3 shows SLR projections from two models based on the different RCPs scenarios. The lower end CO_2 emissions is projected to yield a low rise in sea level (B1) while the high-end CO_2 emissions (RCP 8.5) is projected to yield scenario A1F1. The bars on the outside of the graph represents error margins.

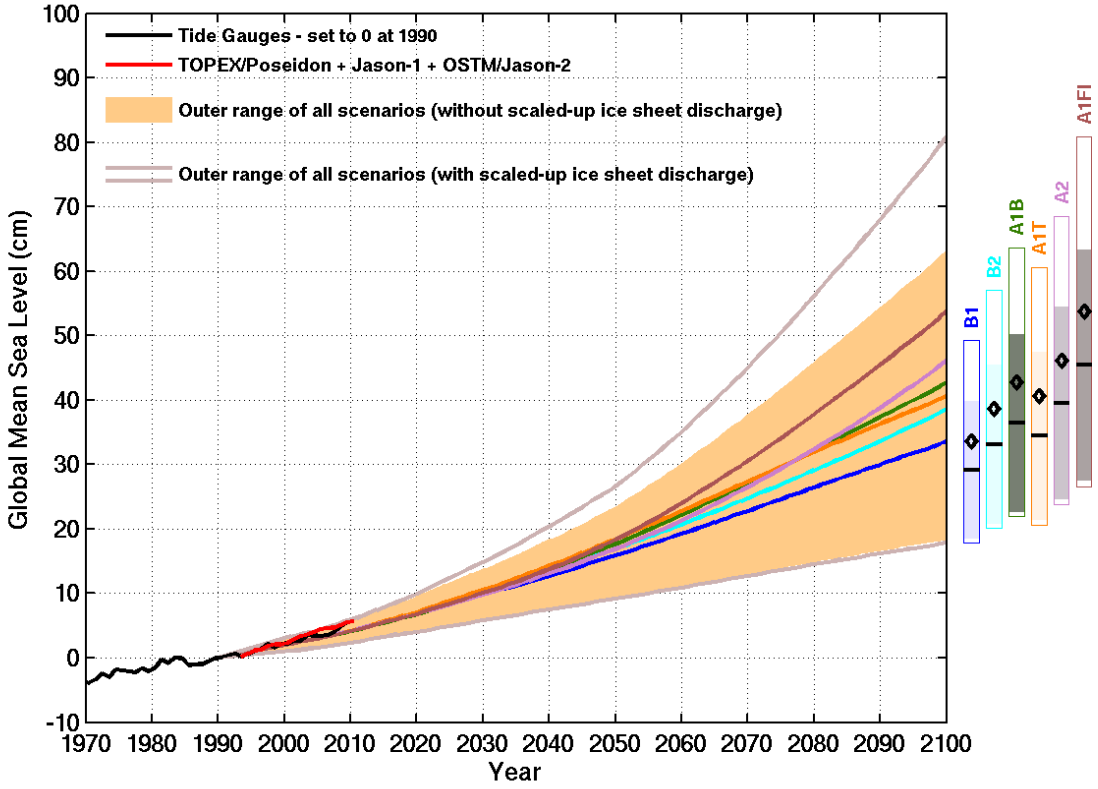

Figure 2.3 Scenarios of future sea-level rise. ***Source Fig. 1 Church et al (2011) p. 134.***

There are significant uncertainties associated with these projected magnitudes of SLR ((Horton et al., 2014). The inability to predict the actual amount of GHGs that will be in the atmosphere in future is one of the key uncertainties. The future GHGs amounts in the atmosphere are an extrapolation from the present emissions. Secondly, SLR projections are confounded by the inability of models to give precise prediction of the impact of increasing concentrations of greenhouse gases (Walsh et al., 2004, Horton et al., 2014). The models give a generalised projection of the impacts yet there are possibilities of the future levels surpassing the projections. The projections are based on thermal expansion and melting of land-based ice, without considering the possible dynamical behaviour of the polar ice sheets' response to changing climate (Mimura, 2013). The insufficiency in the physical understanding of the polar

ice sheets' dynamics (beyond thermal expansion and melting) in response to changing climate leaves a lot of possibilities (Mimura, 2013). As proposed by Church et al (2011),

"Reliable projections of Sea level change depend critically on improved understanding of the full range of underpinning issues, the rigorous testing of models of all aspects of the climate system contributing to Sea level change, and the complexities of combining these terms" (Church, et al, 2011 p. 133).

Uncertainties associated with the melting of Greenland and Antarctica polar ice sheets has potential to confound SLR projections (Mimura, 2013) if the climate system reaches a tipping point which commits one or more of the land-based ice sheets to irreversible melting (Siebentritt, 2016). Furthermore, there is a tendency for most studies to confine SLR projections to AD 2100. But it is necessary to acknowledge that SLR shall continue to rise even beyond AD 2100 (IPCC, 2013) with levels of up to 2.0–3.0m projected for AD 2300 thus challenging the future existence of some coastal cities and low-lying island nations (Horton et al., 2014).

The rising sea level will drive extreme and erratic events of unprecedented magnitude and frequencies (Church et al., 2006). For example, high tides, associated storm surges and coastal flooding (Harvey and Smithers, 2018), (**see Box 2.2 for details**), are predicted to manifest in coastal areas. These events are predicted to vary both in temporal and spatial scales with time scales ranging from seconds (for surface waves) to hours (for tides) while storm surges may become seasonal and align with other natural climate variabilities (Church et al., 2016). With coastal areas already subject to threats arising from individual oceanic phenomena such as storm surges, increased risks are anticipated from a collective occurrence of these natural phenomena (McInnes et al., 2016) which is further exacerbated by the growing populations and assets in the coastal areas (Hallegatte et al., 2013).

Causes and effects of Sea level rise *Source*: Cechet et al., 2011
Tides and storm surges: Climate change will not be a simple, uniform warming process, but will vary from region to region. Changing climate will bring changing weather, with associated changes to wind strength and direction affecting storm tides riding on raised sea-levels. *Ocean currents*: Currents on the Australian west and east coasts will strengthen as more heat is transported from the tropics to the mid-latitudes resulting in impacts on coastal ecosystems. *Inundation*: Even if the sea were totally calm, significant areas of Australia's coastline will be flooded if sea-levels rise as predicted. *Erosion*: Soft coastlines are potentially mobile because of rising sea level. *Salinisation*: Groundwater, estuaries, lakes and rivers will be 'invaded' by salty sea water, altering and causing massive changes to coastal ecosystems

Box 2.2 Causes and effects of Sea level rise *Source: Cechet et al., 2011.*

2.2.1 Sea Level Rise and Australia's Coasts.

Assets and infrastructure development in the coastal areas are demand driven. The estimated average global losses from flooding and subsidence in 2005 stood at approximately US$6 billion per year, and projected to increase to US$52 billion by 2050 (Hallegatte et al., 2013). Aggregating the negative SLR impacts and high-growth socio-economic effects generates a greater risk at the coastal front with those risks likely to increase over time (Abadie et al., 2017). In Australia, there is sparse research on the actual value or property considered at risk from climate change and SLR. The first study-The First Pass National Assessment Report on Climate Change Risks to Australia's Coast produced by the Department of Climate Change (2009) and its Supplementary report (2011) provided a nation-wide value estimates for property susceptible to SLR. Among the few regional studies that followed on property value considered at risk from SLR, a detailed study in Townsvile concluded that 4,400 homes will be completely inundated from SLR alone by the year 2100 without considering compounding factors (The Climate Institute, 2016).

Research based on the 2008 Australian property prices valued total properties at risk from climate change to be worth $63 billion with the figure projected to be $88 billion in 2015 (The

Climate Institute, 2016). According to The Climate institute (2016), costs associated with the risk of climate change and SLR has been factored into home and property insurance. The Areas considered as high-risk locations, can have home insurance policy premiums being 10 times higher than low risk areas while in some areas home insurance policies are already unaffordable or insurers won't even offer policies (The Climate Institute, 2016). A climate impact and vulnerability report published by the Intergovernmental Panel on Climate Change (IPCC, 2014) further indicate that despite previous property losses, the Australian governments are still failing to discourage property development in risk prone areas thus exposing citizens to unnecessary risk such as the destructions sustained from high tides at Collaroy beach in 2016 (**Figure 2.4**).

The First Pass National Assessment Report on Climate Change Risks to Australia's Coast highlights inundation and coastal erosion as two basic coastal risks arising from the combination of SLR and changes in extreme events. SLR impacts from extreme events are already evident in Australia's coastal margins. Studies indicate that coastal areas are already sustaining impacts from coastal storms and tidal changes that causes erosion and occasional inundation (Poumadère et al., 2015, Leitch, 2017a). **Figure 2.4** shows evidence of coastal inundation and erosion in Collaroy beach (New South Wales) which resulted in loss of coastal property from high tides. Tides of 8m heights caused destruction to property forcing residents to be evacuated from a number of beachside properties (Code and Tarasov, 2016).

Figure 2.4 Property battered by high tides in Collaroy Beach. ***Source: Photos by Amanda Hoh, ABC news, 2016***

Vulnerability of these coastal margins is predicted to increase in the future (Poumadère et al., 2015) from the projected SLR, thus subjecting more property, infrastructure and human lives to risk (Tonmoy and El-Zein, 2018). Risks associated with the accelerated climate change and SLR of the 21st century (Nicholls and Cazenave, 2010, Gurran et al., 2013) require adaptation strategies to help human and natural systems to accommodate the projected impacts.

2.3 Adaptation to Sea Level Rise

Adaptation has generally been adopted as a practicable response to the impacts of climate change and more specifically to SLR (Berrang-Ford et al., 2011, Pielke Jr et al., 2007, Adger and Barnett, 2009). Although adaptation and **mitigation** are complementary strategies for mitigating the risks of climate change (IPCC, 2014b), many Governments are focusing more on adaptation to address challenges resulting from climate shifts and its related consequences.

The IPCC, (2014) defines adaptation as 'the process of adjustment to actual or expected climate and its effects.' It involves taking practical actions throughout society, by individuals, groups and governments (Neil Adger et al., 2005) to manage risks from climate impacts, protect communities and strengthen the resilience of the economy (NCCARF, 2013). Adaptation can involve gradual transformation with many small steps over time, or major transformation with rapid change. Through adaptation, human and natural systems are anticipated to cope with the climatic shifts including SLR (Harvey and Smithers, 2018). Therefore, in human systems, adaptation should moderate or exclude plausible harm by developing resilient pathways and more importantly facilitate exploitation of opportunities presented by climate change.

2.3.1 Adaptation options and decision making.

Three adaptation strategies of 'accommodate', 'protect' and 'retreat, are widely endorsed by climate experts around the world (Swart et al., 2014, NCCARF, 2016, Ryan et al., 2011, Nicholls, 2011). **Figure 2.5** below shows an illustration of the three adaptation strategies. The 'accommodate' options involve developing mechanisms that facilitate communities to coexist with threats from SLR and climate change (NCCARF, 2016, Ryan et al., 2011). These mechanisms facilitate the continual use of developed coastal land by adopting more resilient building types to accommodate climate driven changes. For instance, developing buildings with piled construction that can be raised above flood levels. 'Retreat' on the other hand

involves either relocating, withdrawing or abandoning assets that are considered to be at risk and pave way for biological ecosystems to retreat landward as sea level rises. The ecosystems act as buffers at the land-sea interface thus protecting assets from damage by coastal erosion and inundation. “Protect” options involve the use of hard structures (e.g. construction of physical barriers such as seawalls) or soft solutions (e.g. dunes and vegetation) to protect assets on land from impacts of extreme events. Advances in coastal developments has also presented considerations for a forth option being the “Avoid” option which identifies future no build areas and uses planning tools to prevent new developments in areas considered “at risk” from SLR (NCCARF, 2016). Adoption of all or any of the four options significantly relies on the existence of institutional and governance structures for decision-making (IPCC, 2014b).

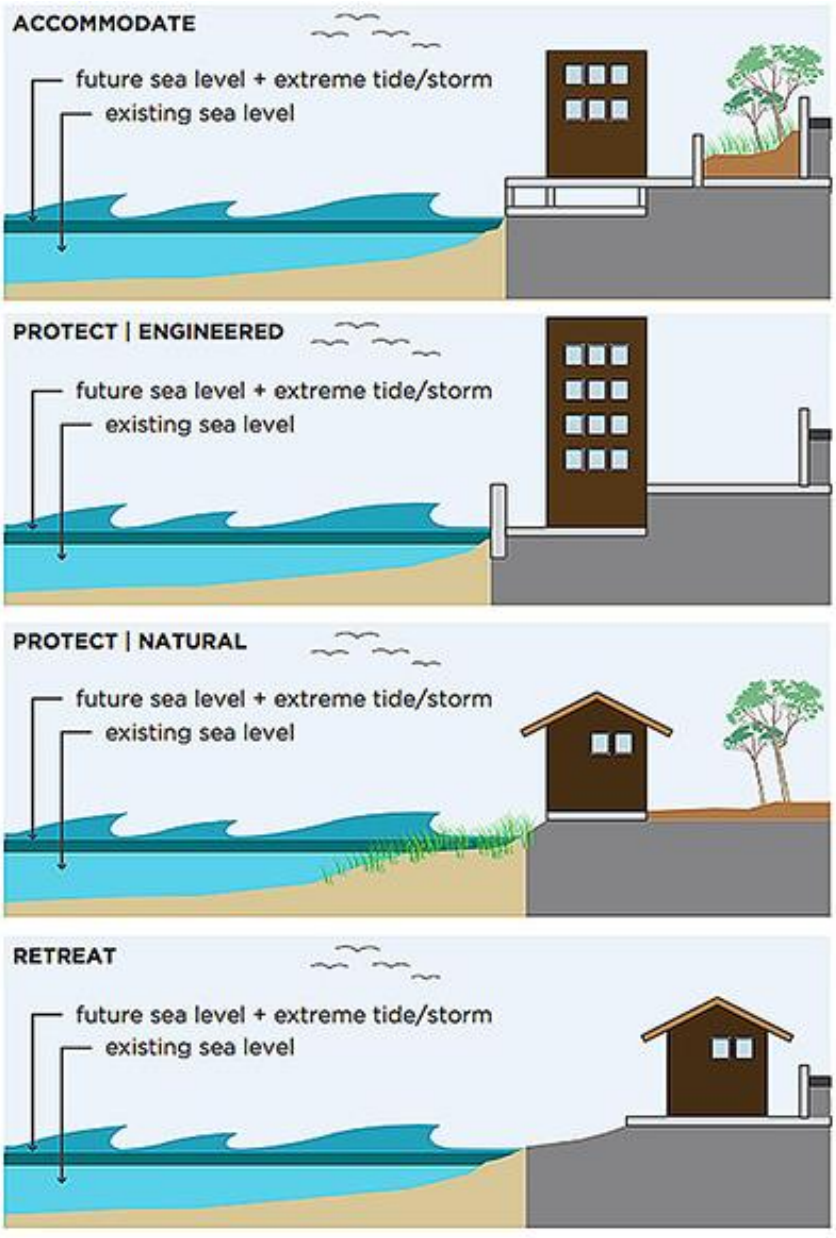

Figure 2.5 SLR adaptation options. ***Source: adopted from Campbell and Wilson (2015) p. 3.***

2.4 Coastal Governance and Adaptation to SLR

The First Pass National Vulnerability Assessment (Australian Government, 2011) estimated that approximately $63 billion worth of residential buildings were at risk of inundation from a projected 1.1 metre of SLR. A significant but unquantified number and value of other infrastructure such as roads and bridges, were also considered at risk of inundation. Later studies suggest even higher rates of rise-slightly larger SLR (by up to about 0.06 m) for the Australian coastline than the global mean sea level projections (McInnes et al., 2015). This difference from the global average is attributed to dynamic processes which include regional ocean currents, sea floor movements, and gravitational variability due to water mass redistribution (land-based ice and other terrestrial water storage) in the climate system (NOAA, 2017). Today, "more than $226 billion of current residential, commercial, industrial, road and rail assets in coastal areas are potentially exposed to inundation and erosion hazards, in event of a sea level rise of 1.1 metre" (NCCARF, 2018).

Stocker (2012) suggests that effective governance of the coastal zones is a challenge to many Governments around the world including Australia (STATE OF THE ENVIRONMENT COMMITTEE, 2011, Leitch, 2017a). The complex and dynamic biophysical processes at the coast, coupled with varied interests of diverse stakeholders confound the administrative processes for effective coastal management (Clarke et al., 2013, Stocker, 2012). In Australia, like elsewhere, effective governance of coastal areas faces challenges from the complexity of coastal systems in their nature and their diverse uses, the interplay of diverse jurisdictions-federal, state and local (Taylor et al., 2014) and administrative bodies with unique coastal mandates, and the diverse perspectives on the use, management and governance of coastal zones (Clarke et al., 2013, Stocker, 2012). The role of each level of government will be discussed briefly below

2.4.1 The Federal and State governments and their role in SLR adaptation.

Leitch (2017) sums up the roles of Federal and States/Territory governments:

"*The Commonwealth (federal) Government has no direct constitutional power on the coast. It influences coastal management through provision of broad policy direction (national policies, plans), provision of information and guidance and through provision and allocation of funding for specific initiatives……..The States and territories governments determine the legal and regulatory frameworks of the local Governments which include, governance, planning, service delivery, community development, assert management and regulation. Each state government determines the roles and responsibilities of the local governments…….*" (Leitch, 2017 p. 211).

2.4.2 The role of the federal Government

The Commonwealth Coastal Policy of 1995 (CCP 1995) explains that management of coastal zones in Australia is a shared responsibility (Good, 2011b, Caton and Harvey, 2010) between the three tiers of government in Australia (federal/state/local). The federal government, as the highest form of governance has encouraged a cooperative approach to the management of coastal zones in recognition of the fact that 'no single sphere can manage the coastal zone on its own' (CCP 1995 in Good, 20011b p. 6). As purported by Caton and Harvey (2010) under the Australian Constitution, the federal government has limited powers that relate to environmental management across the Australia. As such, the federal government does not have any legislative framework or laws to govern coastal zones (Good, 2011b). "However, it has an important role in coastal planning and management through its indirect financial and funding powers, by leading national policy-making in a range of related areas, and through its influence, particularly through the Council of Australian governments (COAg) (Caton and Harvey, 2010 p 203) For this reason, the federal government does fully recognise local government as primarily responsible for everyday planning and management (Good, 2011b). In 2000, the Commonwealth introduced the Environment Protection and Biodiversity Conservation Act of 1999 (EPBC Act) to replace a number of legislations that significantly changed the Commonwealth-state relations.

Despite not having direct legislative power over coasts, the Federal government has influence on the management of the coastal areas. According to Good (2011) the federal government's influence is through:

- the provision of grants to the States under s. 96 of the Constitution (CCP 1995);
- the provision of information about coastal zone management,

- the establishment of national plans and policies to guide State/Local Government plans/policies/action (Good, 2011 p. 6).

Previous federal governments put in place institutional structures such as The Department of Climate Change and Energy Efficiency (DCCEE) and the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) to facilitate the federal governance in coasts. The existence of such structures is dependent on the principles of the government in power and can be lost when there is change of government. Currently, the federal government has several platforms and strategies in place such as the National Climate Change Forum, Intergovernmental Coastal Advisory Group, Coasts and Climate Change forum and working groups that facilitate research and protection of the coast.

2.4.3 State government and coastal management

As a consequence of stipulations within Australia's federal constitution, coastal management in Australia is largely the responsibility of the eight separate states and territories (Harvey and Caton, 2010). Land use regulations are vested with the state governments. This means that coastal resources, coastal planning and development, and coastal management are regulated by state and territory governments. State governments in turn delegate many coastal management responsibilities to local government (Harvey and Caton, 2010). According to Harvey and Smithers (2018), state-based coastal management in Australian is highly varied. Only four states have dedicated coastal legislation (Queensland, New South Wales, South Australia and Victoria), but most states have a coastal policy or strategy linked variously to planning and development control legislation. These coastal policies range from non-statutory guidelines through to statutory state-wide polices. States or territory governments therefore provide policy guidance, financial support, and technical expertise to the local governments to enhance coastal protection (Good, 2011b, Leitch, 2017b, Caton and Harvey, 2010).

In South Australia the Coast Protection Board is the statutory authority responsible for the State's coast and administering the state's dedicated coastal legislation: the *Coast Protection Act 1972*. The Board plays a key role in development assessment in accord with the planning and development legislation: the *Development Act 1993*. Any new development proposals or substantial changes to coastal land must be referred to the Coast Protection Board for comment. The Board is supported in providing advice on referrals by a multi-disciplinary team of coastal engineers, planners and scientific officers situated in the Coastal Management Branch of the

Environment Department (at the time of writing it is the Department of Environment and Water–DEW). It has also produced a coastal policy based on latest IPCC projections which provides guidance for development set-back from the coast. Coastal planning and development at the local level is therefore given direction through this state government legislative and policy 'architecture'. Of note, planning authorities (local government) must pay regard to any comments made by the Coast Protection Board about a proposal that has been referred to the Board (i.e. the planning authority cannot consent to or approve a development without having regard to the Board's comments). However, this does not always result in the Board's recommendations being followed. Of particular relevance to this study the CBP does have the power to direct a planning authority to refuse or impose conditions for construction of coastal protection works within 100 metres landward or one kilometre seaward of the coast measured from the mean high water mark on the seashore at spring tide (DEWNR, 2013).

2.4.4 Local Government and Coastal Governance

Of the three tiers of government, local governments, or councils are at the coalface of managing coasts as key decision-makers and the first point of contact for communities (Ramm et al., 2017, Caton and Harvey, 2010). Local governments, in many cases, do not have their own constitutional standing since they operate within a policy framework which has largely been imposed by state policies. Local councils are the delegated agents of the state government (Measham et al., 2011). The role of local government includes land use planning, infrastructure development, emergency management, foreshore and tidal management (NCCARF, 2016). They are responsible for the operationalisation of plans and policies in coastal spaces (Button and Harvey, 2015).

Local governments manage local risk by operationalising and aligning local adaptive responses to local challenges (Forino et al., 2018). These key strategic responsibilities manifest through policy development and post-policy partnerships, as well as the implementation of plans and policies in the coastal spaces (Button and Harvey, 2015). However, most councils are overwhelmed with chronic problems when managing developed coastal spaces mostly due to financial constraints and even lack of expertise especially in non-metropolitan councils (Caton and Harvey, 2010). Studies have proposed allocation of resources and distribution of authority that in accordance with the effectiveness at each level of governance (Abel et al., 2011). Despite the proposed allocation of authority and resources between levels of governance, higher governments disburse limited resources to local councils for policy implementation.

In fulfilling these state policies, coastal councils resort to incorporating adaptation to SLR in their development plans, policies and related amendments. This is a risk management approach that focuses on assessment of development applications and land-use planning as well as the diligent application of planning policy (LGA of SA, 2012) which is likely to minimise risks on councils sustaining negligence-based claims from the public. However, it should be noted that the challenges manifesting in the various coastal areas including level of risk from SLR, are unique in both time and space. The rate of rolling out adaptation plans therefore may varies for each local council with each guided by the level of climate risk and other coastal problems they face. Some local councils may have to fast track their adaptation plans than others to adapt (NCCARF, 2016). The complexity and uniqueness of coastal problems has contributed to the slow progress in turning adaptations strategies into action (Swart et al., 2014).

2.5 Perceptions and Decision Making

Theories in psychology have proposed two essentially different behaviours that human beings use to process information about the world to make judgments: the rule-based system and the association/similarity-based processing system (Slovic and Weber, 2002). The rule-based is premised on learnt ideologies and strives on the cognitive conception of information about the situation to be addressed. "To operate, we need to have learned the rule" (Slovic and Weber, 2002). The association/similarity-based processing system which requires real world knowledge and sufficient practice in the decision-making process. The two processes work in parallel and often shapes an individual's perception to risk. For those with influence on policy and decision making processes, enforcement of one of the two types of behaviours may meet resistance from quarters who uphold the other.

Perceptions to risks by those who have influence on policies and decisions are of significance in governance. Risks is characterised by multiple conceptions which brings out some level of perception subjectivity from both policy makers and the public (Slovic and Weber, 2002). Risk can be perceived as a hazard, a probability, a consequence or a potential threat/adversity (Slovic and Weber, 2002). For this research, risks shall be perceived from the context of the probabilities and consequences of occurrence of adverse events.

2.6 Perceptions on climate change and SLR as risks.

According to Weber (2010), decision making is based on detectable changes, desires and the need to meet social order demands. Although studies show that individual perceptions are largely influenced by personal exposure to a hazard event (Taylor et al., 2014), it is not clear if the observation is also applicable to perceptions on threats from slow-onset events such as SLR (Larin, 2014). Climate change is a slow, gradual and inconspicuous adjustment of average climate condition which happens to be a difficult phenomenon to detect and track accurately based on personal experience (Weber, 2010, Retchless, 2017). Inability to detect these changes, and the subsequent risk associated, drives the insufficient concern and trust by the lay public to the scientific descriptions and projected impacts presented. Little or moderate concern towards climate change arise amongst the majority since it is not seen as presenting a great deal

of personal harm (Leviston and Walker, 2011). The less pronounced risks from climate change adaptations are largely reflected in decision-making processes (Leviston and Walker, 2011) with less support being given to decision concerned with the less pronounced or risks perceived to be non-immediate. Although climate change risks can be studied and evaluated objectively, subjective perception of such risks is also important and is often affected by an individual's characteristics (Hu et al., 2017).

A typical conceptual structure of disaster risk from climate change is shown in **Fig 2.6** below as adopted from the IPCC 2012 Special Report on Extreme events (IPCC SREX, 2012). In this case, disaster risk occurs at the intersection of climate events, level of exposure and overall vulnerability to climate events. This means risk as a function of the interplay between hazards, level of exposure and vulnerability of those interacting with the hazard. For coastal zones, in the case of exposure to SLR, the determinants to the magnitude of the risk are two sided with disaster risk management and climate change adaptation on one side and climate change (natural and anthropogenic driven) on the other side (IPCC SREX, 2012).

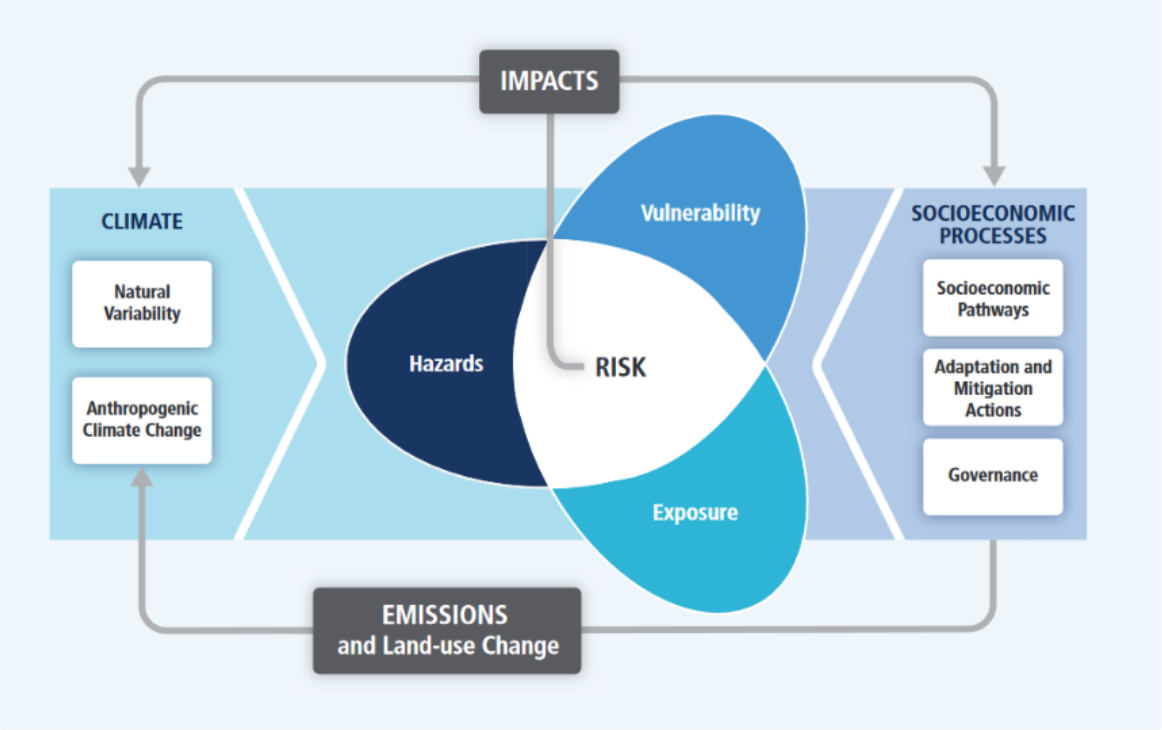

Figure 2.6 Conceptual structure of climate change disaster risk. ***Source: Fig SPM.1 (IPCC 2012, p. 4)***

The prevalence and acknowledgment of risk within a society calls for a solution space which forms part of an emerging research (Palutikof and Barnett, 2014). It is on this solution space

that most emerging research on adaptation to climate change, perception of risk and decision making centres around (Palutikof and Barnett, 2014). Within the solution space emerges the risk management process (see **Fig 2.8**). The process depicts a sequence of procedure to follow in addressing a perceived risk. In practice, this theoretical risk management framework faces the heuristic human factors.

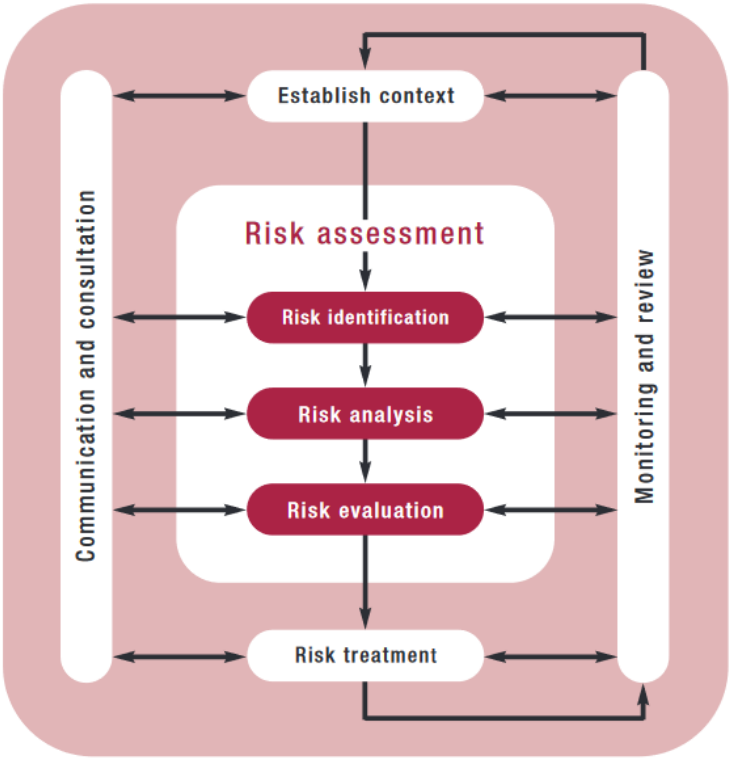

Figure 2.7 Risk management process (based on ISO 31000).

There are different schools of thought on factors that influence risk perception. A study by Hu et al., (2017) point to institutional trust, attitudes, values, beliefs, heuristics and biases as fundamental factors shaping an individual's perception to risk. Trope and Liberman (2010) through their proposed Construal Level Theory focus on temporal distance or projected time space (long term or short term) during which a hazard is perceived to most likely occur as a key factor that influences risk perception and behavioural biases. The theory states that as the temporal distance increases into the future, risks associated to events of that distant future are interpreted as more abstract hence being relegated to being of lesser priority (Trope and Liberman, 2010, Covi and Kain, 2016). Risks from climate change are subjected to this bias from public and politicians' perceptions (Hu et al., 2017). Hence, since action to address rising sea levels is perceived as planning for a non-immediate risk which is relatively new (Ryan et

al., 2011), it can be argued that the temporal distance bias influences the decision process on adoption of strategies to mitigate impacts from SLR. For the less pronounced impacts such as those from SLR, there is need to have a clear understanding of its projections in order to conceptualise projected risks. Such an understanding will help drive mitigation and adaptation policies in the now so as to safeguard the future.

2.7 Decision making as a function of risk management

Addressing risk from SLR, like any other risk, involves a risk management process. **Figure 2.8** shows an iterative risk management process that has been endorsed by the IPCC (IPCC, 2014c) as an effective approach to adaptation decision-making. The decision-making framework has capacity to incorporate influence from both climate and non-climate related changes and to deal with large uncertainties. The framework thus present decision-makers with a platform to analyse vulnerability, risk and uncertainty and to assess appropriate policy responses. More importantly, the feedback loops within and between components of the framework makes flexible and receptive to new knowledge and experiences so as to progressively cope with climate change and SLR uncertainties. (PROVIA, 2013)

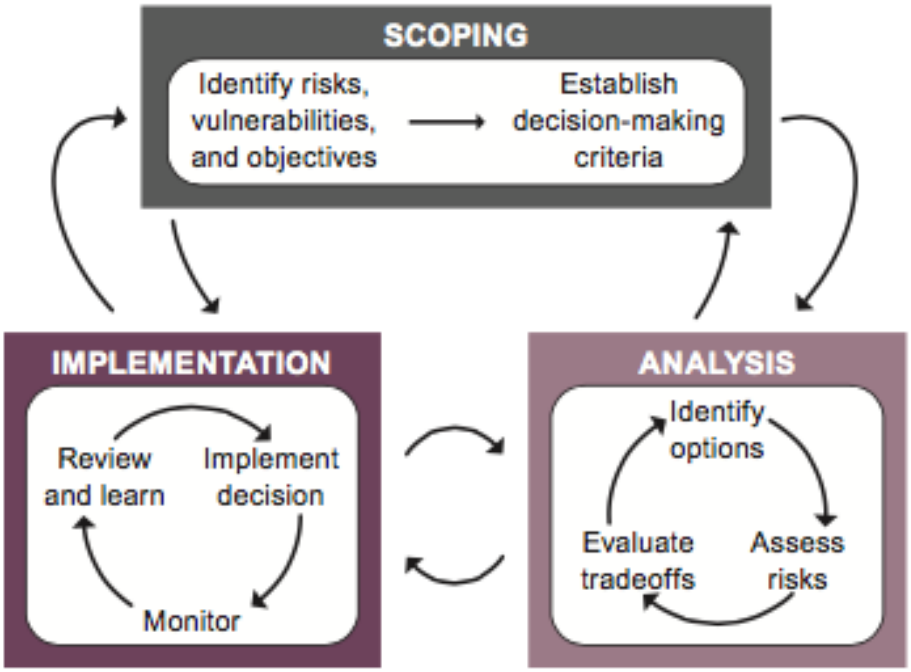

Figure 2.8 Climate change adaptation as an iterative risk management process. ***Source: Adapted from IPCC (2014c, Fig SPM.3 p.7).***

The National Climate Change Adaptation Facility (NCCARF- NoteAdapt) proposes a number of principles to be considered when adopting and implementing adaptation strategies.

2.8 Adapting to Sea Level Rise in South Australia

South Australia's coastal systems are similarly faced with inundation and coastal erosion like elsewhere in Australia. Accelerated coastal erosion and flooding from projected SLR poses threats to built assets and infrastructure along South Australia's inhabited coasts. The rapid increase in South Australia's coastal population and the demand driven coastal developments further exacerbate the risk posed thereto (Coast Protection Board, 2016), largely from inundation and erosion (NCCARF, 2018). The threats to coastal infrastructure present challenges to Australian coastal planners and managers at a range of scales (national to local) (NCCARF, 2016). A better understanding and planning for developments which may be 'at risk from SLR' in future (Button and Harvey, 2015) is necessary to improve resilience of coastal communities (Harvey and Smithers, 2018, Clarke et al., 2013, Nalau et al., 2015). Developmental planning in coastal zones, should take into account both the projected sea-level rise together with collective impacts from a host of erratic and extreme coastal weather events (Harvey and Smithers, 2018).

Coastal councils in South Australia have taken measures to uphold their statutory obligations to both the state and federal governments to address issues of coastal climate change. A host of climate change plans have been developed across the coastal regions of South Australia with parts of the plans being dedicated to addressing SLR and its impacts. Below are some of the plans that have incorporated SLR adaptation strategies:

Adapting Northern Adelaide (2016) – a climate change adaptation plan for the Northern Adelaide region covering the City of Salisbury and City of Playford.

Limestone Coast (2015) - Regional Climate Change Adaptation Plan for the Limestone Coast Regional Climate Change Adaptation Plan Project.

Resilient Hills and Coasts (2014)- Integrated Vulnerability Assessment for Kangaroo Island prepared for Kangaroo Island council area.

AdaptWest (2016) – (Western Adelaide Region Climate Change Adaptation Plan) a regional plan for the City of Port Adelaide Enfield, the City of Charles Sturt, and the City of West Torrens.

Resilient Hills and Coasts (2016). Resilient Hills and Coasts: Climate Change Adaptation Plan for the Adelaide Hills, Fleurieu Peninsula and Kangaroo Island Region. A report prepared for Alexandrina Council on behalf of Resilient Hills and Coasts project.

Resilient South (2014)- Regional Climate Change Adaptation Plan - for the Cities of Onkaparinga, Holdfast Bay, Marion and Mitcham.

Central local government region integrated climate change vulnerability assessment (2011)- for Central Local Government Region of South Australia.

Regional Climate Change Adaptation Plan for the Eyre Peninsula (2014)- Prepared for the Eyre Peninsula Integrated Climate Change Agreement Committee.

A number of the available plans have commenced adaptation planning with some having advanced the implementation of some SLR adaptation options. However, according to the LGA SA (2012), a number of issues have been presumed to affect the preparations and readiness of coastal councils in regard to adapting to coastal climate change and SLR. Resource constraints in coastal councils, lack of support from the higher tiers of governments as well as aligning coastal decisions to federal and state governments' policies are some of the challenges bedevilling coastal adaptations efforts. The LGA SA has therefore proposed measures as outlined in **Box 2.3** below.

Box 2.3: Adaptation measures for coastal Councils *Source: LGA of SA, 2012*

- Engage with relevant State Government departments to ensure both tiers of government have a consistent understanding and systematic approach to dealing with the impacts of sea level rise in the Council area.
- Develop a sea level rise impacts and risk- based information paper to enhance Elected Members' understanding of the issues.
- Engage with the LGA to initiate a sector- wide strategy and project to support and assist coastal Councils in the development and financing of consistent approaches to spatial mapping that provides long-term information on the impacts of sea level rise and storm surge on development planning zones and infrastructure.
- Engage with the LGA to initiate discussions with relevant State Government agencies to clarify roles, responsibilities and expectations regarding development in the coastal zone, in particular freehold lease and land management agreements.
- Advocate for the establishment of a responsible authority on coastal sea level rise planning decisions.
- Investigate alternative funding sources to undertake coastal sea level rise mapping including Commonwealth/State grants, LGA Research and Development Fund and partnerships with tertiary institutions and other relevant stakeholders
- Engage with the Department of Transport, Energy and Infrastructure to clarify roles, responsibilities and ownership of Crown Land and roads that become permanently inundated as a result of sea level rise (LGA/LGAMLS Roads and Infrastructure Project)

Box 2.3 Adaptation measures for coastal councils. ***Source: LGA of SA, 2012.***

2.9 Perceptions to SLR Adaptation Policy

Leitch (2017) argues that the challenge of adapting to SLR by coastal councils has all the hallmarks of a wicked problem. These challenges can be argued from different perspectives.

First, decision-making in local councils is subject to vested interests and competing priorities upheld by two key stakeholders: local council employees and Mayors (in addition to Councillors). Council employees and Mayors uphold "different (often conflicting) perceptions to problems, the knowledge required to address the problems, and approaches potential solutions. These differences stem from diverse worldviews that are underpinned by values, aspirations and vested interests"(Leitch, 2017b) . In a study done by Measham and his

colleagues (2011) in 15 coastal municipal councils in the Sydney region, it was evident that adaptation represented only one priority area amongst a host of other competing interests that local councils have to address. In the study, one respondent indicated,

> *"We're involved in everything from babies to bitumen and the request for more funding just comes in on a daily basis. We're not about to start throwing large sums of money at building extraordinary fortifications just in case the sea level rises."* Measham et al., 2011 p. 900)

Short-term expectations by local communities are often prioritised against the "perceived" long-term goals of climate change-related impacts with unknown consequences for communities (Mukheibir et al., 2013). SLR is usually perceived as being a long-term problem and therefore unpopular in comparison to other priorities that are perceived to be more urgent. Resource allocation at councils is demand driven. "In the context of the scarce resources available to Councils and the competing demands for resources, councils are reluctant to allocate considerable funds to address uncertain risks, when there are so many other core services to be provided." (Baker, 2011, p 21). At council level, when faced with issues of competing priorities, resources are allocated to meet the perceived immediate needs and expectations of the community at the expense of issues considered non-immediate.

Second, the hybrid nature of **local government**-being state controlled but community elected presents challenges for decision making and policy implementation at local level. Policy audits have revealed evidence showing 'that between 10% and 18% of coastal decisions by local councils are not in accordance with the advice from higher tiers of governments, with more than half of these involving advice on coastal hazards (Good, 2011a). By nature, local councils seek to satisfy both its statutory requirements and at the same time its local stock of voters. Considering that the decision-making process is largely influenced by employees and elected council members (Mayors and Councillors), the process is considerably affected by their varied perspectives, input and roles. Council employees' obligations are to uphold statutory requirements while Mayors' predisposition is more inclined to voter satisfaction. These inescapable differences affect prioritisation of environmental policies including coastal hazards such as SLR. The positions and influence in decision making by Mayors can be overarching. For instance, in an article covered by ABC news in 2014, a Queensland Deputy Premier (Jeff Seeney) "intervened to force the removal of all references to climate change-derived SLR from the regional plan of Moreton Bay Regional Council (Solomons and Willacy, Dec 2014).

At council level, it is important to recognise that the allocation of resources and goals setting is strongly tied to the platforms of elected officials (Measham et al., 2011). The support given to SLR, or lack of it, from local councils' Mayors through their positional influence can enable or stifle SLR adaptation at the local scale. The relevance of information on adaptation to coastal climate change and SLR to instigate action depends on perceptions of local coastal managers who influence decision-making. As noted by Cooper and Lemckert (2012) and Yohe and Tol, (2002), the adaptive capacity in communities depends on information management by decision-makers, perceived credibility of the available information by decision makers as well as the credibility of the decision-makers themselves. Stalled action is often associated to claims of inadequate information, perceived lack of credibility or denying the need for local adaptation in preference of other interests*"* (Measham et al., 2011). Adaptive capacity thus requires all of the three mentioned factors. a coordinated approach to SLR adaptation can be realised through employment of relevant tools and processes across internal divisions of local governments with the support from Mayors and Council employees. A decision arrived at by Mayors and Council employees often reflects individual choices made by each participant which are largely influenced by individual perceptions and areas of operation (Measham et al., 2011).

2.10 Conclusion

A wide range of literature has extensively explored factors influencing risk perception which has brought emphasis to risk studies. With the emergence of climate change and related risks associated with climate variability both in space and time, scholars have extended research of these socio-economic factors to climate change risks so as to devise appropriate adaptive strategies to climate change. However, little effort has gone into examining the socio-cognitive and behavioural factors of decision-making process so as to establish the how responsive institutions are towards mitigating and adaptive to Climate change.

The prevalence of common sense dictates that perception of risk and adaptation behaviours are generally guided by one's personality, culture, cognitive factors and one's experiences on risks. In addition, for risks such as SLR, the temporal factor pushes the risk factor to the distant future. When these different factors come into play, they bring out differences on how individuals perceive potential risks from future projections.

People's perceptions are always drawn into, and significantly shapes the decisions people make. As proposed by Slovic and Weber, (2002), the differences in (risk) perception forms the

central part of disagreements about the best course of action between technical experts and members of the South Australia local councils. Although some literature advocate for plurality of views and interests to be incorporated in the planning theory (Leitch, 2017a), decision making process gets challenged when there are divergent perceptions from those involved in the process. These divergent views may deter efforts intended to facilitate adaptation to SLR.

This research is therefore necessary to examine if there exist any perception differences between coastal councils' employees and Mayors towards SLR and associated risks and to investigate how these differences between the key stakeholders to the decision-making process affect choices of adaptation to climate change and SLR.

Chapter 3 – Methodology

3 Chapter 3: Methodology

3.1 Introduction

This chapter outlines and describes the processes and procedures that were followed to obtain and analyse data needed for investigating the aims and objectives of the study and ultimately addressing the research question. In this chapter, I explore the methods employed in the research: qualitative and quantitative methods, survey instrument design, ethics procedures, sample selection, data collection process (survey release and reminders), data retrieval and analysis.

The research forms part 2 of a two-phased study under the title **'Understanding South Australian local government perceptions of risk to sea level rise.'** Part 1 of the research was conducted in 2017 as an Honours project (by Ms Allira Taylor-Wilkins - **Appendices 1 and 2**) which explored the perception of Councillors to SLR. Part 2 of the research focuses on exploring views of Mayors and Council employees.

The approach adopted for Part 2 was a survey of two groups of people with capacity to directly influence adoption and implementation of policies in coastal councils. Questionnaires were designed to examine the perceptions of Mayors and Council employees in regard to South Australia's coastal councils' preparation and readiness for SLR. The online surveys had been administered and results collected prior to the commencement of this thesis. The thesis presents the analysis of the findings from the online questionnaires.

The Methodology chapter is divided into three sections. The first section examines the online survey method: the research approach used for this study and its suitability, followed by research design which describes the approach followed in the research (research instrument and its administration to collect information). The section is summed up with a summary of limitations of the methods used.

3.2 Qualitative and Quantitative data collection

For this research, an online survey was employed to address the aims of the study which integrated qualitative and quantitative data. Research has evolved from the traditional silos of qualitative and quantitative approaches to more of integrated and "multi-dimensional research strategies that transcend or even subvert the so-called qualitative-quantitative divide", (Mason,

2006). The integration of the traditional quantitative and qualitative research methods has become unremarkable in recent years (Bryman, 2006). Mixing methods is perceived to be more helpful in bridging the rift between qualitative and quantitative approaches. Manson (2006) also purports that mixing methods provides an exploratory platform to a researcher, which facilitates research elements such as "thinking outside the box", "enhancing capacity for theorizing beyond the macro and micro as well as enhance and extending the logic of qualitative explanation".

3.3 The Online Survey

Online surveys are perceived to be a modified interview process which is more flexible and widely used methods for gaining information about people's experiences and views. According to Granello and Wheaton (2004, pp 387), "online data collection, through e-mail and Web-based surveys, is becoming an increasingly popular research methodology." Online survey facilitates the collection of standardised (and therefore comparable) information from a study population. "Survey research is a useful and legitimate approach to research that has clear benefits in helping to describe and explore variables and constructs of interest" (Ponto, 2015. pp. 168). According to Ponto, (2015), one key advantage about the survey research approach is its capacity to use quantitative research strategies (through numerically rated items in questionnaires), qualitative research strategies (using questionnaires with open-ended questions), or both strategies (i.e., mixed methods). As it is often used to describe and explore human behaviour, surveys are therefore frequently used in social and psychological research (Singleton Jr and Straits, 2009, Ponto, 2015).

The choice of an online survey approach for this empirical research is intended to better understand how Mayors and employees of coastal councils perceived council preparedness for projected SLR in South Australia. This research is based on evidence derived from a small group of people from which data was collected and analysed. The collected data from the sample population is used to bring some insights on how some segments of coastal councils perceive council preparedness to cope with SLR.

There are several factors that make online survey more suitable and particularly attractive to researchers. Among other things, online surveys are cost effective, allow for flexibility and control over data format, reduce response time, integrate data collection with technology which translates to ease of data entry as well as the ability to obtain additional response-set

information (Evans and Mathur, 2005, Granello and Wheaton, 2004). Furthermore, online surveys have the capacity to include a diversity of question formats such as open-ended, dichotomous, single response and multiple response questions (Evans and Mathur, 2005) to collect both qualitative and quantitative data. Integration of qualitative and quantitative data in a research gives a rich, deep contextual perspective to help understand a phenomenon (Brannen, 2017), in this case perception towards SLR.

The study also aimed to draw out perceptions of Mayors and Council employees in different geographical locations, an online survey study provided a convenient platform to collect standardised information from participants in different geographical location at the same time.

Despite the many advantages of online surveys, researchers in many fields where online survey has been widely used have raised concerns about this methodology (Granello and Wheaton, 2004). Among the many concerns raised by researchers, the limitations associated with the use of online survey for this study included representativeness of the sample population, and technical difficulties, technological variations, impersonal, perceived privacy issues, unclear answering instructions to lack of online expertise and low response rates (Evans and Mathur, 2005). To address these limitations, several measures were put in place for this study to address the shortfalls of the online survey approach. This included among others, simplification of questions and provision of clear instructions during the development of the questionnaires. The questions presented in the instrument were relatively simplified but at the same time not compromising the standard of information to be collected. To address low response rate, periodic reminder emails (1 email a week after distribution of questionnaires and 1 a week before survey was closed) were sent to the respondents to remind them of making contributions to the survey. Regarding privacy issues, respondents were furnished with consent forms where confidentiality issues were clarified (**Appendix 2**). In addition, the survey did not request any form of identification and respondents were grouped according to council regions. The sample were representative in that all the Mayors in the 34 coastal councils were invited and Council employees were derived from across different cadres and ranks of employee positions from 10 coastal council regions of South Australia.

3.4 The study samples

As outlined in Chapter 1, this research forms the second part of a "two-phased research" under the title **'Understanding South Australian local government perceptions of risk to sea level rise.'** The first part of the research was conducted in 2017 as an Honours project which explored perceptions of Councillors in regard to SLR. Part 2 of the research, which is the current research, focuses on exploring views of Mayors and Council employees. The current research focuses on exploring views of Mayors and Council employees who have a significant influence on decision-making and policy design and implementation. The sample populations for the two studies (Councillors for the Honours project and Mayors and coastal council employees for this research) were selected from 10 coastal council regions (comprising 34 coastal councils) of South Australia represented in **Figures 3.1** and **3.2** below. Selection of the respondents focused on councils that have a land-sea interface and coastal zones to manage. A database of the names and contact details of the Mayors and council employees was constructed from a number of sources.

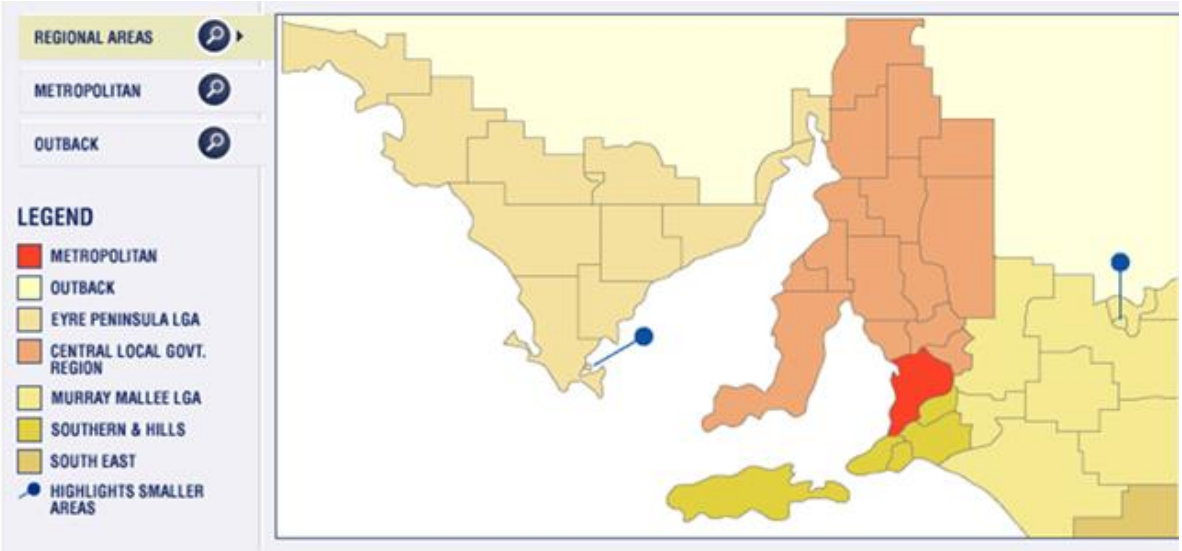

Figure 3.1 A map of coastal councils in South Australia. Source: LGA SA

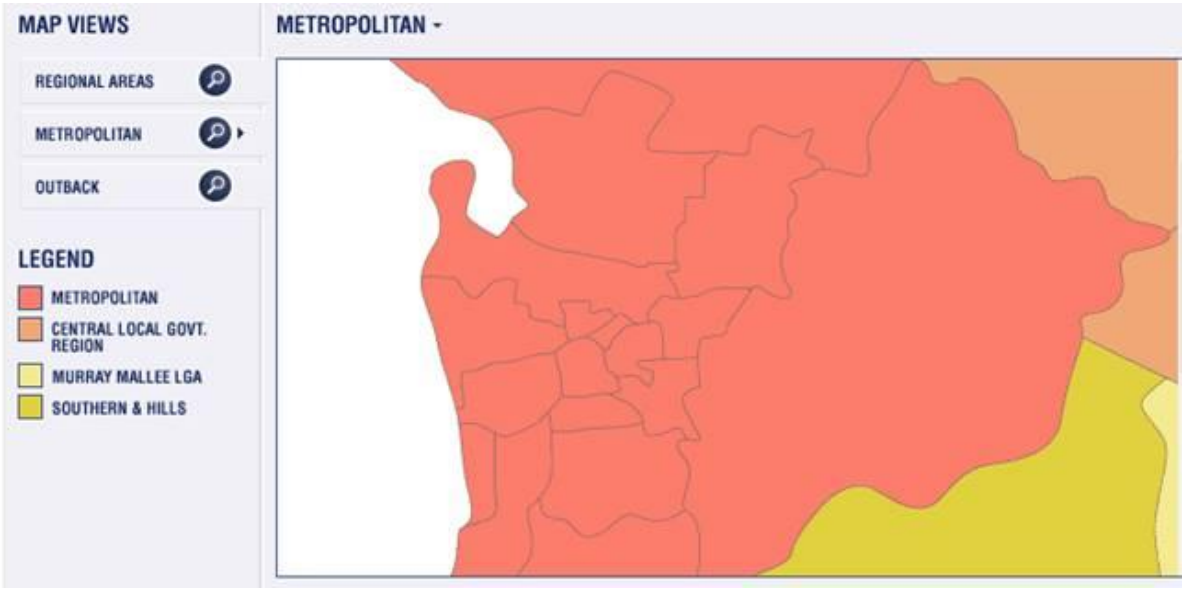

Figure 3.2 A map of the Metropolitan coastal councils. Source LGA SA

The Local Government Association of South Australia (LGA SA) website lists contact details (phone numbers and email addresses) of all Mayors. All 34 Mayors of coastal councils were invited to participate in the survey. Council employees were derived from the same 34 coastal councils. A total of 117 Council employees were invited to take part in the survey.

3.5 The Questionnaires

The use of questionnaires as an information-gathering technique in an online survey is one way of bridging the divide between the traditional quantitative and qualitative research methods. According to McGuirk and O'Neill, (2016), questionnaires are used frequently in a mixed-method research approach because of their capacity to draw on both quantitative and qualitative data sources and analysis.

The survey instrument used in this research was designed to capture both quantitative and qualitative data from Mayors and Council employees on their perceptions about preparations by local coastal councils for SLR and associated risks. The survey tool was a semi-structured questionnaire comprising of a mixture of multi-statement Likert items and open-ended questions to explore various dimensions regarding SLR (**see Appendices 5 and 6**). Two similar questionnaires were used (one for Mayors- **Appendix 5** and one for Council employees - **Appendix 6**) with minor differences in some questions so as to align responses to the two sets of respondents. Each questionnaire had a total of 31 questions divided into 5 sections (Part one

to Part five). The questionnaire concluded by requiring demographic background of the respondents (Part 5).

The questionnaire focused on the following components which were presumed to drive preparedness for SLR in coastal councils:

- Understanding about SLR
- Concern about SLR
- Perception about council readiness to respond to SLR
- Correlation between respondents concern and action
- Perception about council responsibility and liability
- Preferred adaptation options
- Councils strengths and weaknesses

3.5.1 Ethics Approval and administration of surveys

The ethics approval for this research project was received during Part 1 (for collection of data for the Honours project) of the bigger research. The current research is therefore covered under the same ethics approval (see **Appendix 3).** The survey was conducted online during the period **22/1/18 to 16/2/18** and the questionnaires were administered by Nicole Pelton (a research officer) to collect the data sets which are analysed in this research. Questionnaires were sent through SurveyMonkey-an online survey development cloud-based software - to the different email addresses provided by councils and the respondents inputted their responses. The survey went through four stages:

Stage 1- Initial invitation

22/1/18- Mayors (34 recipients invited)

22/1/18- Council employees (117 recipients invited)

Stage 2- Reminder 1

29/1/18 - Mayors - 6 responses as of 6/2/18

2/2/18 Council employees - 31 responses as of 6/2/18

Stage 3- Final Reminder - Monday 12/2/18

Stage 4- Close Survey 16/2/18

A total of 15 responses were received from Mayors and 42 from Council employees. The responses received by the researcher were consolidated and exported from SurveyMonkey to SPSS for analysis.

3.6 Data extraction and analysis

For quantitative analysis, descriptive statistics from selected questions were extracted from SPSS and exported to Microsoft excel to produce graphs for analysis. Values obtained for Mayors were plotted side by side with values from Council employees' responses as shown in **Figures 4.1 to 4.35.** Crosstabulation were also conducted to analyse response patterns per region. For qualitatve analysis, responses were extracted from the open-ended items of the questionnaires and analysed through NviVO. The results obtained are presented in Chapter 4.

3.7 Methods Limitation

It is acknowledged that both the research method and the survey instrument used in this research have shortcomings that may have impacted the results of the study. Questionnaires have long been attributed to the low response rates due to low levels of willingness by potential respondents to participate in research conducted through this tool. If potential respondents see such use of online questionnaires as illegitimate, aversive, or unrewarding, participation rates maybe low in comparison with those for other media (Granello and Wheaton, 2004). Respondents may worry about possible violations of privacy or lack of. This often drives low response rates from the participants. Another weakness attributted to the use of questionnaire to conduct research is response biases (Sjöström and Holst, 2002). This has potentiall to impact the validity of questionnaires or surveys. A number of factors surrounding the use of questionnaires may individually of collectively influence responses given by respondents to a survey. According to Sjöström and Holst (2002), studies have shown that responses given by research participants are often inclined towards a social norm than to the actual situation.

There are a number of measures that were put in place to mitigate the challenges presented by the methods used. One key measure to improve levels of response is to make follow up to the respondents with reminder emails as well as indicate on the questionnaire an estimated time needed to respond to the questionnaire (Evans and Mathur, 2005). Measures for respondents' consent that incooporates a non-disclosure statement are also important to improve trust from respondents. For this research, all the three measures were put in place.

Chapter 4 – Results

4 Chapter 4: Results

4.1 Demographics of the sample population

A random sample population was obtained from ten (10) coastal council regions in South Australia. The ten regions include: Metropolitan North, Metropolitan South, Metropolitan Central, Northern Gulf, West Coast, Eyre Peninsula, Northern Spencer, Yorke Peninsula, Fleurieu and KI, and South East (as shown in **Figure 3.1 and 3.2** above). The demographics of the 57 respondents from the two groups are described below.

Of the 15 Mayors that took part in the survey, 10 identified themselves as male and one as female. The age range of the group was from 18 to over 75 years and educational levels ranging from Secondary-Year 11 to Vocational. Ten Mayors identified to be from 6 (six) of the listed coastal council areas and have lived in the respective council areas for different periods ranging from 7years to over 20years.

The 42 Council employees who took part in the survey were aged between 25 and 74 years. Out of the 42 respondents, 32 responded to the gender item and 15 identified themselves as males and 17 were females. The participants were from a range of disciplines and different operational levels: from CEO positions through planners, policy developers, engineers and environmental specialists down to the on-the-ground personnel.

From those invited to participate, 15 out of the 34 Mayors (44%) responded to the questionnaire and another 44% (52 out of 117) of Council employees also responded to the survey. It should be noted however that there were discrepancies in the number of responses received per given question since some respondents omitted responding to some questions. A summary of the responses per council regions are shown in **Table 4.1** below.

Table 4.1 A table showing council regions and distribution of respondents.

	Responses	
Council Region	**Mayors**	**Council Employees**
Metropolitan North	0	1
Central Metropolitan	0	3
Metropolitan South	1	6
Northern Gulf St Vincent	0	1
West Coast	0	3
Eyre Peninsula	2	1
Northern Spencer Gulf	1	3
Yorke Peninsula	3	5
Fleurieu and KI	3	5
South East	1	3
No region identified by respondent	4	11
Total	**15**	**42**

Results from the survey were analysed and are presented below.

4.2 Respondent's perceived understanding of SLR

An objective of this study was to elicit from the participants their perception of SLR as a concept - its causes and what is likely to happen to SLR in the future. This is because for effective coastal management and adaptation to SLR, decision making should be premised on informed perspectives from those who influence policy and decision-making. Coastal managers will therefore need to have a sound understanding of the likely impacts of SLR as well as a good understanding of how much it is likely to rise. The first part to the survey was crafted to get some insights on Mayors' and Council employees' understanding of the SLR

concept, causes and future predictions. The responses to these three aspects are described below for each of the **two** participants groups.

Perceptions – understanding concept of SLR

Several statements were posed to the sampled respondents to interrogate their understanding of the SLR concept. When posed with statements "I have a good understanding of the concept of SLR", the majority of respondents agreed with the statement as shown in **Figure 4.1** below. The majority of Mayors (87%, n=13/15) and Council employees (90%, n=37/41) believed that they had a good understanding about SLR concept as evidenced by their answers being either agree or strongly agree.

However, there was uncertainty about understanding of the SLR concept by a few of the Mayors and Council employees (13% n=2/15 and 10%, n=4/41) respectively as indicated by their "neutral" responses.

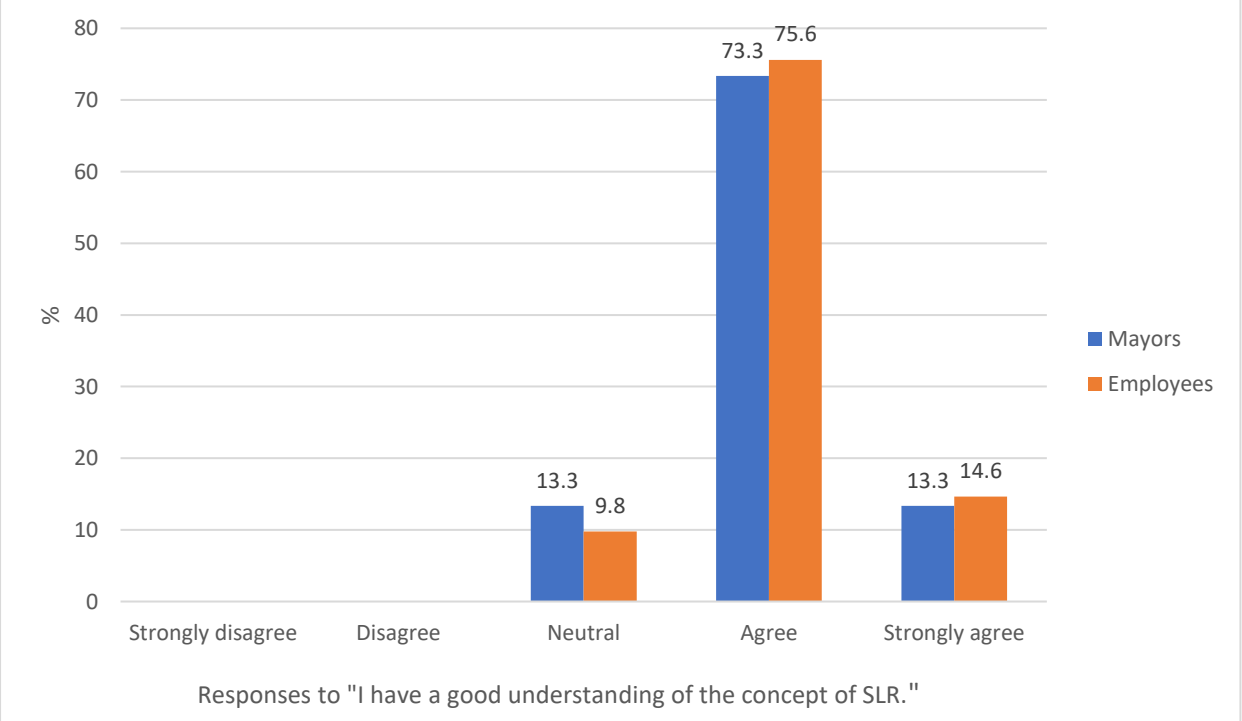

Figure 4.1 Mayors' and Council employees' understanding of the SLR concept.

Perceptions – causes of SLR

Figure 4.2 below shows participants' responses to the statement "I have a good understanding of the causes of SLR. The majority of both Mayors and Council employees (67%, n=10/15 and 79%, n=33/42 respectively) either "agreed" or "strongly agreed" that they understood the causes of SLR

However, there was a higher level of uncertainty amongst Mayors (33%, n=5/15) than Council employees (17%, (n=7/42). Only a small portion (5%, n=2/42) of Council employees indicated a lack of understanding of the causes of SLR by disagreeing to the statement.

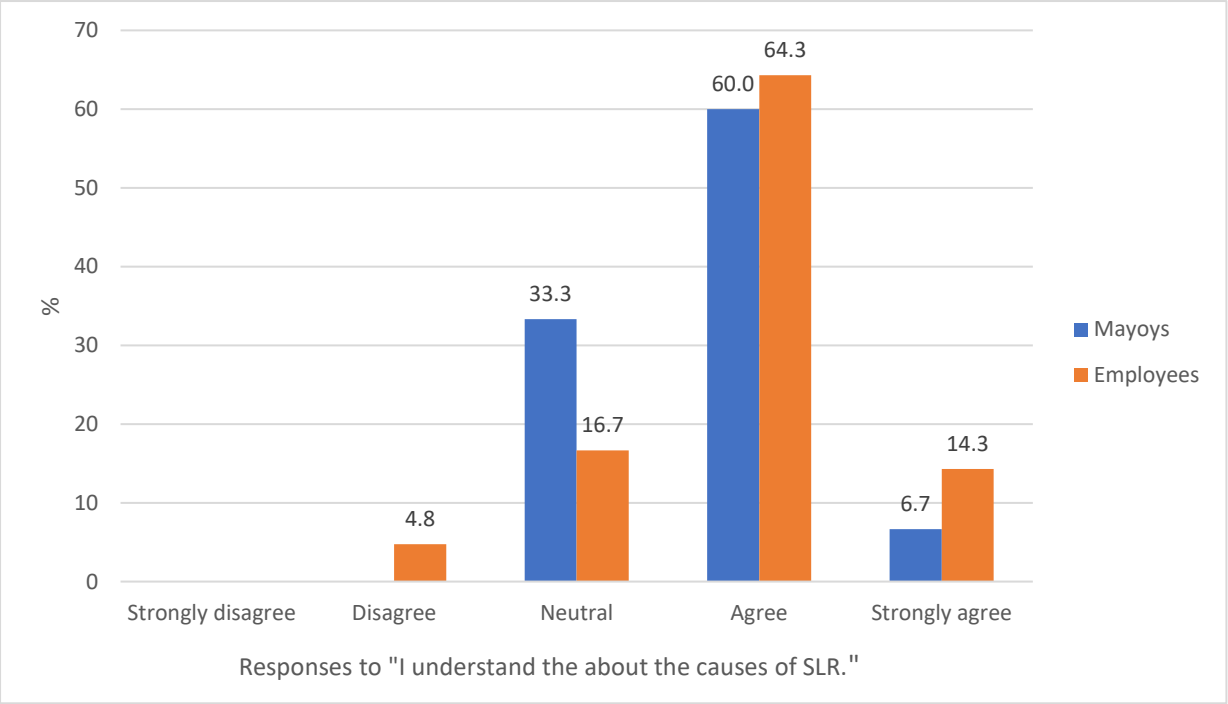

Figure 4.2 Mayors' and Council employees' perceived understanding of causes of SLR.

Perceptions – understanding predictions of SLR

Despite most respondents feeling that they understood the SLR concept, when questioned on whether they have a good understanding of predictions on future SLR for their respective regions, two-thirds of Mayors (67%, n=10/15) agreed to having a good understanding of predictions of future SLR while the other 33% (n=5/15) were uncertain.

On the other hand, mixed feelings emerged among Council employees with responses ranging from strongly disagree to strongly agree. Most Council employees (74%, n=31/42) believed they had a good understanding of predictions on future SLR in their regions and 17% (n=7/42) indicated lack of understanding by either disagreeing or strongly disagreeing to the statement presented (**see Figure 4.3 below**).

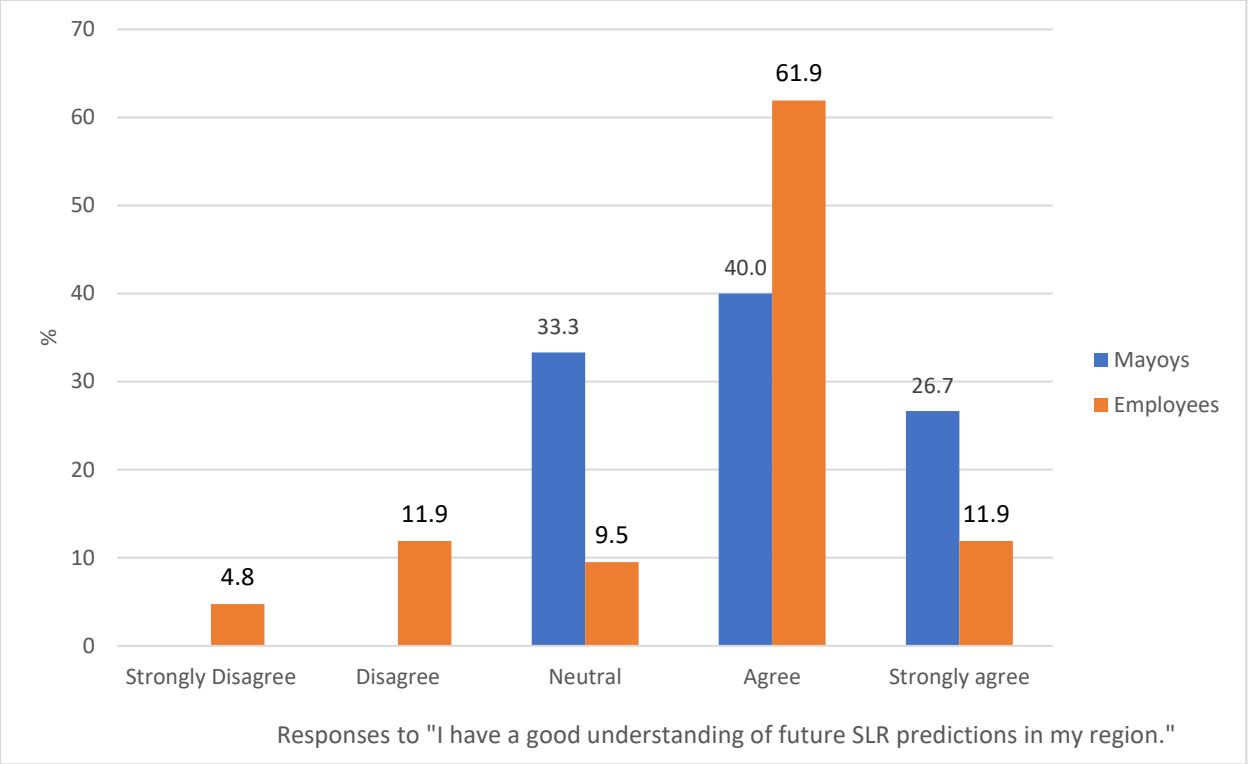

Figure 4.3 Mayors and Council employees perceived understanding of the predictions of future SLR.

Figure 4.4 below shows responses from participants when asked to rate their expectations of where sea levels would be in 50 years. The majority of the respondents believed that it will be higher than today.

Most responses from Mayors (74%, n=11/15) indicated that sea level will either be 'higher' or 'much higher' than current levels. Some of these responses were backed by explanations that attributed the future sea levels to our current actions as reflected by comments such as:

"[Future sea levels will] depend on what we do from now on to mitigate the cause and effect" [Respondent ID 9; Mayor].

A notable 13% (n=2/15) of Mayors however believed that there would be no change to sea levels in 50 years and this is further compounded by 27% (n=4/15) of Mayors who believe SLR in South Australia has been greatly exaggerated **(refer to Figure 4.5)**.

On the other hand, all Council employees (n=42/42) believed that sea levels will either be 'higher' or 'much higher' compared to its current levels. This was emphasised by comments such as:

"[SLR will be] potentially much higher if global emissions are not curtailed sooner rather than later" [Respondent ID 25; Council employee].

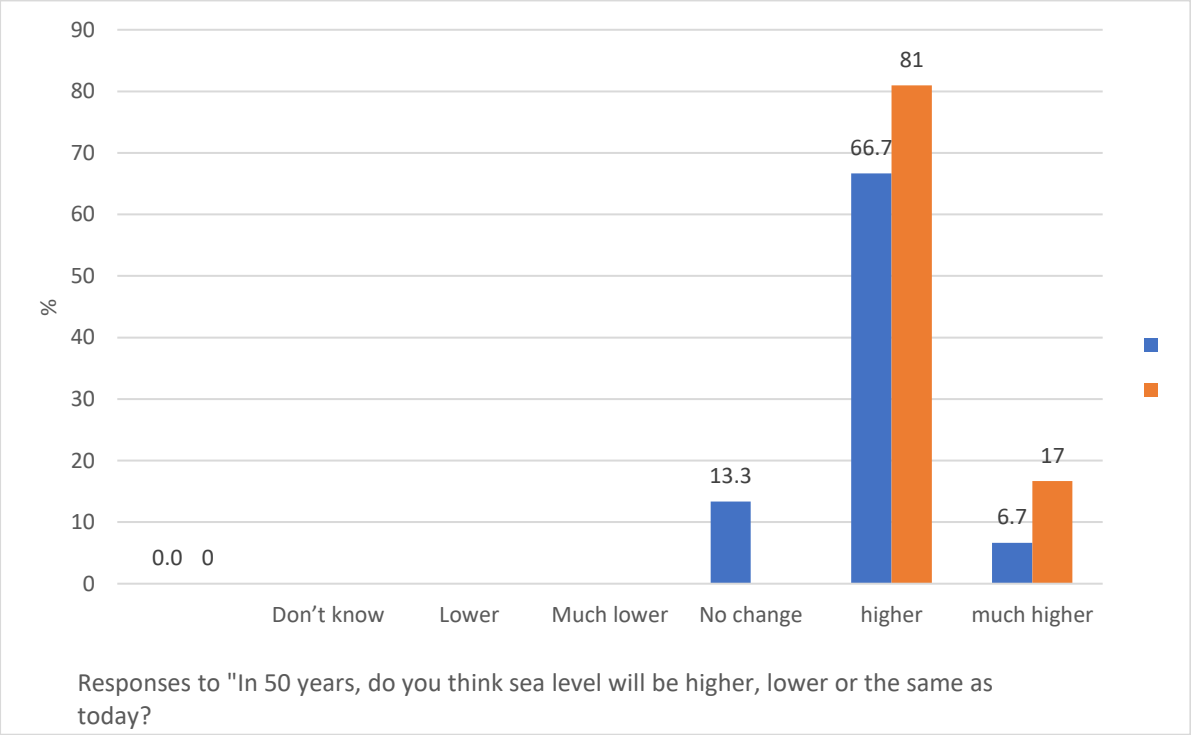

Figure 4.4 Perceptions of Mayors and Council employees in regard to position of sea level in 50 years.

To further make a follow up on the respondents' understanding of predictions on future sea levels, the statement "the likelihood that sea level will rise in South Australia has been greatly exaggerated" was presented and the responses are summarised in **Figure 4.5** below. From the Mayors, 40% (n=6/15) either disagreed or strongly disagreed with the statement while a notable 27% (n=4/15) agreed that the likelihood that sea levels will rise in South Australia has been greatly exaggerated.

On the other hand, the majority of Council employees (74%, n=31/42) either disagreed or strongly disagreed to the statement while only 2% (n=1/42) agreed that there was likelihood of a great exaggeration to the predictions of sea levels rising in South Australia. A notable 33% (n=5/15) of Mayors and 24% (n=10/42) of Council employees were uncertain with regard to the presented statement.

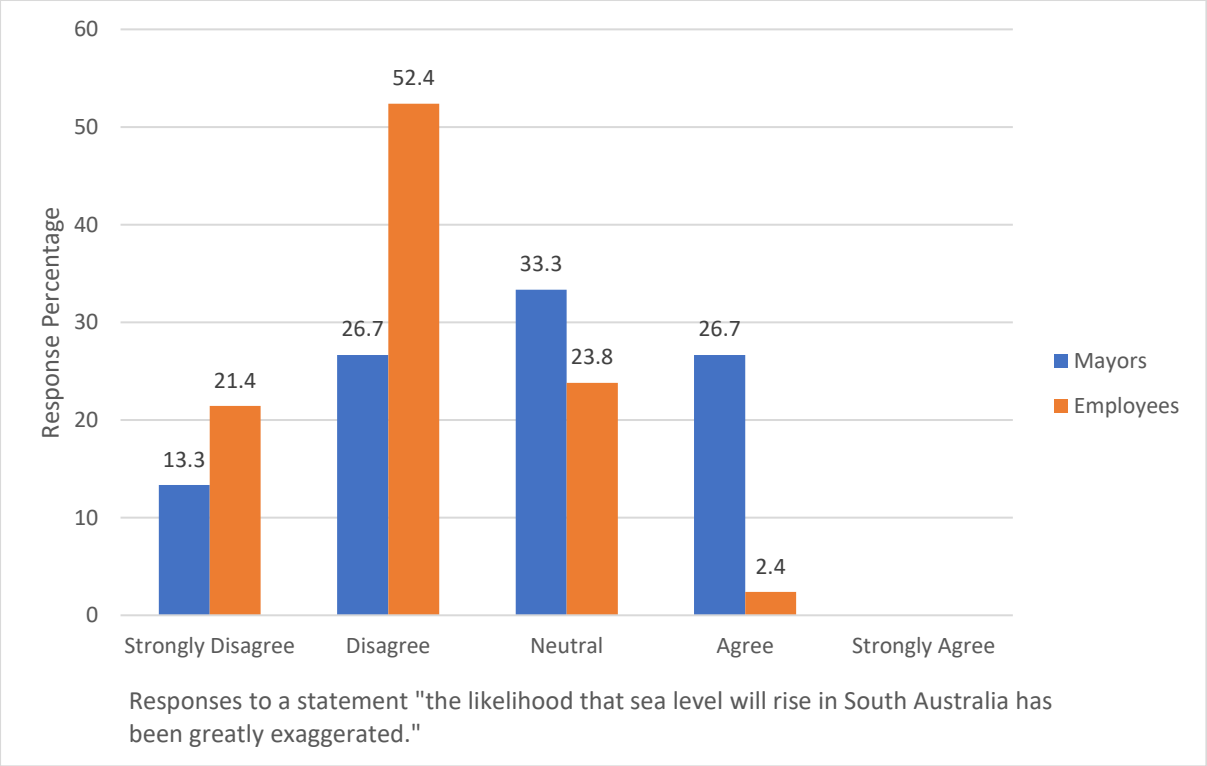

Figure 4.5 Perception of Mayors and Council employees in regard to exaggeration of SLR in South Australia.

To gain further insight into respondents' understanding of the SLR concept, respondents were asked to select from a list what they believed were the main long-term causes of the rising seas for South Australia. **Figure 4.6** below presents the most frequently cited causes as being ocean temperature increase, extreme storm events and glaciers melting with ocean temperature increase being the most selected by both Mayors (87%, n=13/15) and Council employees (79%, n=33/42). One fifth (20%, n=3/15) of Mayors felt that the sea level was not rising and therefore this question was not relevant. Some of the respondents thought that there will be multiple causes of changes to sea levels such as a combination of ocean temperature increase, extreme storm events, glaciers melting and subsidence of land hence comments such as:

[SLR will be caused by] "Confluence of stormwater and seawater during storm events as well as storm surge" [Council employee Respondent ID 29; region 3 (Metropolitan South)].

"All these (listed) events will have an effect and the level of change will be the sum of all effects". [Council employee Respondent ID 35; region 3 (Metropolitan South)].

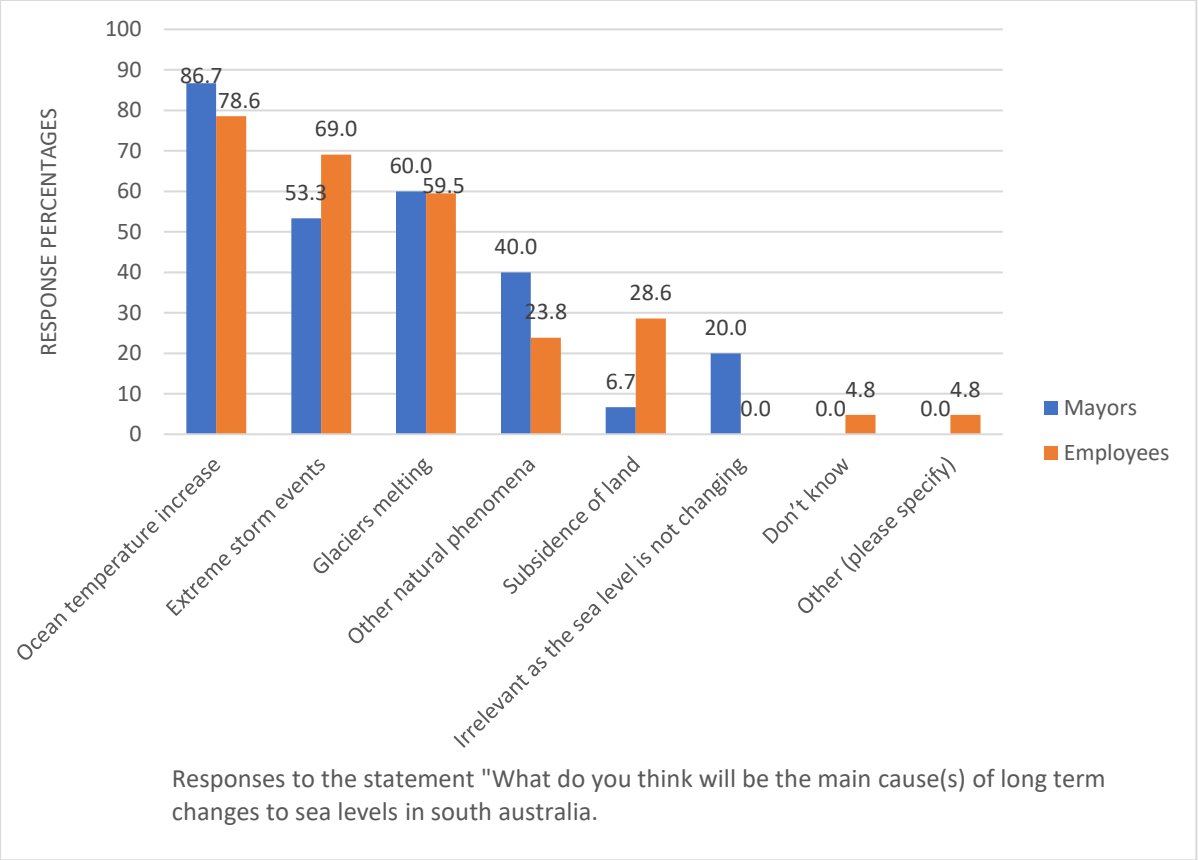

Figure 4.6 Perceptions of Mayors and Council employees as to what will be the likely long-term causes of SLR in South Australia.

To gain further insight to the respondents' perceptions to SLR, a set of statements to establish Mayors and Council employees' level of concern over SLR were also administered and the results are presented in **Figures 4.7** to **4.12** below.

4.3 Respondent's concern about SLR

According to the literature, risk perception is intrinsic to the decision-making process and peoples' level of concern and risk perception is a key driver to both decision-making and policy development. The level of concern and risk perception by participants to this study has capacity to influence council decisions and adoption of adaptation strategies. This study sought respondents' level of concern for SLR by asking them to rate a series of statements.

In Figure 4.5 above, when respondents were presented with the statement "the likelihood that sea level will rise in South Australia has been greatly exaggerated", some respondents (27%, (n=4/15) of Mayors and 2%, (n=1/42) of Council employees) agreed that there is some exaggeration to sea level rising in South Australia. To get more insight to such a viewpoint, several other statements were presented to the respondents about their concern of SLR. When

presented with the statement "I am concerned about SLR", the majority of Mayors (83%, n=11/15) either 'strongly agreed' or 'agreed' that they were concerned about SLR while a notable 13% (n=2/15) of Mayors 'disagreed' with the statement. For the same statement, most of Council employees (88%, n=37/42) agreed that they are concerned about SLR **(see Figure 4.7).**

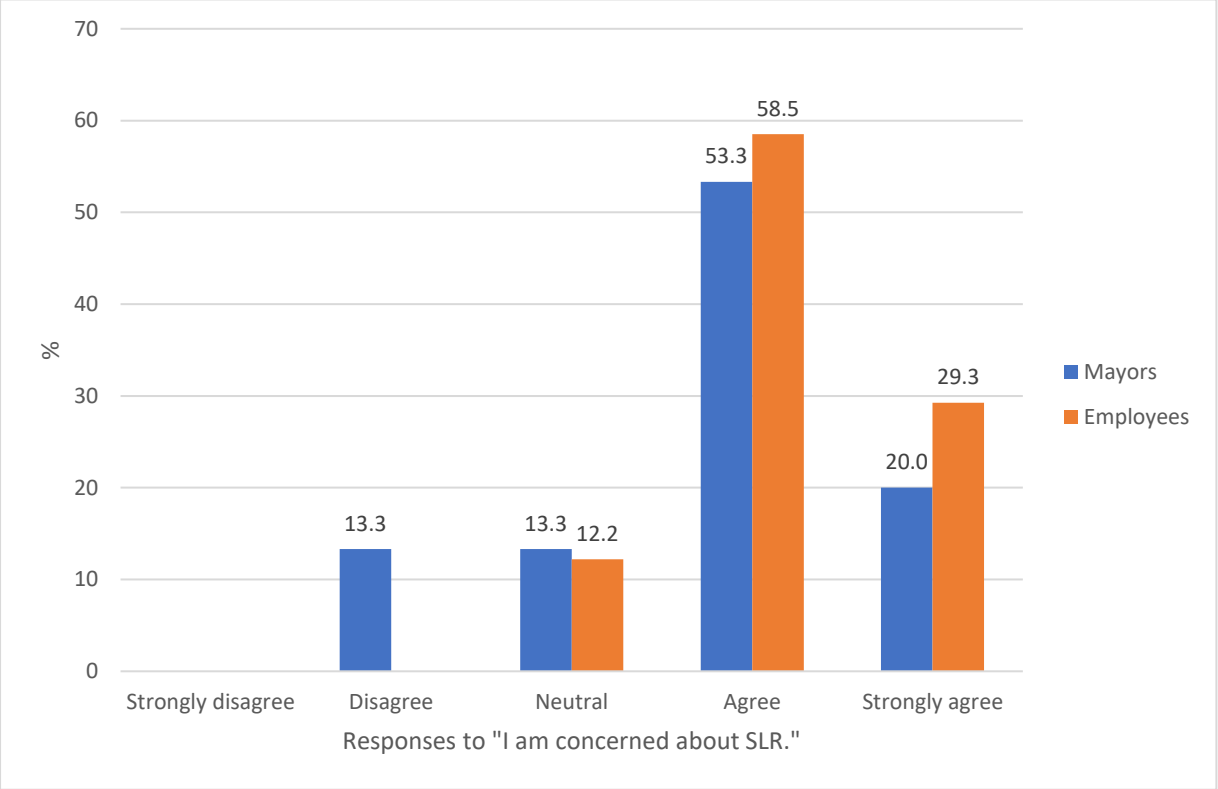

Figure 4.7 Responses of Mayors and Council employees on their concern about SLR.

When presented with the statement "SLR is too slow to bother preparing for", the majority of Mayors (87%, n=13/15) either 'strongly disagreed' or 'disagreed' with the statement **(Figure 4.8)**. The remaining 13% (n=2/15) of Mayors believed that SLR is too slow to bother preparing for.

Similarly, the majority of Council employees (98%, n=41/42) either agreed or strongly agreed to the statement and only 2% (n=1/42) being uncertain.

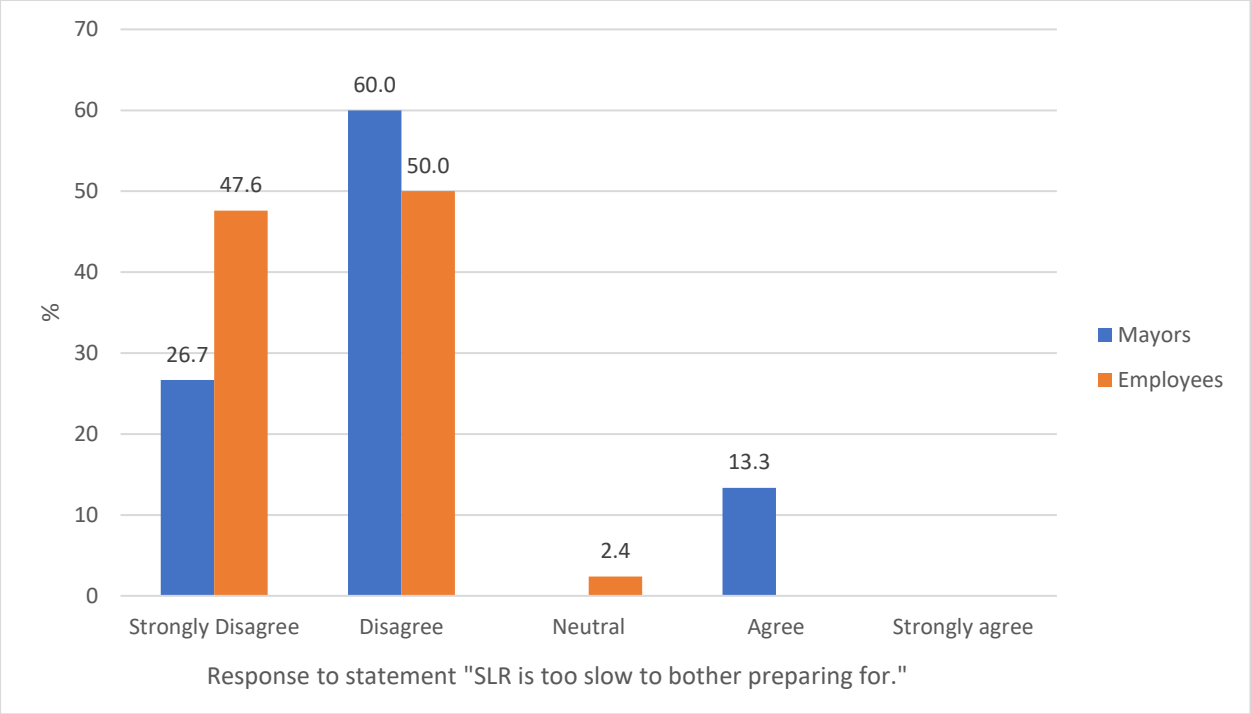

Figure 4.8 Perceptions of Mayors and Council employees on the need to prepare for SLR.

To further establish their concern about sea level rising in their respective council areas, respondents were asked for their opinion on the statement 'SLR is unlikely to affect this council's coastal region in future.' **Figure 4.9** below shows that 87% (n=13/15) of Mayors disagreed with the statement while 13% (n=2/15) believed that it was unlikely that SLR would affect their councils' coastal region.

Similarly, the majority of Council employees (95%, n=40/42) disagreed with the statement while 5% (n=2/42) of Council employees believed that it was unlikely that SLR would affect their councils' coastal region.

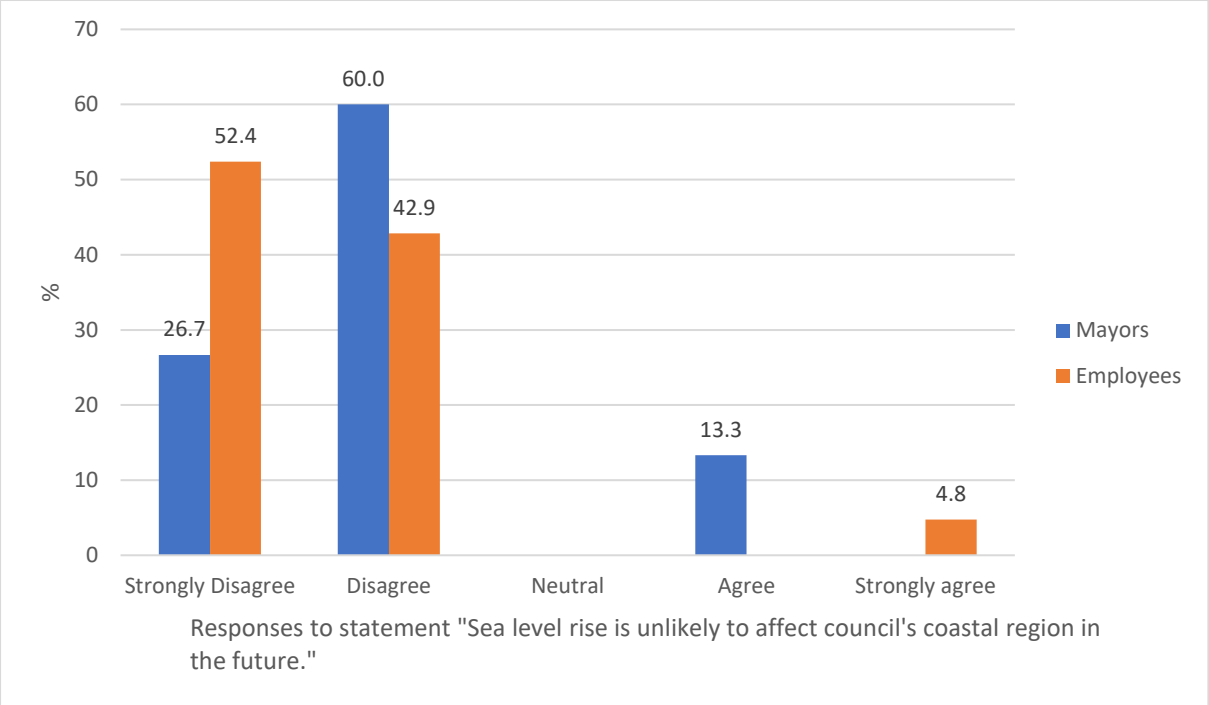

Figure 4.9 Perceptions of Mayors and Council employees on likelihood of SLR affecting councils' coastal regions in future.

Respondents were also asked a series of questions estimating the period they expect SLR to pose a problem for their house (if they lived in the area), their community and the South Australia coast. Most Mayors (67%, n=10/15) did not live in the council areas they worked for. **Fig 4.10** shows that only 13% (n=2/15) of Mayors felt that SLR is already a problem to their houses while another 13% (n=2/15) thought SLR will not affect their houses. Only 7% (1/15) of Mayors projected that SLR will be a problem in the distant future (more than 50years).

From Council employees' responses, 27% (n=11/41) of the respondents did not live in the council areas they worked for. Only 2% (n=1/41) of Council employees felt that SLR is already a problem to their house(s) while 34% (n=14/41) thought SLR will not affect their houses. A notable 29% (n=12/41) however, projected that SLR will be a problem in the distant future (more than 50years).

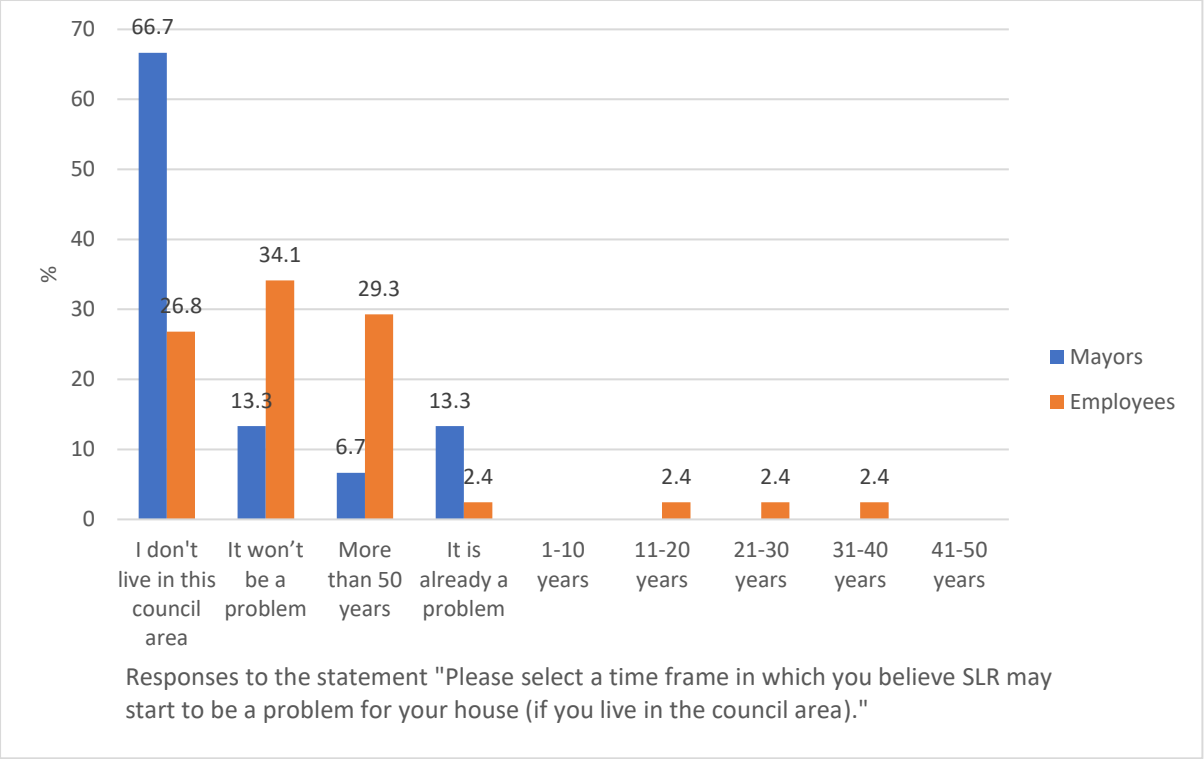

Figure 4.10 Perceptions of Mayors and Council employees on their projections about when they feel SLR will start affecting their houses.

When asked about when SLR will starting to be a problem for councils' coastal communities and South Australia, mixed responses became evident within each group with the response patterns varying between the two groups of respondents. For both statements, the overall trend among Council employees was that most either felt SLR "is already a problem" or will be a problem in the near future (within the next 20years). On the other hand, the trend among Mayors for the two statements had high responses on the 41-50years time frame.

When respondents gave perceptions on the time frame when SLR will be a problem to councils' coastal community **(Figure 4.11)**, 40% (n=6/15) of Mayors felt that either 'it is already a problem' or will be a problem within the next 10years while 20% (n=3/15) predicted SLR to become a problem between the next 11 to 40 years. Notably, 33% (n=5/15) of Mayors perceived SLR being a problem to coastal communities' in about 41-50years while 7% (n=1/15) felt SLR 'won't be a problem'.

The majority of Council employees, 60% (n=25/42) of felt that 'it is already a problem" or will be a problem within the next 10 years while 28% (n=12/42) of Council employees felt that SLR will be a problem between the next 11 to 40 years. A further 12% (n=5/42) of Council

employees projected the time frame for SLR to start to be a problem to coastal communities to be 'over 50 years'.

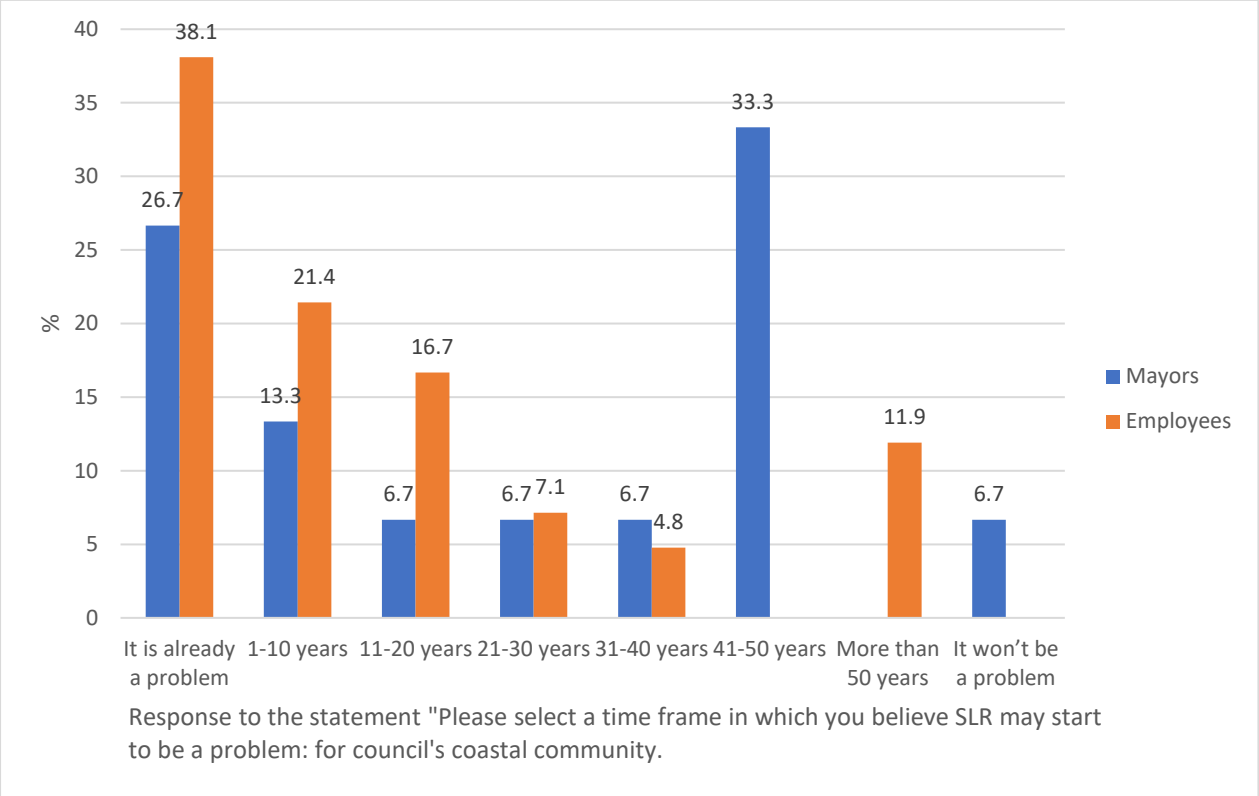

Figure 4.11 Perceptions of Mayors and Council employees as to when SLR is likely to be a problem for seaside residents and infrastructure.

Responses to SLR being a problem to South Australia **(Figure 4.12)** showed a similar pattern to responses received for SLR being a problem to councils' coastal community **(Figure 4.11).**

Responses from Mayors indicate that 47% (n=7/15) felt that SLR is either already a problem or will be a problem within the next 10 years while 13% (n=2/15) predicted SLR will be a problem within the next 11 to 30 years. Of note again is a third (33%, n=5/15) of Mayors who selected 41-50years as the time frame when SLR will start to be problem to coastal communities' while 7% (n=1/15) felt SLR 'won't be a problem'.

Council employees shared the same view that SLR is already a problem with the majority (63%, n=25/40) of respondents perceiving SLR as a current problem or will be within the next 10years. An additional 25% (n=10/40) of Council employees projected SLR to be a problem

in the next 11 to 40 years while 13% (n=5/40) projected 'over 50 years' to be the time frame for SLR to start to be a problem to seaside residents and infrastructure.

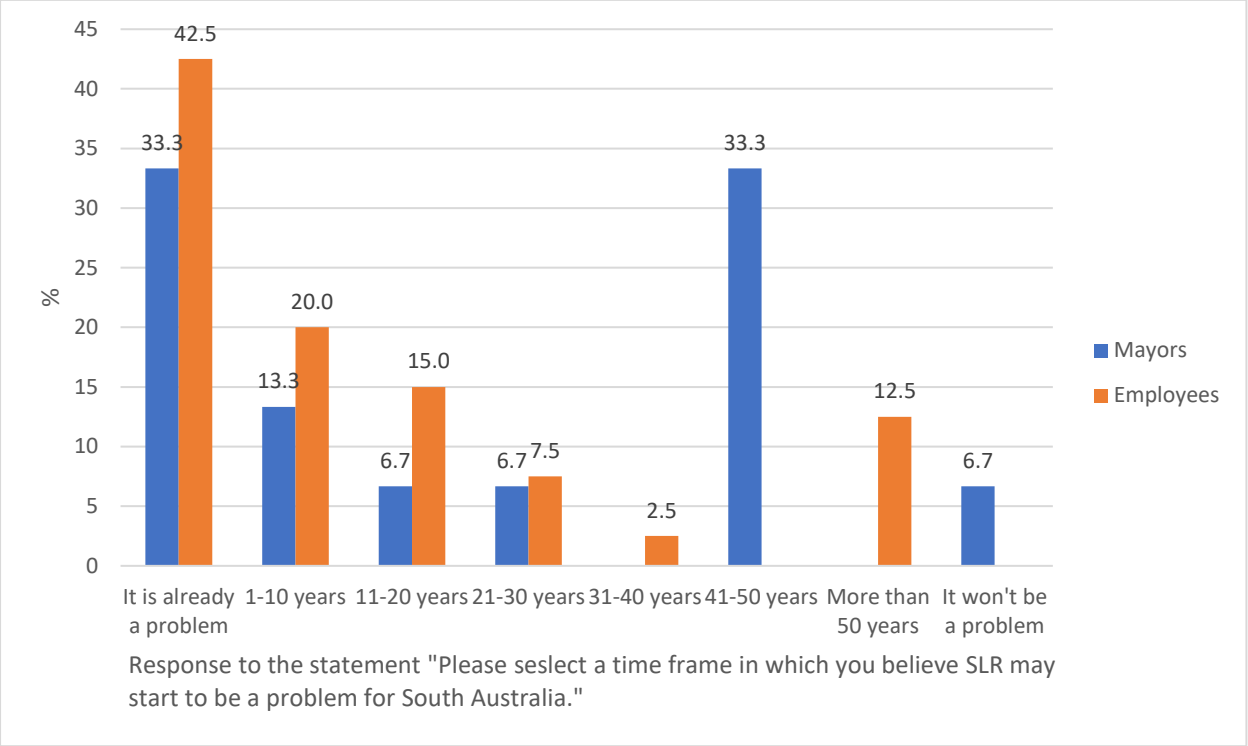

Figure 4.12 Perceptions of Mayors and Council employees as to when SLR is likely to be a problem for the South Australia.

4.4 Correlation between respondent's perception and action

After establishing the respondents' perceptions and concerns about SLR, further insight was sought to find out if there is a correlation between perceptions and possible action in regard to addressing SLR. Two dimensions explored in this section were to establish respondent's intention to gather information on SLR and their engaging in any actions to address SLR.

Respondents were therefore asked to rank how likely they were to improve their knowledge of SLR predictions for their respective council area in the next six months. **Figure 4.13** shows that majority of respondents (75%, n=9/12 Mayors were willing to improve their knowledge while 25% (n=3/12) were uncertain.

The majority of Council employees (65%, n=22/34) were willing to improve their knowledge while 24% (n=8/34) were uncertain as to whether they will improve their knowledge in the

next 6 months. Some (12%, n=4/34) respondents from the Council employees group felt that improving their knowledge of SLR predictions in the next 6 months was either ‘unlikely’ or ‘very unlikely’.

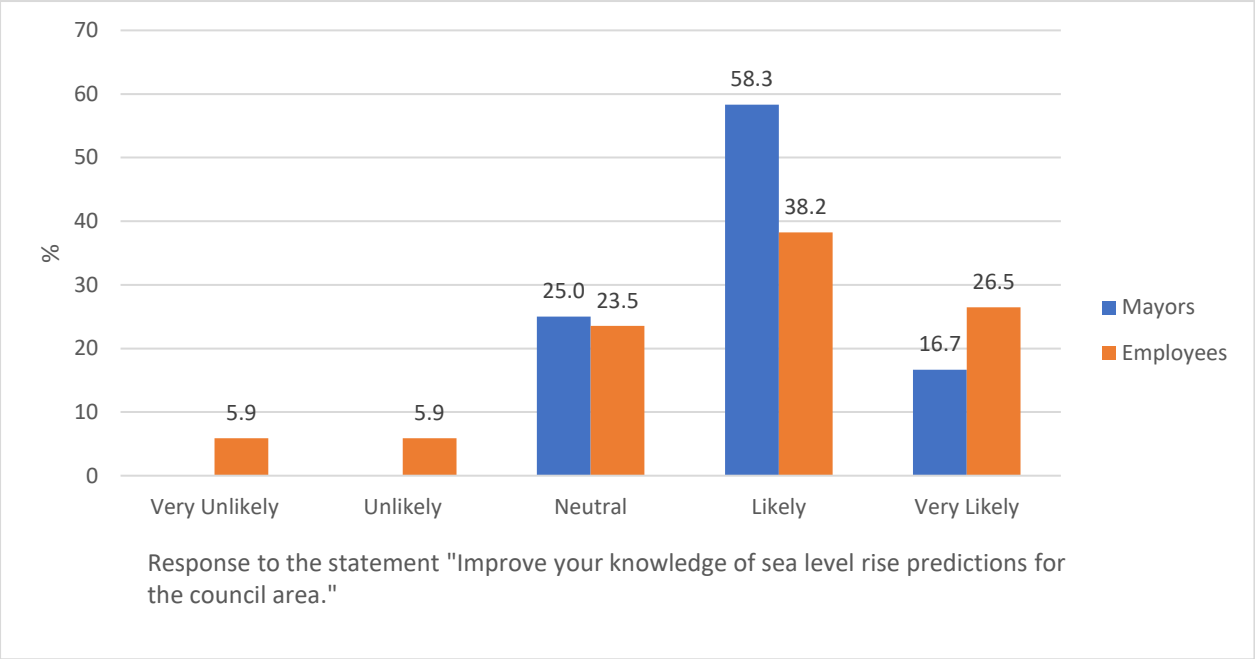

Figure 4.13 Perceptions of Mayors and Council employees as to whether they are likely to improve the knowledge of SLR predictions for their council areas.

In addition, when asked about the likelihood of seeking information on various coastal adaptation options to SLR and associated hazards, the majority of respondents (75%, n=9/12 Mayors believed they are either ‘likely’ or ‘very likely’ to seek such information and only a few (8%, n=1/12) did not see themselves seeking information on adaptation options of SLR associated hazards.

On the other hand, about 59% (n=20/34) of Council employees believed they are either ‘likely’ or ‘very likely’ to seek information on adaptation options of SLR associated hazards while 15% (n=5/34) did not see themselves seeking such information **(Figure 4.14).**

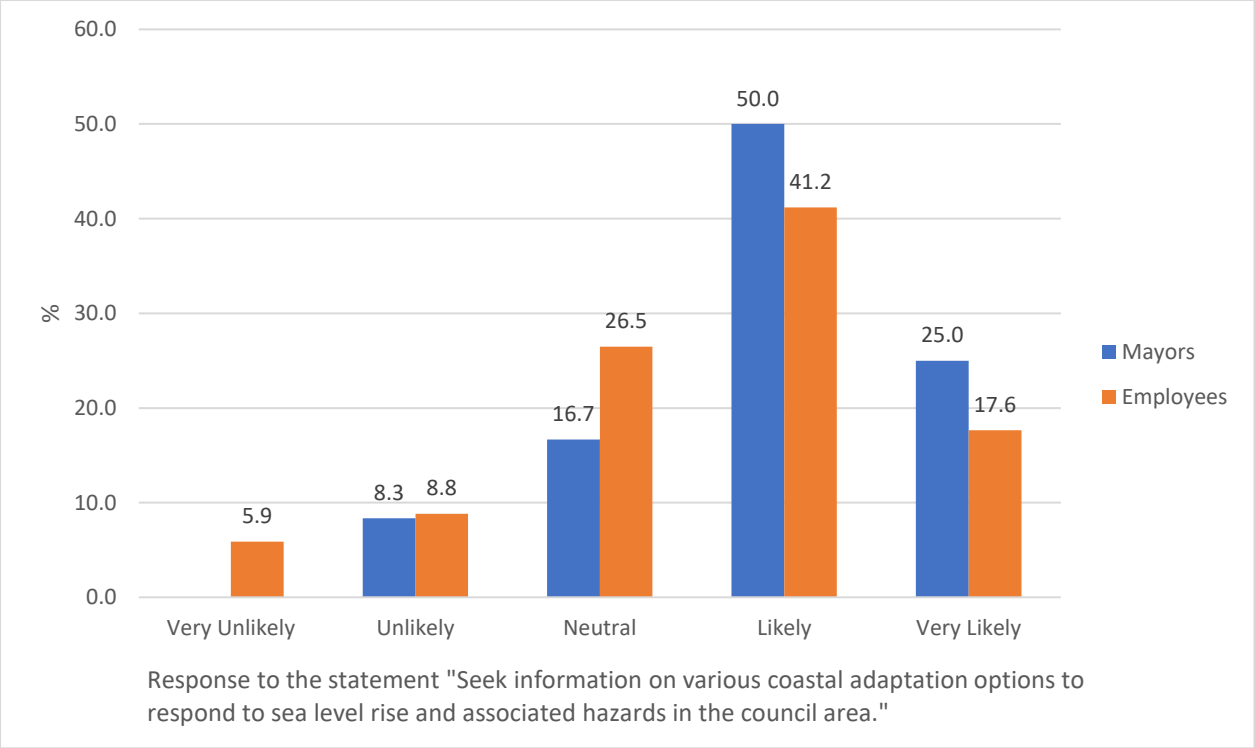

Figure 4.14 Perceptions of Mayors and Council employees as to when SLR is likely to be a problem for the South Australia.

The second dimension sought to establish if there is a correlation in the respondent's concern and their support for adaptation initiatives as part of their support for action was by asking respondents how likely or unlikely, they were going to "advocate for council to undertake a coastal hazard risk assessment". **Figure 4.15** shows that two-thirds, (67%, n=8/12) of Mayors selected either 'very likely or 'likely' while 25% (n=3/12) were uncertain. Only 8% (n=1/12) of Mayors were unlikely to advocate for risk assessment.

Over half of Council employees (53%, n=18/34) selected either 'likely' or 'very likely' while 27% (n=9/34) of Council employees were uncertain about advocating for risk assessment. The remaining 20% (n=7/34) of Council employees were unlikely to advocate for risk assessment.

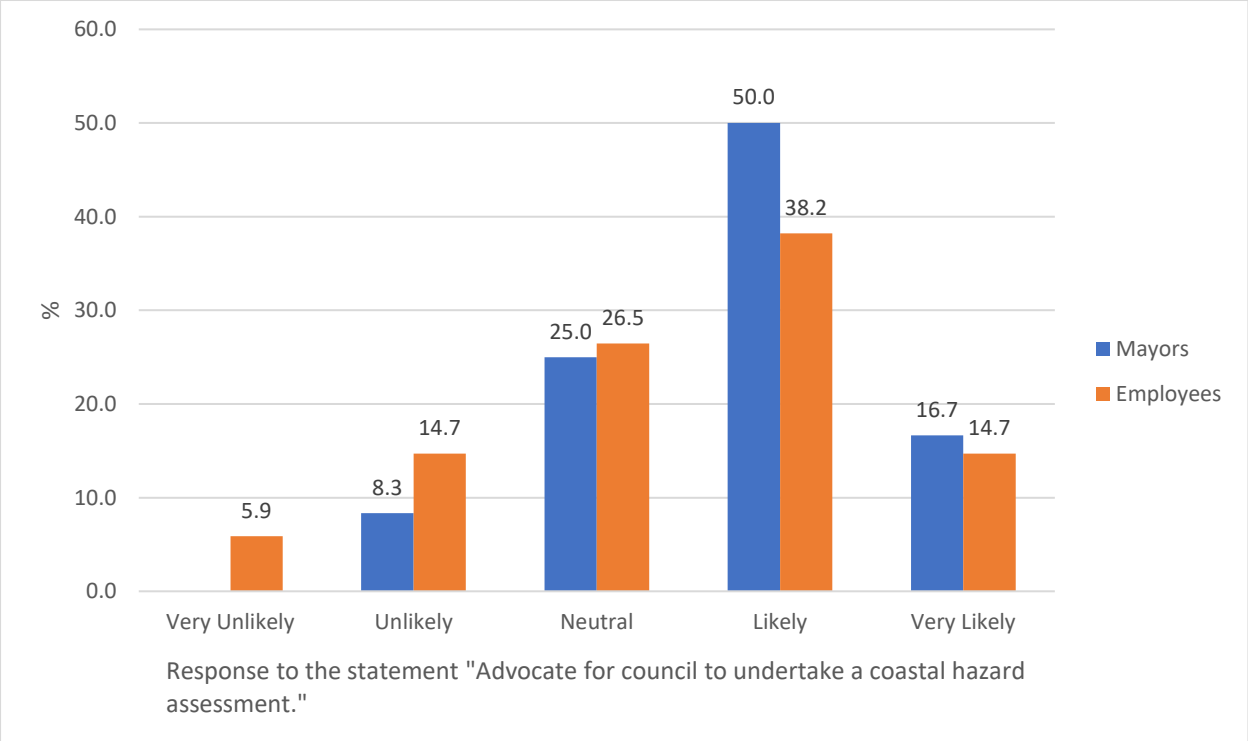

Figure 4.15 Views of Mayors and Council employees on whether they are likely to advocate for council to do a coastal hazard assessment in the next six months.

A similar pattern to responses in Figure 4.15 was evident when respondents were asked about "advocating for councils to adopt a coastal adaptation strategy': the majority of the respondents (75%, n=9/12 Mayors and 68%, n=23/34 Council employees) felt they were likely to advocate for the adaptation strategy **(Figure 4.16).** However, a recognisable 17% (n=6/34) of Council employees were unlikely to advocate for coastal adaptation strategies together with 8% (n=1/12) of Mayors.

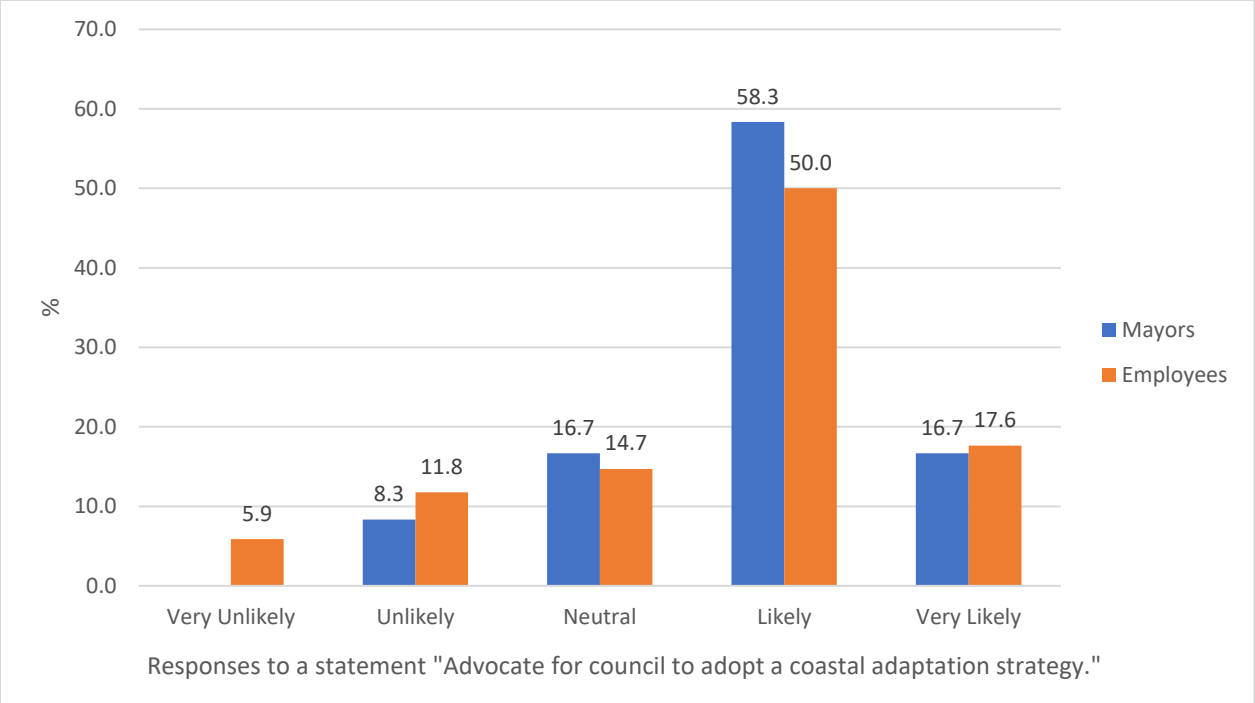

Figure 4.16 Perceptions of Mayors and Council employees on their likelihood to advocate for adoption of coastal adaptation strategy in the next six months.

4.5 Perception about council responsibility

As discussed in Chapter 2, coastal management in Australia is a shared responsibility between the three tiers of governments (federal, state and local). Roles and responsibilities vary between these jurisdictions. The level of understanding as to who is responsible in preparing for SLR is of utmost importance in helping drive adaptation policies and strategies within coastal regions. Respondents were asked which level of government: local, state or federal is responsible for preparing for SLR. The results are presented in **Figures 4.17 to 4.20** below.

When presented with the statement “I feel Council is responsible for preparing for SLR”, the respondents gave a range of responses from ‘strongly disagree’ to ‘strongly agree’ with 40%, (n=6/15) of Mayors agreeing that council is responsible for preparing for SLR. while 20% (n=3/15) of Mayors disputed council being responsible for preparing for SLR. High levels of uncertainty were evident amongst Mayors shown by 40% (n=6/15) of respondents being neutral in their responses.

The majority of Council employees (64%, n=27/42) believed it was Council’s responsibility while 17% (n=7/42) disagreed that Council is responsible for preparing for SLR. There were also considerable levels of uncertainty amongst Council employees, with 19% (n=8/42) of the respondents being neutral in their responses **(Figure 4.17)**.

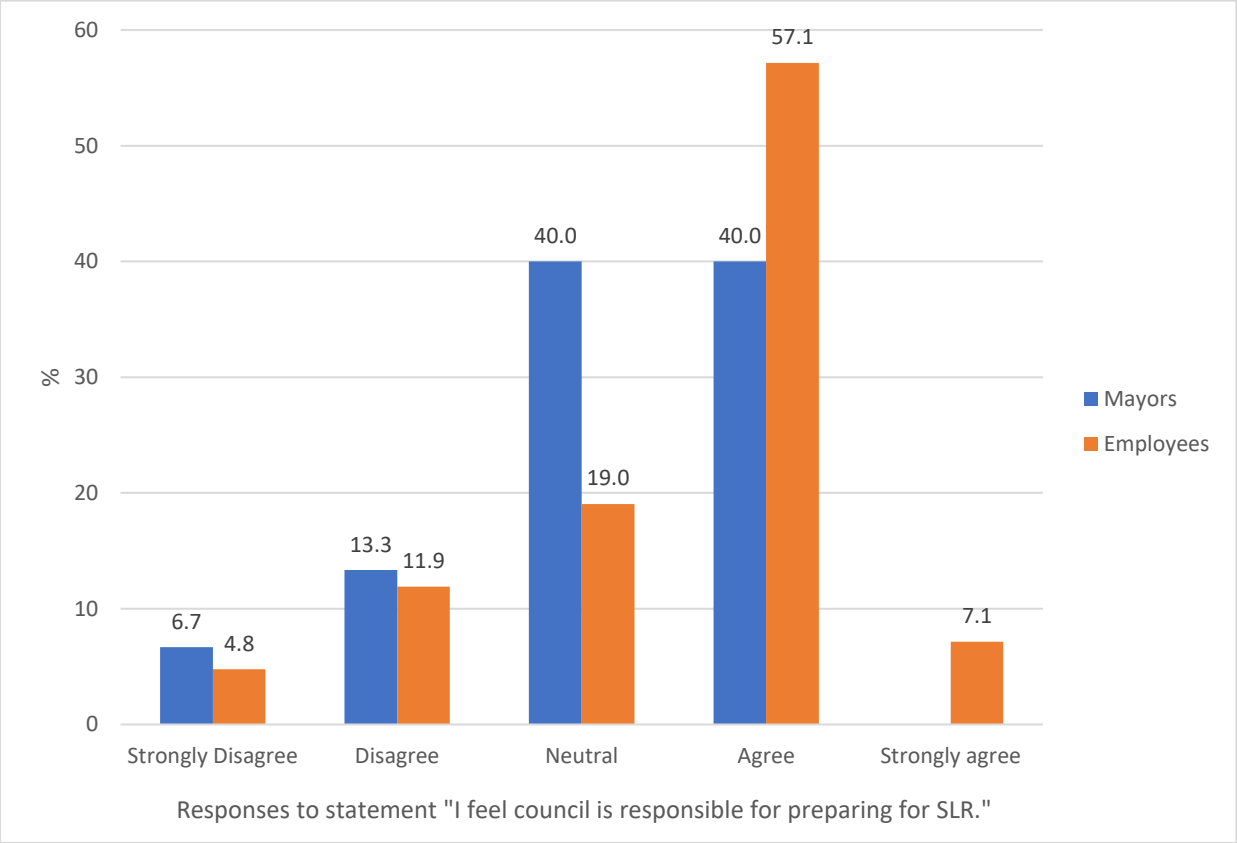

Figure 4.17 Perceptions of Mayors and Council employees on Council being responsible for preparing for SLR.

When asked if they feel "it is the responsibility of the state government to prepare for SLR", the majority of Mayors (87%, n=13/15) as well as Council employees (83%, 35/42) believed it was the state's responsibility to prepare for SLR. Only 2% (n=1/42) of Council employees 'disagreed' that state government is responsible for preparing for SLR **(Figure 4.18).**

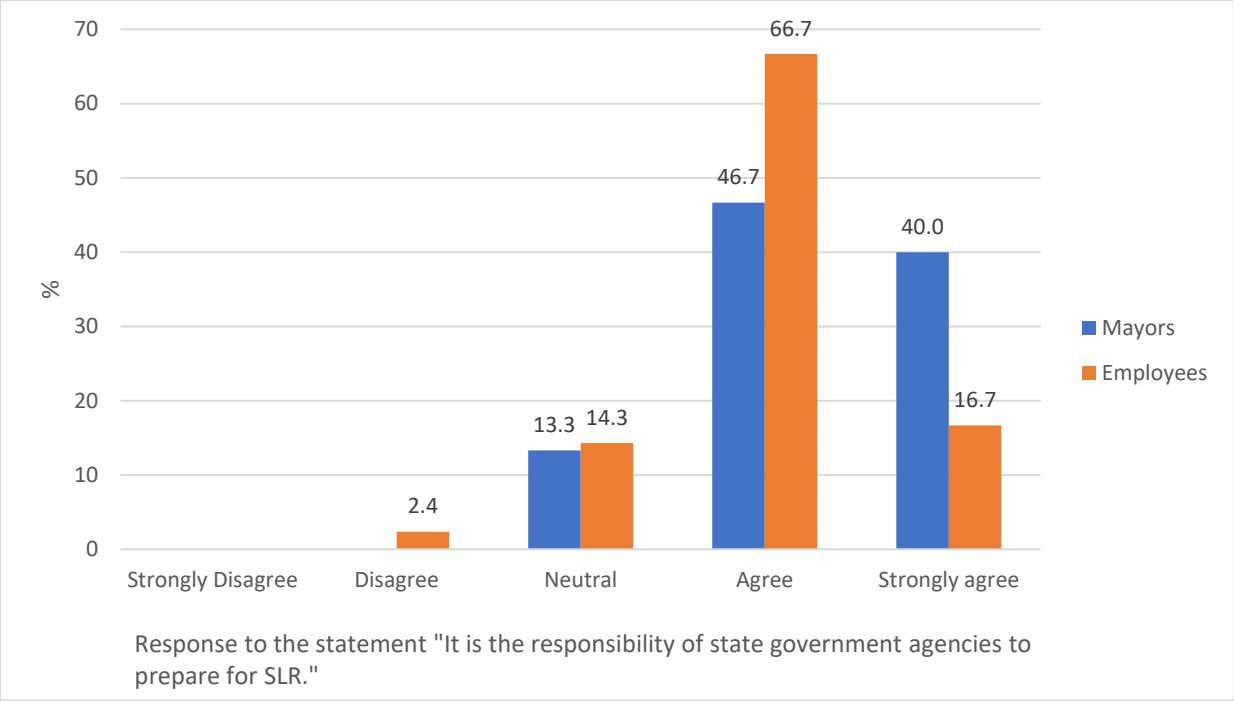

Figure 4.18 Perceptions of Mayors and Council employees on state government being responsible for preparing for SLR.

Similarly, when asked if they feel "it is the responsibility of the federal government to prepare for SLR", a similar response pattern to that of state government being responsible was evident with 73% (n=11/15) of Mayors and 83% (n=35/42) of Council employees agreeing to the statement. Some Mayors and Council employees (27%, n=4/15 and 12%, n=5/42 respectively) were uncertain while only 5% (2/42) of Council employees disagreed to the statement. **(Figure 4.19).**

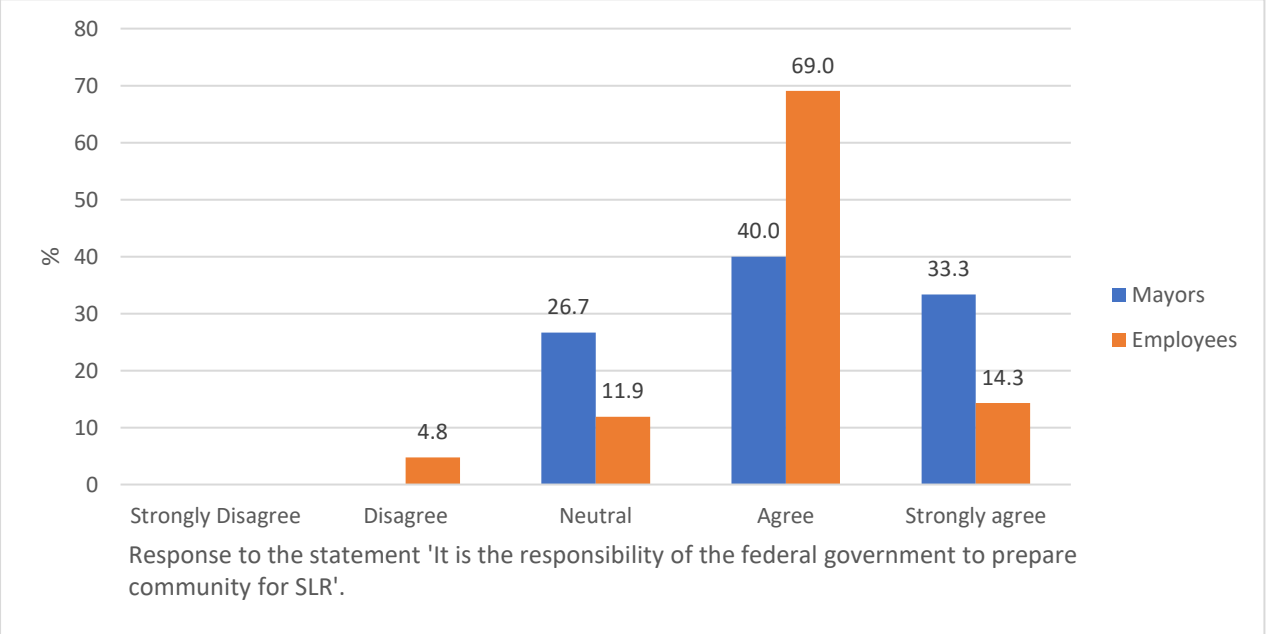

Figure 4.19 Perceptions of Mayors and Council employees on federal government being responsible for preparing for SLR.

In addition to responsibility for preparing for SLR, respondents were further asked for their opinion on "Which level of government should be responsible for approving coastal development in areas vulnerable to coastal hazards". **Figure 4.20** show that majority of the respondents were divided between local government and state government. Significantly more Mayors (58%, n=7/12) felt that the responsibility lies with local government while 25%, (n=3/12) felt it was the responsibility of the state government.

On the other hand, 37% (n=13/35) of Council employees felt that the responsibility lies with local government while more than half of the employees (51%, n=18/35) felt that it is a state responsibility. Some participants (8%, n=1/12) of Mayors and 9%, n=3/35 Council employees) did not know whose responsibility it was.

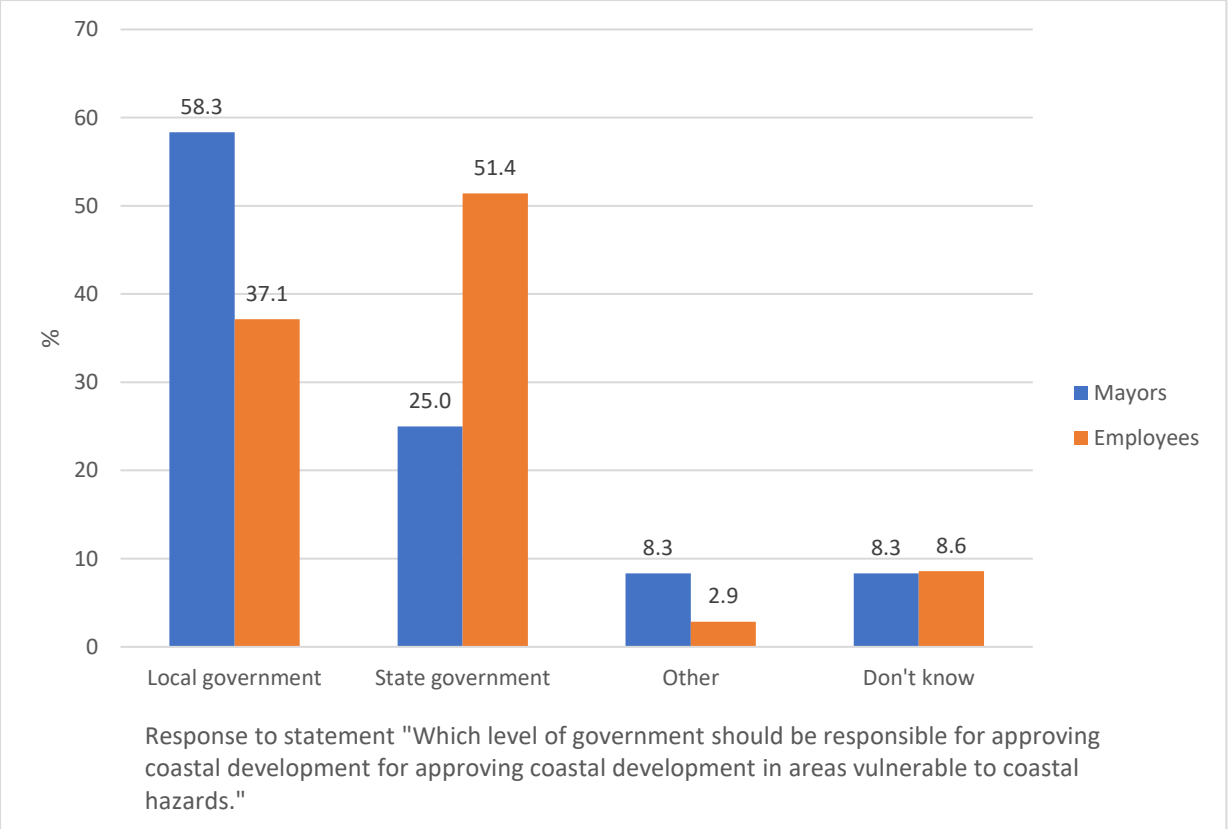

Figure 4.20 Perceptions of Mayors and Council employees on responsibility for approving coastal development in areas vulnerable to coastal hazards.

4.6 Perceptions about council readiness

When posed with the question "Preparing for SLR is too costly for my Council" both Mayors and Council employees showed mixed feelings as shown in **Figure 4.21** below.

Mayors were divided in their views with a third (33%, n=5/15) of the respondents either disagreeing or strongly disagreeing with the statement while 47% (n=7/15) supported the statement that it is costly for councils to prepare for SLR.

A similar polarised pattern was evident among Council employees' views with 48% (n=20/42) of respondents suggesting that it is not costly for councils to prepare for SLR. On the contrary, 41% (n=17/42) of council employees either 'agreed' or 'strongly agreed' that it is costly for councils to prepare for SLR.

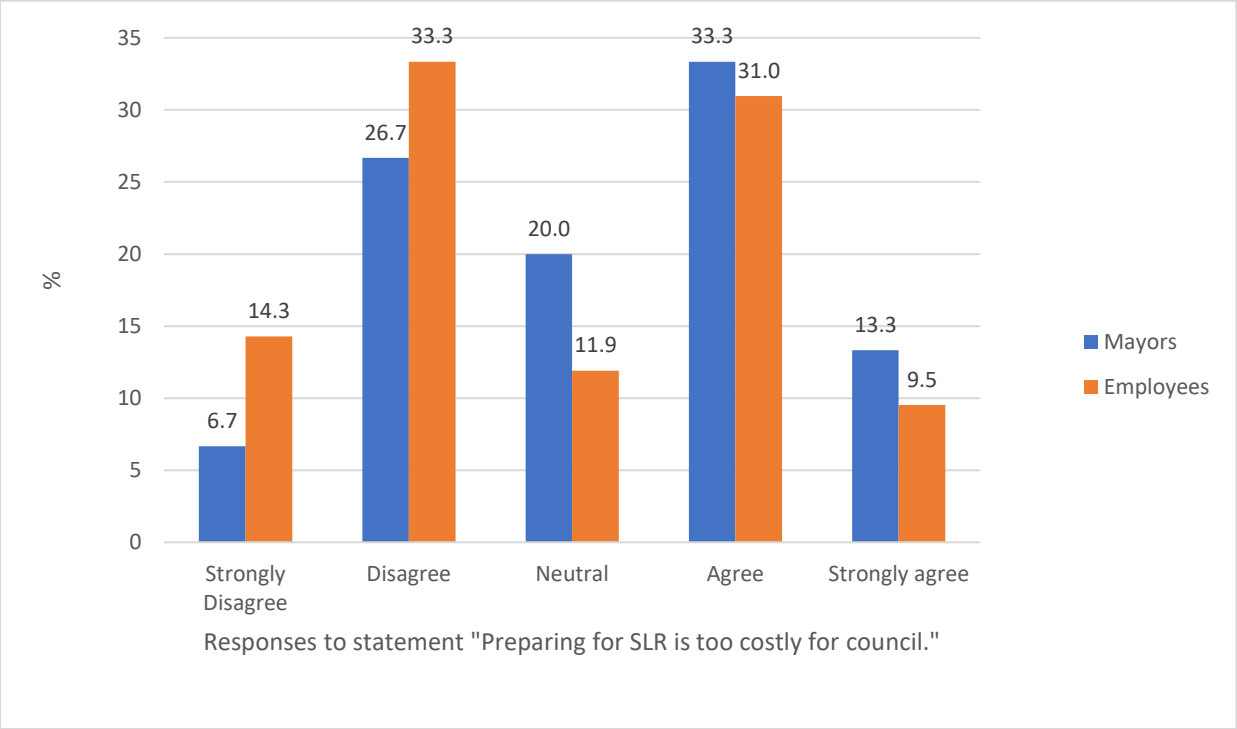

Figure 4.21 Perceptions of Mayors and Council employees on whether it is costly for councils to prepare for SLR.

To further get an insight on the respondents' perception to councils preparing for SLR, both Mayors and Council employees were presented with the statement "Preparing for SLR is inconvenient for councils". The results (shown in **Figure 4.22**) showed a similar pattern to results from **Figure 4.21**: Preparing for SLR is costly for council where respondents showed some divergent views ranging from 'strongly disagree' to 'strongly agree'.

When responding to this statement, half the number of Mayors (50%, n=7/14) felt that preparing for SLR is an inconvenience to councils. While 21% (n=3/14) were uncertain about the statement, 29% (n=4/14) disagreed with the statement thus acknowledging the relevance of the need to prepare for SLR.

Council employees also produced a divergent set of responses. The majority (56%, n=23/41) of Council employees were however inclined to believe that preparing for SLR is not an inconvenience for councils while a notable 32% (n=13/41) felt that it was an inconvenience to councils.

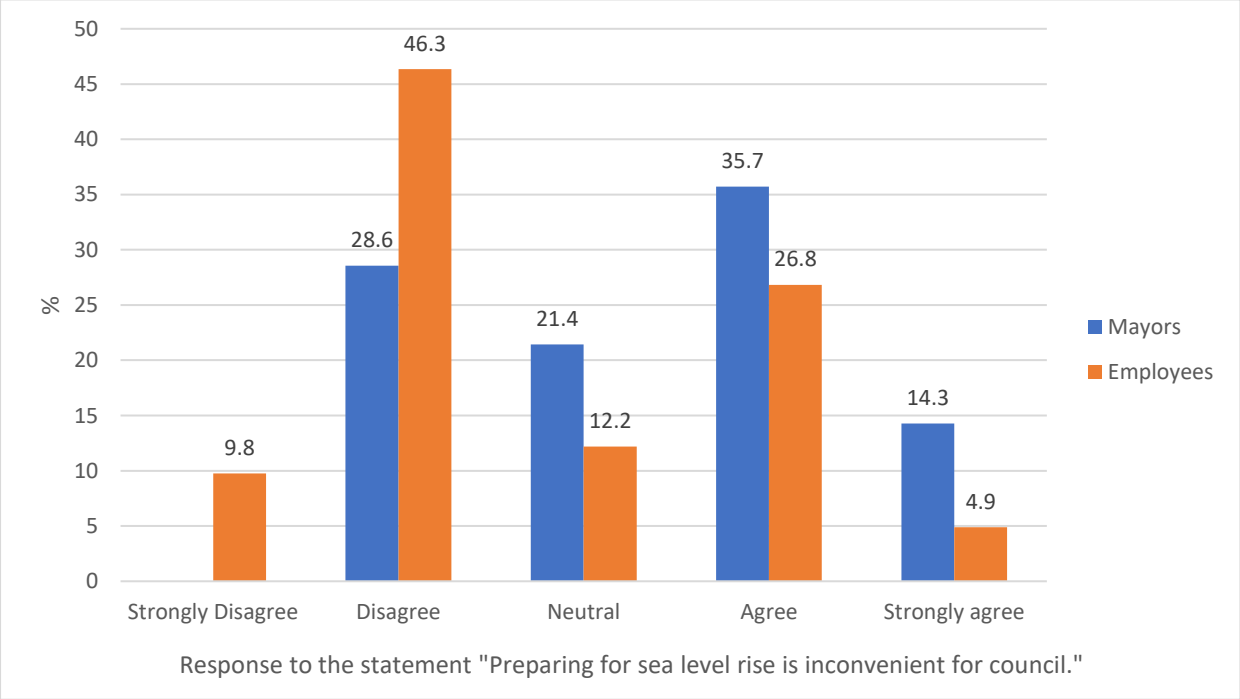

Figure 4.22 Perceptions of Mayors and Council employees on Councils preparation for SLR.

Perception on level of difficulty to prepare for SLR by councils also brought divergent responses amongst Mayors and Council employees with large numbers disagreeing that it is a difficult task for councils. The majority of Mayors (60%, n=9/15) indicated that preparing for SLR is not too difficult for councils as opposed to 20% (n=3/15) who felt it is difficult.

Two-thirds of Council employees (67%, n=28/42) did not believe preparing for SLR could be too difficult for councils as opposed to the 17% (n=7/42) who perceived it as difficult.

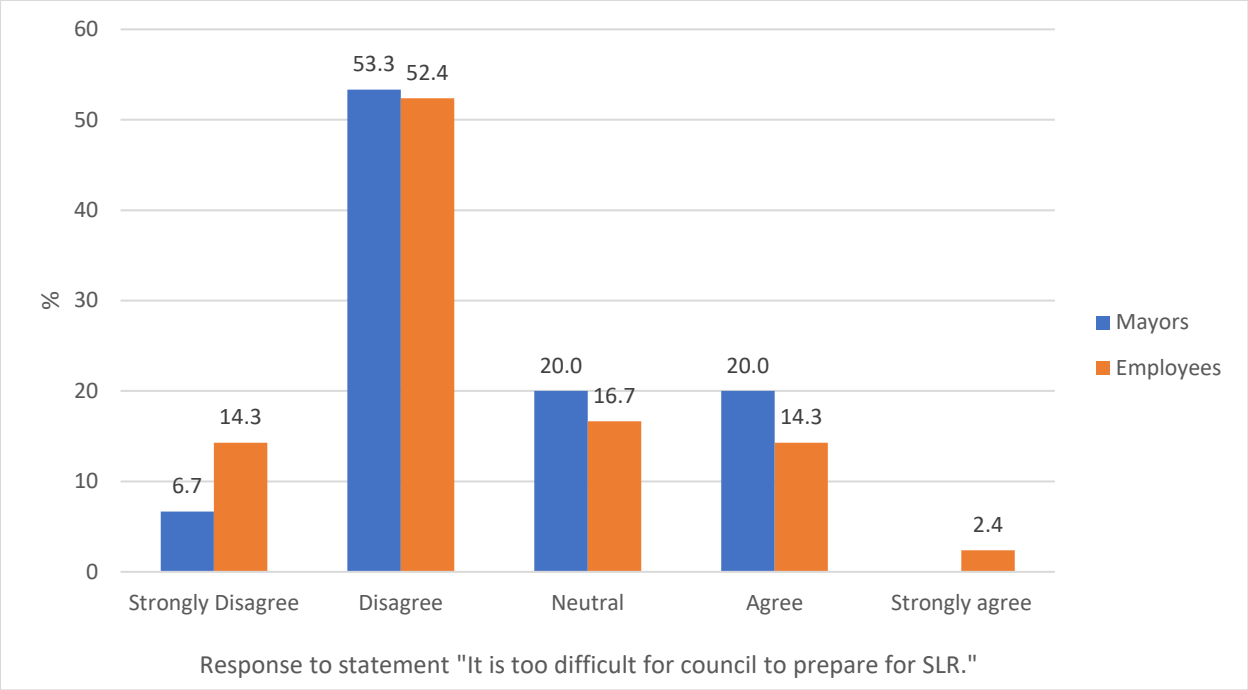

Figure 4.23 Perceptions of Mayors and Council employees on whether it is difficult for councils to prepare for SLR.

Respondents also demonstrated some level of understanding that preparing for SLR now will help prevent damage to homes and infrastructure in future as shown by results in **Figure 4.24**. Almost all Council employees and Mayors (95%, n=40/42) and 87%, n=13/15 respectively) felt that future damages can be prevented by preparing for SLR now save for 1 Council employee (3%) who disagreed.

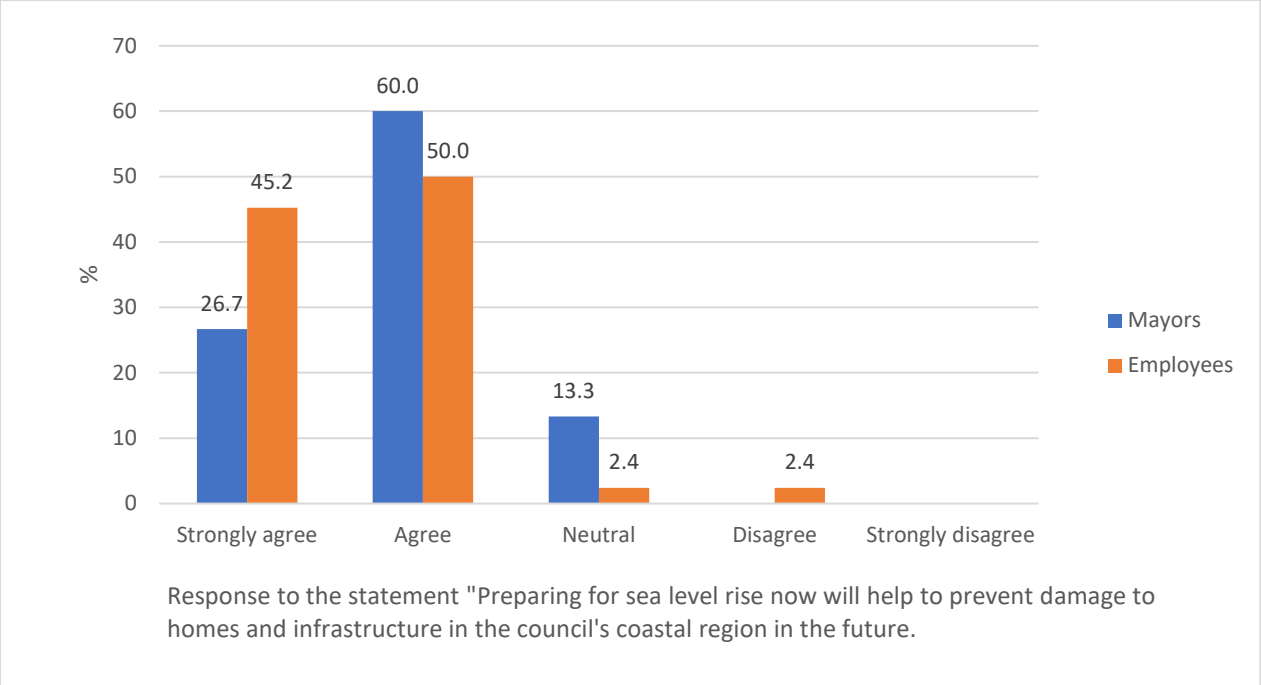

Figure 4.24 Perceptions of Mayors and Council employees on whether preparing for SLR now will help to prevent damage to homes and infrastructure in future

Figure 4.25 shows results from mayors and Council employees' responses to the statement "I do not know how council can prepare for SLR. Almost all Mayors (93%, n=14/15) indicated that they know how councils can prepare for SLR. The majority of council employees (82%, n=35/42) also either disagreed with the posed statement thus implying that they know how councils can prepare for SLR.

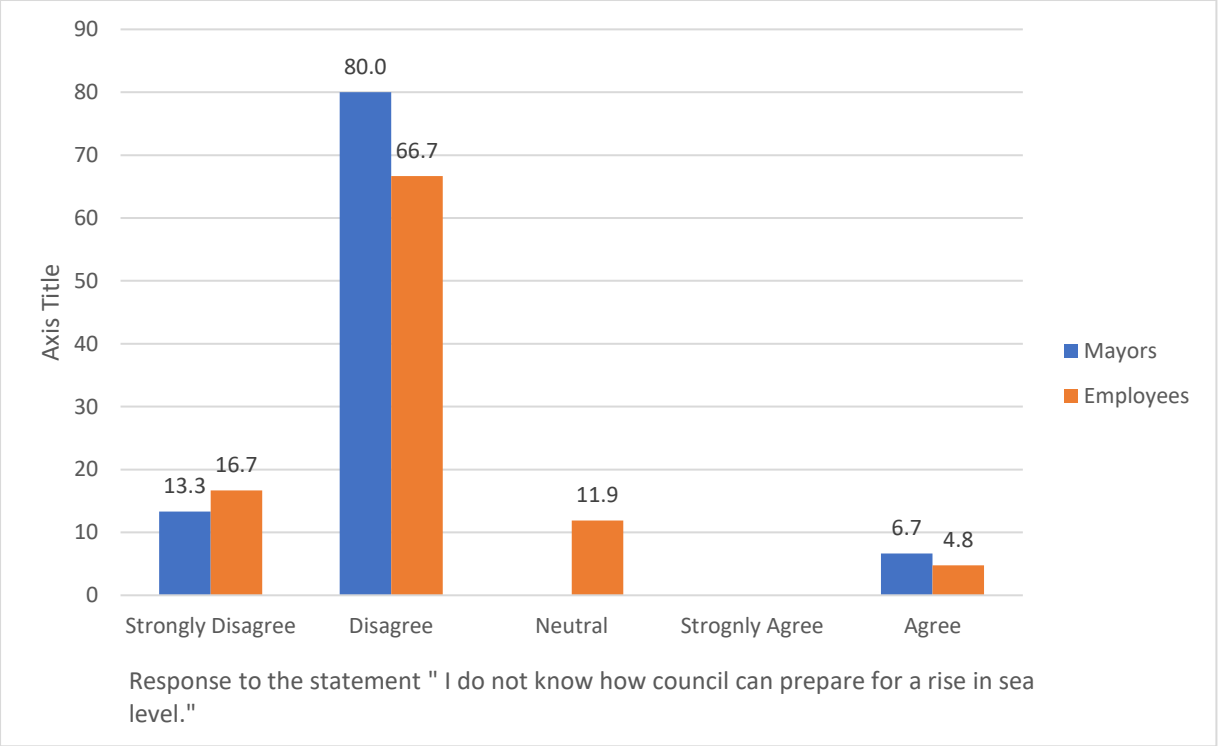

Figure 4.25 Perceptions of Mayors and Council employees on whether they don't know how councils can prepare for a rise in sea level.

Respondents' perceptions on 'council preparedness was further explored by asking for their opinions on various aspects of council preparedness and capacity for coastal adaptation. When asked of their level of satisfaction with the development and implementation of coastal adaptation strategies for their respective councils, Mayors' responses showed a high level of satisfaction as 83% (n=13/15) of them were either 'very satisfied' or 'satisfied'. On the other hand, council employees showed some mixed feelings with 44% (n=15/34) showing some level of satisfaction while 24% (n=8/34) were either 'dissatisfied' or very 'dissatisfied' **(Figure 4.26).**

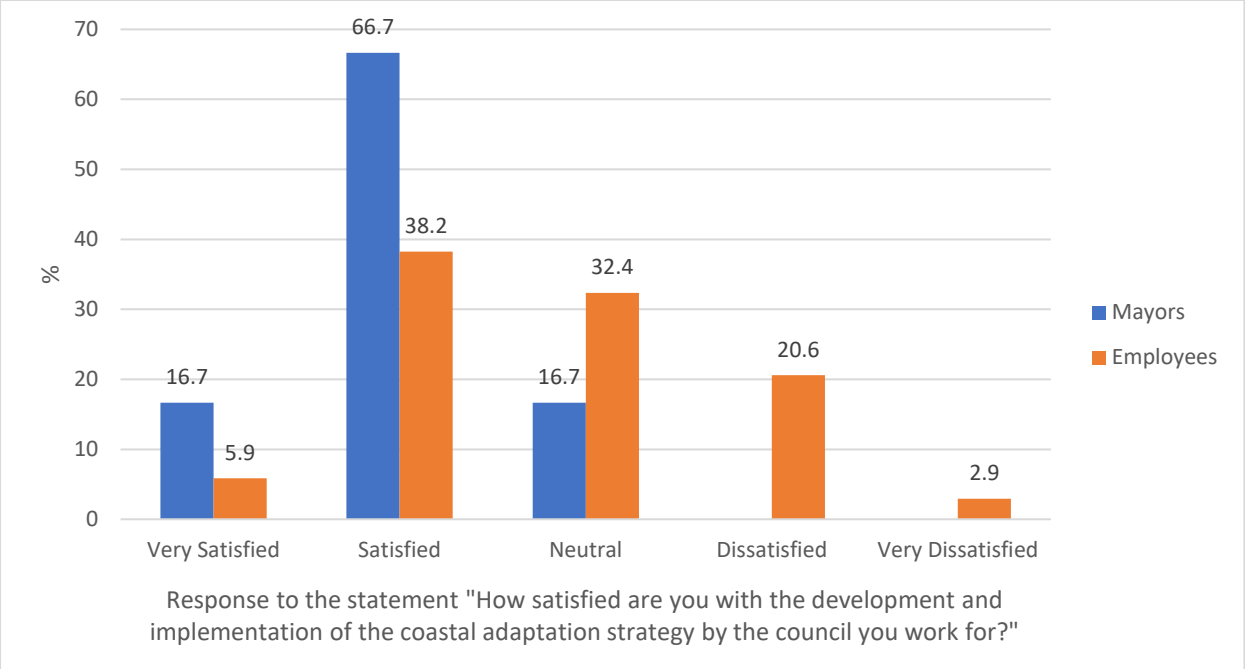

Figure 4.26 Perceptions of Mayors and Council employees on their satisfaction about the development and implementation of coastal adaptation strategy by councils.

On the issue of satisfaction with the approach taken by councils to conduct coastal hazard risk assessment, most Mayors (83%, n=10/12) selected either 'satisfied' or 'very satisfied' hence perceived to be content with the approach. On the other hand, Council employees were divided in their responses, with 45% (n=15/33) being satisfied and 21% (n=7/33) being dissatisfied. A significant 33% (n=11/33) of council employees were uncertain.

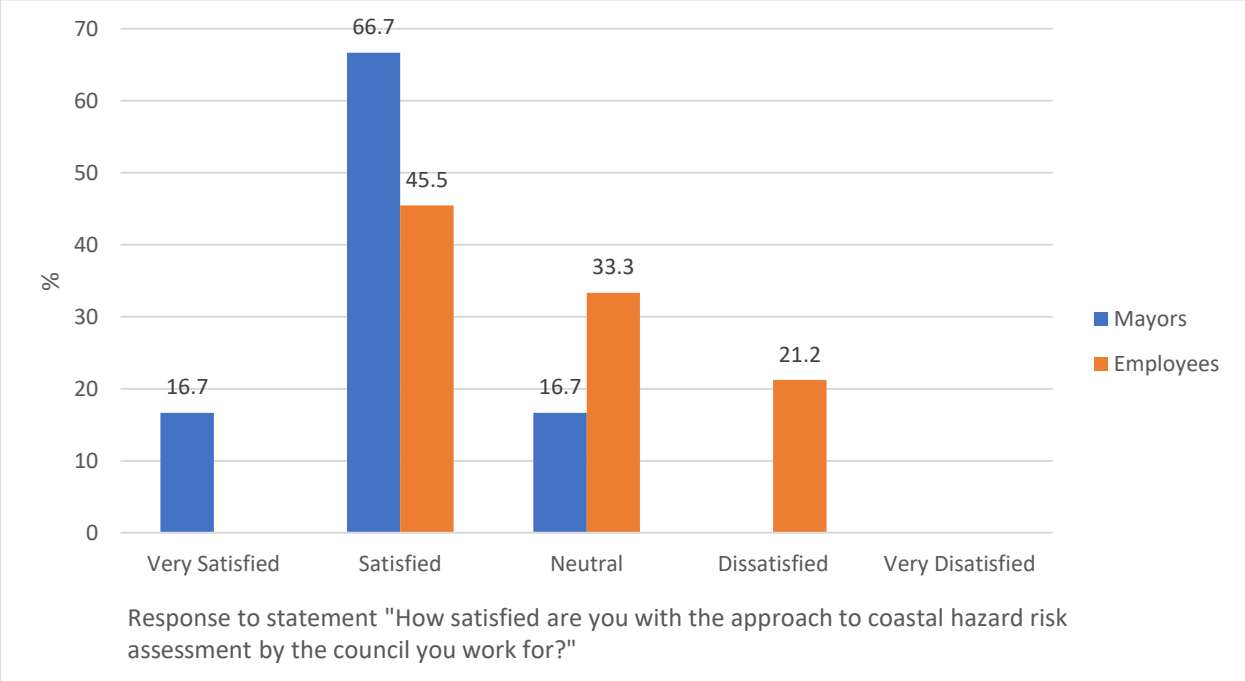

Figure 4.27 Perceptions of Mayors and Council employees on their satisfaction about coastal hazard risk assessment approach taken by councils.

Varied responses were also observed when respondents were asked “How would you rate your understanding of council's legal liability with respect to coastal hazards associated with SLR?" The majority of Mayors were confident of their understanding of councils’ legal liability in regard to coastal hazards associated to SLR. Over half (58%, n=7/12) of them had either a ‘good’ or ‘excellent’ understanding while 8% (n=1/12) felt their understanding was poor. However, a notable 33% (n=3/12) were uncertain.

For Council employees, almost a third (32%, n=11/32) felt they had a good or excellent understanding of the legal liabilities. Most of the respondents in this category either rated themselves ‘below average’ (35%, n=12/34) or neutral (32%, n=11/34) in their understanding of the legal liability of councils to SLR coastal hazards.

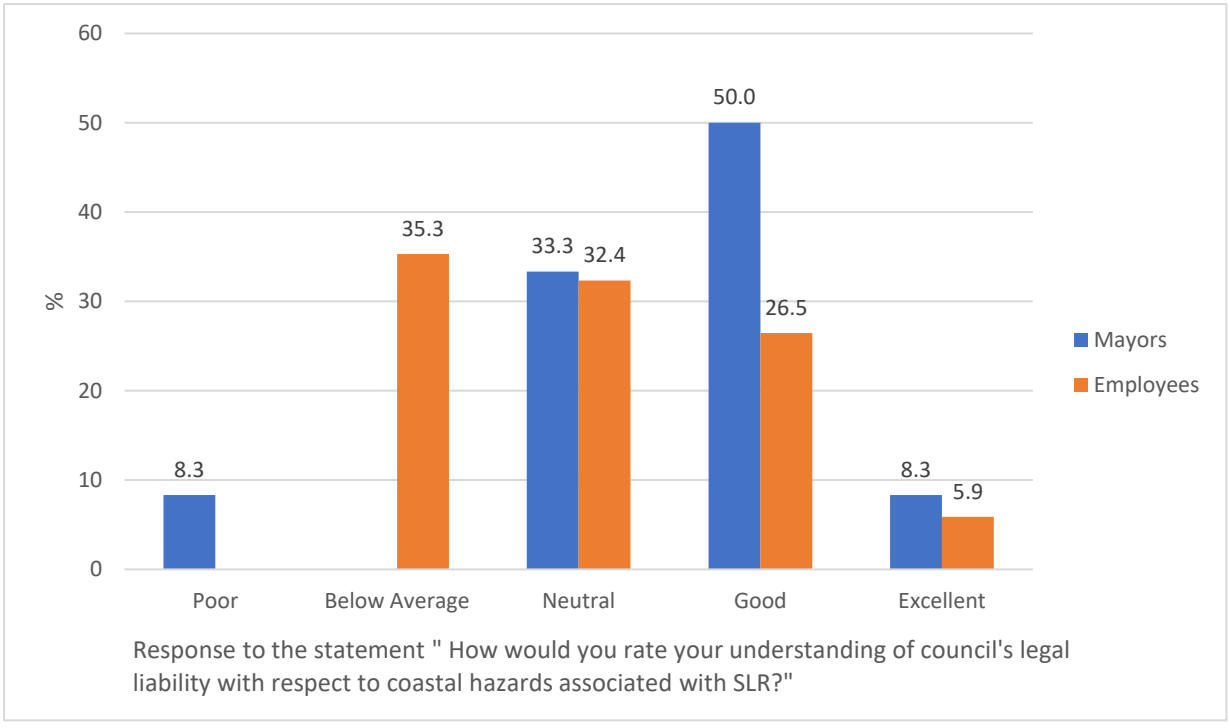

Figure 4.28 Perceptions of Mayors and Council employees on their understanding of councils’ legal liability with respect to coastal hazards associated with SLR.

Respondents were also presented with the statement "In your opinion, do you think (other) Councillors within your council generally share your views about climate change?" Both Mayors and council employees showed a low level of confidence in the prospect of shared perceptions between them and (other) councillors in their councils **(Figure 4.29).**

Only a third of Mayors (33%, n=5/15) were confident that other councillors always or often held the same views as theirs in regard to climate change while the majority (60%, n=9/15) felt that "sometimes" other councillors do share the same views as theirs in regard to SLR.

A similar response pattern was evident among Council employees with only a few (14%, n=6/42) of respondents being confident that Councillors either "often" or "always" held the same views as theirs towards SLR. Over two-thirds (69%, n=29/42) felt that "sometimes" they do have same views with Councillors in the councils they work in while 14% (n=6/42) felt it was "rare" to have Councillors holding the same views as theirs.

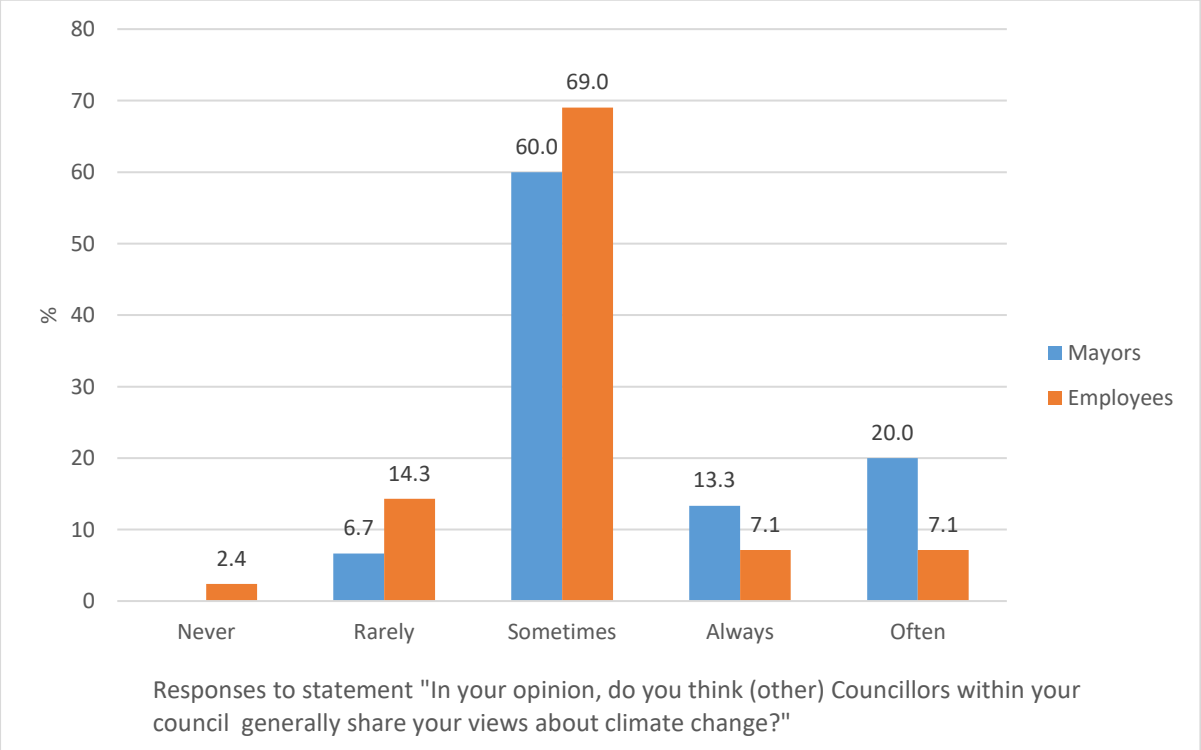

Figure 4.29 Perceptions of Mayors and Council employees whether (other) Councillors in the council they work for shared the same views as theirs in regard to climate change.

When presented with the statement "In your opinion, do you think (other) council staff within your council generally share your views about climate change?" Both Mayors and council employees showed some level of certainty in the prospect of shared perceptions between them and (other) council staff in their councils **(Figure 4.30).**

Over half of Mayors (58%, n=8/14) were confident that council staff always or often held the similar views as theirs in regard to climate change while 42% (n=6/14) felt that "sometimes" councillors do share the same views as theirs.

The majority of Council employees (64%, n=27/42) felt that 'sometimes' other Council staff held the same views as theirs in regard to SLR while 34% (n=14/42) felt that other council employees did share the same views as theirs towards SLR.

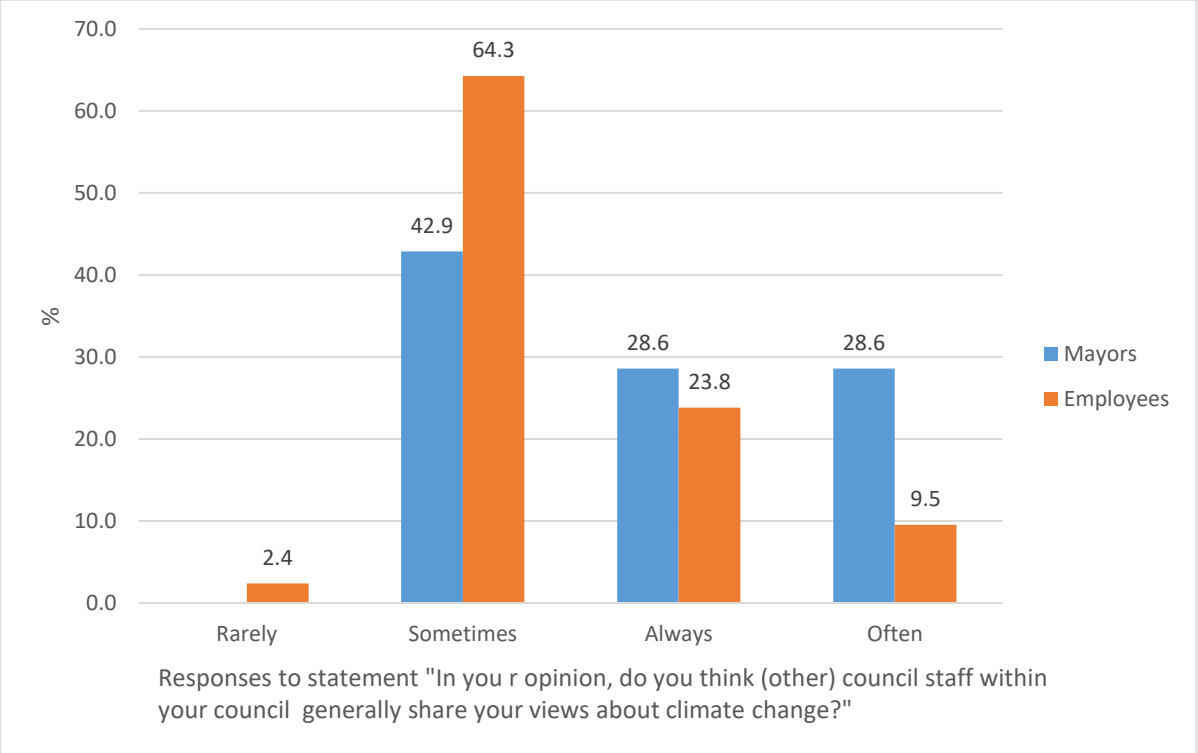

Figure 4.30 Perceptions of Mayors and Council employees whether (other) council staff in the councils they work for shared the same views as theirs in regard to climate change.

With regard to community living in their council area holding the same views as theirs in regard to climate change, there was a high level of uncertainty among both Mayors and Council employees as shown in **Figure 4.31.** Only 20% (n=3/15) of Mayors were certain about shared views with the local community while 7% felt it was rare to have community holding the same views as theirs on issues relating to climate change. The majority (73%, n=11/15) of Mayors felt that "sometimes" community living in their council area did share the same views as theirs. The uncertainties were backed by comments such as given by a Mayor in the South East region:

"The community tends to focus upon the political smoke scream of denial and therefore due to this they tend to be dismissive. With comments and views of "not in my life time" or making comments about them gaining sea front housing views due to this." [Mayor ID 7, region 10 (South East)].

Similarly, the majority of Council employees (79% (n=33/42) felt that sometimes the community living in their council area held the same vies as theirs. Only a small number (12%, n=5/42) believed that the community held the same views as theirs while 9% (n=4/42) felt it was a rare occurrence.

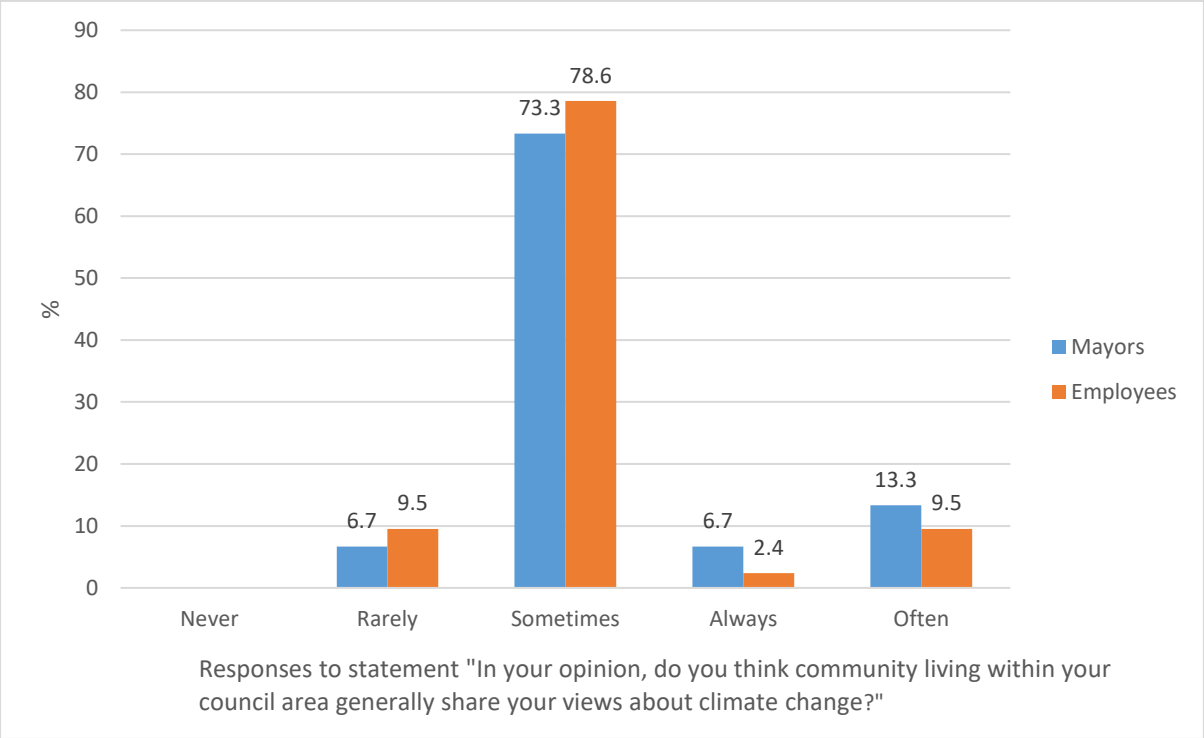

Figure 4.31 Perceptions of Mayors and Council employees whether community in their council areas shared the same views as theirs in regard to climate change.

4.7 Preferences for Adaptation/ Preferred adaptation options

As presented in the literature review, adaptation options are often classified into four broad categories: avoid, accommodate, protect and retreat (NCCARF, 2016, Ryan et al., 2011). Respondents were asked questions about how they favour each of the four broad adaptation options. Mixed feelings were evident in the participants' responses towards each category as shown in **Figures 4.32.to 4.35** below.

Option: Protect

Figure 4.32 shows that majority of Mayors favoured implementation of coastal protection structures (both hard and soft structures) as shown by 92% either 'strongly favouring' or 'somewhat favouring' the use of these structures.

Similarly, 87% (n=33/38) of Council employees shared the same sentiments as Mayors who favoured the "protect" adaptation option (with 37%, n=14/39 'strongly favouring' and 50%, n=19/38 'somewhat favouring' the use of hard and soft structures). However, 8% (n=3/38) of the council employees were against the use of hard and soft coastal protection structures.

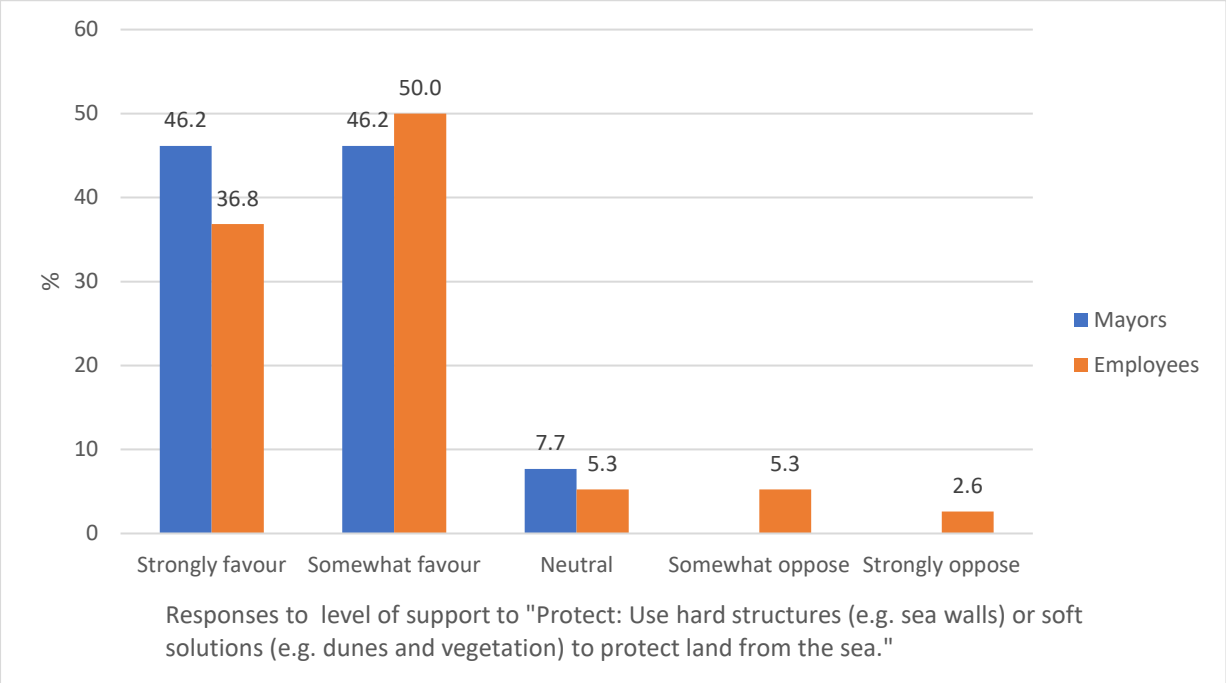

Figure 4.32 Perceptions of Mayors and Council employees on their level of support to the use of 'Protect' adaptation options.

Option: Accommodate

"Accommodate" options propose the continued use of coastal land using more resilient and adaptive building types. These options include buildings using piled construction that can be raised above future flood levels. Mixed feelings from both Mayors and Council employees were evident towards this class of adaptation option as shown by responses ranging from 'strongly favour' to 'strongly oppose'.

The majority of Mayors (70%, n=9/13) were supportive of the continued use of coastal land with adjusted building structures while 23% (n=3/13) were opposed to that approach.

Similarly, 66% (n=25/38) of Council employee respondents either 'strongly favoured' or 'somewhat favoured' the "accommodate" adaptation options while almost a quarter (24%, n=9/38) of them were opposed to the adoption of more resilient and adaptive buildings **(Figure 4. 33).**

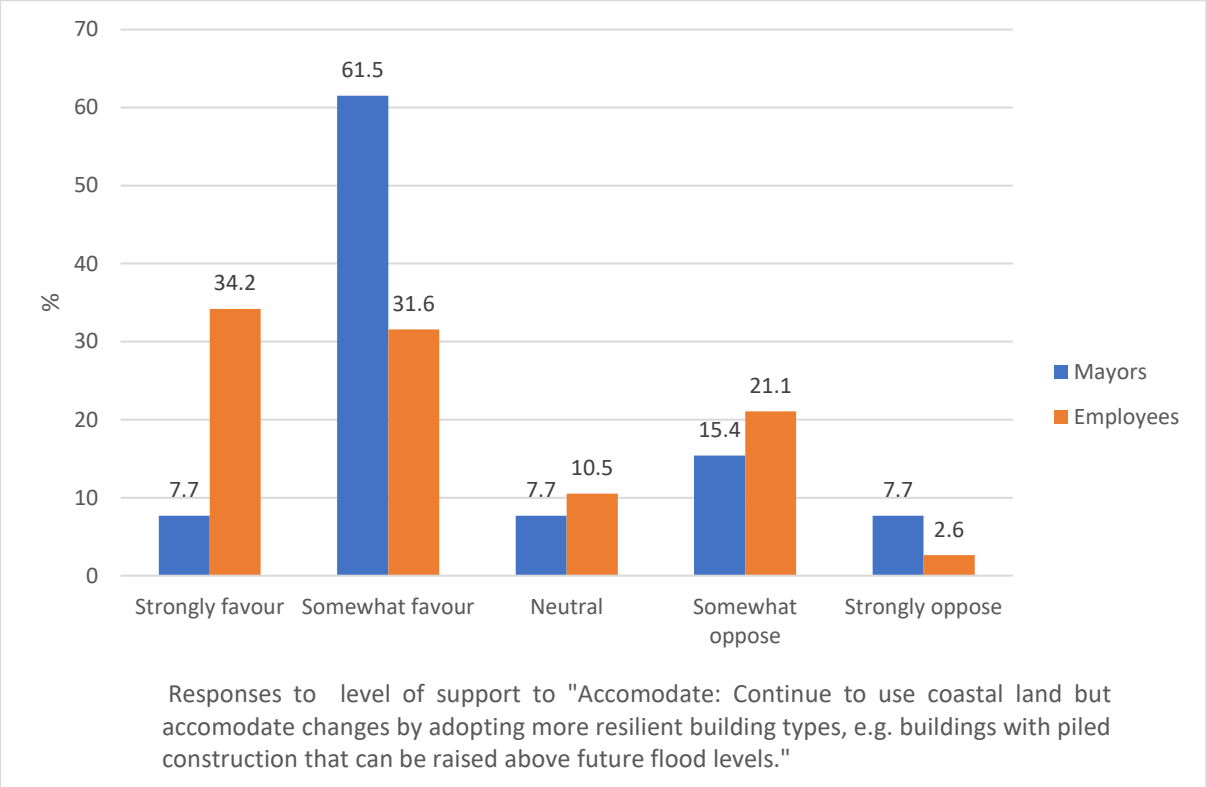

Figure 4.33 Perceptions of Mayors and Council employees on their level of support to 'Accommodate' adaptation options.

Option: Avoid

Figure 4.34 shows responses obtained when respondents were asked about their level of support for the "avoid" adaptation options. The adaptation options in this category include the use of planning tools to prevent new developments in areas at risk now or in future such as identifying future no-build areas. A similar pattern emerged from the responses of the two groups.

Most Mayors (77%, n=10/13) were in support of these forms of adaptation with over half of respondents (54%, n=7/13) 'strongly favouring' the options and complemented by 23% (n=3/13) who 'somewhat favoured' the same options. However, 8% (n=1/13) of Mayors 'somewhat opposed' the 'avoid' adaptation options.

A similar pattern was evident from responses by Council employees with 90% (n=34/38) of respondents either strongly favouring or somewhat favouring the "avoid" adaptation options. Only 3% (n=1/38) of the Council employees were not in support of this set of adaptation options.

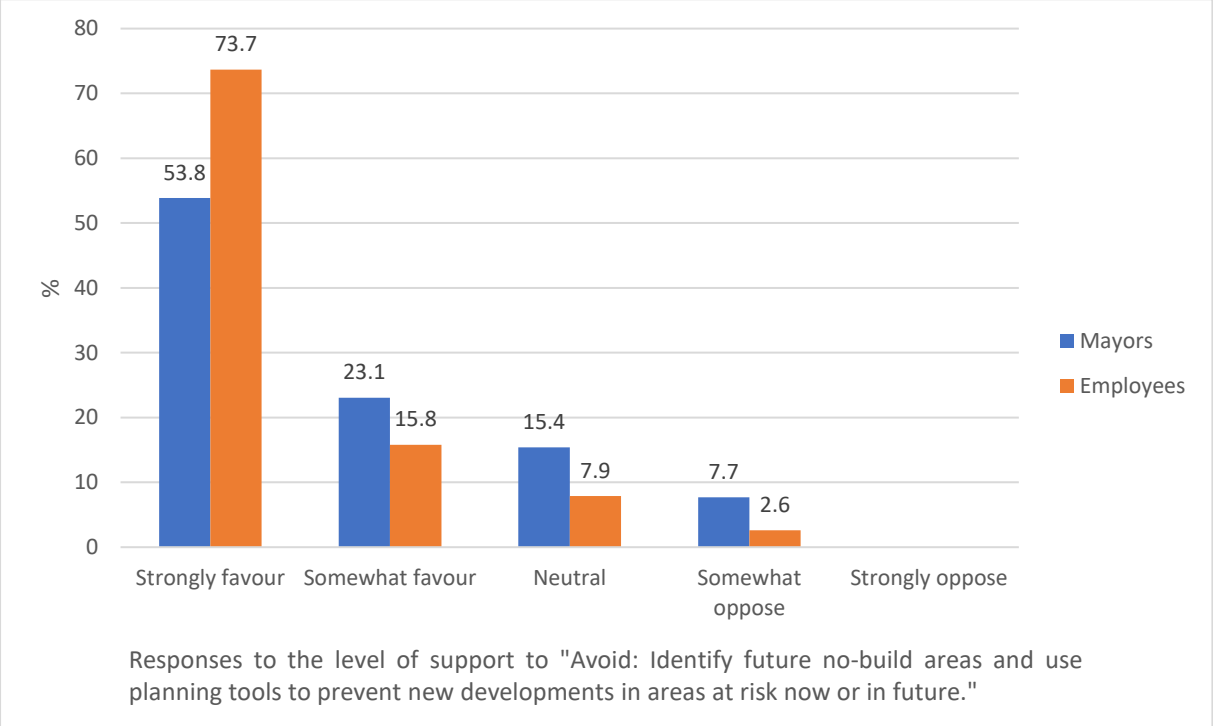

Figure 4.34 Perceptions of Mayors and Council employees on their level of support to 'Avoid' adaptation options.

Option: Retreat

"Retreat" options propose the removing or relocating of properties and infrastructure that are considered "at risk from SLR" as well as ensuring new structures are built out of harm's way (Ryan et al., 2011). Withdrawal and relocating property from the coastal area allows coastal ecosystems to retreat landward thus buffering coastal communities and infrastructure from SLR threats.

There were evidently mixed feelings from both Mayors and Council employees in regard to the retreat adaptation options with responses ranging from 'strongly favour' to 'strongly oppose' for both groups **(Figure 4.35 below).** Of significance however, is how the views are polarised between the two groups. Council employees considerably more inclined towards

supporting the retreat options while Mayors were mostly opposed to the options. The majority of Mayors (62%, n=8/13) opted for either 'somewhat oppose' or 'strongly oppose' hence evidently being against adoption of retreat options while 15% (n=2/13) of Mayors favoured the retreat options.

Most Council employees (58%, n=22/38) favoured the retreat adaptation option compared to 21% (n=8/38) of Council employees who either somewhat or strongly opposed the retreat options.

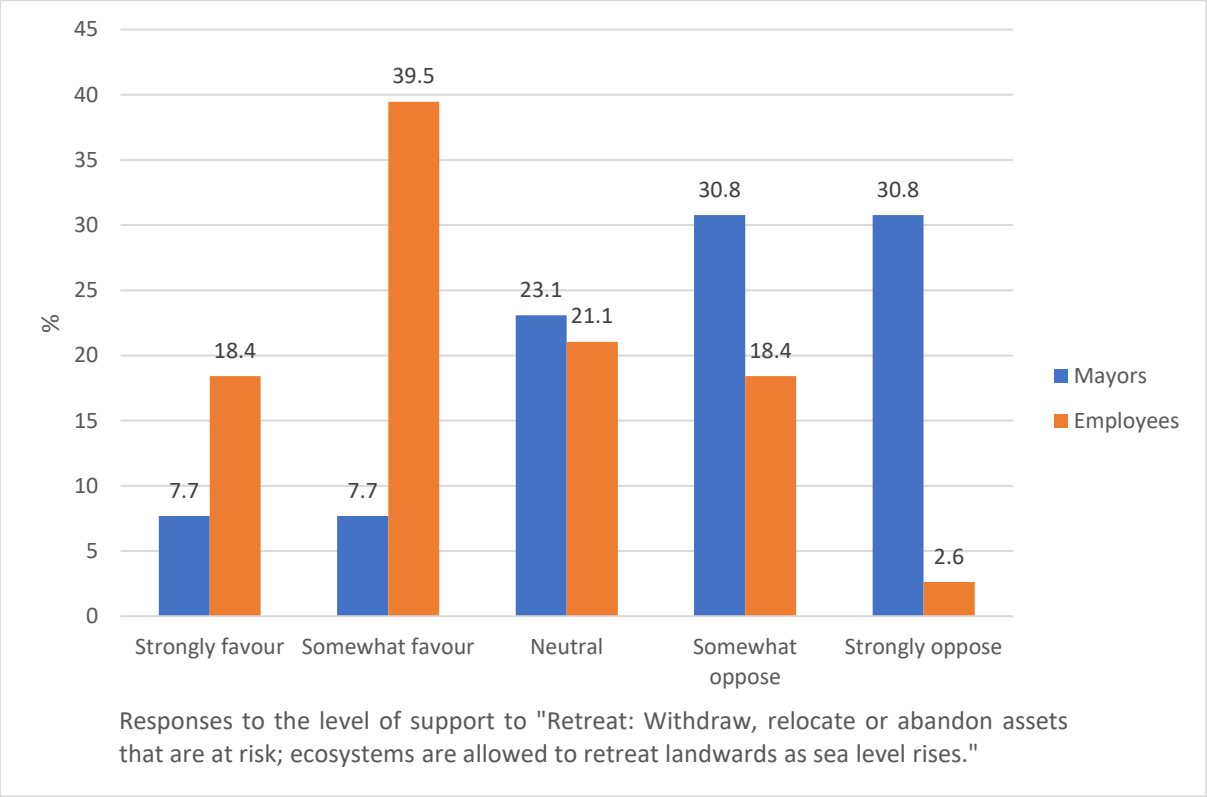

Figure 4.35 Perceptions of Mayors and Council employees on their level of support to 'Retreat' adaptation options.

To further get an insight on the difference in perceptions reflected in Figure 4.34 above, a cross tabulation was done to establish how Mayors differed with Council employees in their regions. The results are presented in **Table 4.2** below. Of the 6 regions that had responses from both Mayors and council employees (Eyre Peninsula, Northern Spencer Gulf, Yorke Peninsula, Fleurieu and KI and South East), most of the Mayors were opposed to the "retreat" option while most Council employees were in support of the option. The difference in perception between Mayors and Council employees were more defined in the South East and Fleurieu and KI regions where Mayors were clearly opposed to the "retreat" adaptation option while Council

employees were in support of the option. The other 4 regions had no Mayors identifying with them.

Table 4.2 A cross tabulation of responses received per region to compare perceptions of Mayors (M) and Council Employees (E) in regard to the "Retreat" adaptation option.

	Strongly oppose		Somewhat oppose		Neutral		Somewhat favour		Strongly favour		total	
	E	M	E	M	E	M	E	M	E	M	E	M
Metropolitan North	0		0		1		0		0		**1**	
Central Metropolitan	0		0		0		2		1		**3**	
Metropolitan South	0	0	0	0	1	1	4		1	0	**6**	**1**
Northern Gulf St Vincent	0		0		1		0		0		**1**	
West Coast	0		1		2		0		0		**3**	
Eyre Peninsula	1	1	0	1	0	0	0		0	0	**1**	**2**
Northern Spencer Gulf	0	0	2	1	0	0	0		1	0	**3**	**1**
Yorke Peninsula	0	1	0	1	1	1	2		2	0	**5**	**3**
Fleurieu and KI	0	1	1	1	1	0	3		0	1	**5**	**3**
South East	0	1	0	0	0	0	2	-	1	0	**3**	**1**
Total	**1**	**4**	**4**	**4**	**7**	**2**	**13**	**-**	**6**	**1**	**31**	**11**

4.8 Respondents perceptions about council strengths and weaknesses

To investigate the councils' readiness for SLR risks, respondents were asked to identify what they perceived as their council's strengths and weaknesses regarding SLR adaptation.

4.8.1 Perceptions on Councils strengths

The following discussion presents respondents opinions about council's strengths that will enable adaptation to the increased threats from coastal hazard associated with SLR.

Mayors' perceptions of council strengths

Mayors held a diverse range of opinions regarding the strengths of their individual councils in relation to adapting to the increased threat of coastal hazards. One recurring strength identified by Mayors was councils' engagement in forward planning. This was perceived to facilitate effective future adaptation of councils to SLR. As put by one respondent:

"Council are already planning in these areas. [They could do with more financial support from State and Federal Governments by using Grants]. If we get it right now it will reduce the cost in the future". [Mayor ID 2, region 9 (Fleurieu and KI)

While another respondent felt that

"Our Council's strengths are in that we have started our planning for climate adaptation of our coastal environment. [We now need to continue this work and build upon it as this is a project that has decades worth of work to be done and many millions of dollars to be invested] to ensure we are ready for the change." [Mayor ID 13, region 9 (Fleurieu and KI)].

Thirty-six percent (n=4/11) of Mayors indicated 'forward planning' as a key strength which councils can use to adapt to the increased threat of coastal hazards associated with SLR.

Respondents also gave some isolated responses which encompassed council strengths such as 'sound decision making', 'excellent local knowledge' and 'functional relationships with local residents and other stakeholders. Some statements given included:

[The council has] "excellent local knowledge" [Mayor ID 1, region 6 (Eyre Peninsula)]

[One strength of the council is] "sound decision making" [Mayor ID 5, region 6 (Eyre Peninsula)].

[Council has] "local knowledge of the particular issues in that location. We are very supportive of all our holiday settlements dotted around the coast. [Mayor ID 11, region 8 (Yorke Peninsula)].

Council Employees perceptions of council strengths

When asked to identify the strengths of their respective local councils, a third (n=10/30) of Council employees also mentioned forward planning as one significant strength of their councils. These respondents felt that the planning processes that their councils are engaged in and in some cases operationalising the existing of adaptation plans, positions their councils at a vantage position to address risks from the projected SLR. This position is reflected in some of the response statements given by respondents:

"Council's strength is that they have recognised that adaption planning is an appropriate response for Council to take, [in supporting private property owners in vulnerable coastal areas.]" [Council employee ID 9, region 8 (Yorke Peninsula)].

"Working on actioning AdaptWest Strategic planning acknowledges the vulnerability - proactive strategies being developed to safe guard." [Council employee ID 28, region 2 (Central Metropolitan)].

According to respondents, local councils are also equipped with local knowledge which is helpful in the planning process. Having sufficient local knowledge facilitates interactions between councils and their local communities which may facilitate functional relationships between the two actors in the coastal spaces. The importance of having local knowledge was reflected in 20% (n=6/30) of responses given by Council employees which included statements such as:

"[Councils generally use good risk management frameworks to address climate change and most South Australian Councils have already completed comprehensive regional climate change adaptation plans that take coastal climate change into consideration.] Councils also have excellent local knowledge which will be critical in understanding the local levels of risk. [Coastal climate change will require very local responses and regional risk profiles will be insufficient to respond effectively.]" [Council employee ID 29, region 3 (Metropolitan South)].

Council employees identified good working relations between councils and local residents as a key strength that can enable adaptation to SLR. This was backed by statements such as;

"*Council's close association with the local community and ability to be responsive on the ground [enables councils to employ adaptation strategies for the increased threat of coastal hazards associated with SLR"]*. [Council employee ID 27, region 9 (Fleurieu and KI)].

"Our local knowledge and better ability to consult with the community about the issue and come to a resolution [helps councils to devise appropriate adaptation strategies to address SLR"]. [Council employee ID 40, region 10 (South East)].

4.8.2 Perceptions on councils Weaknesses

When asked about the 'most significant challenges currently faced by councils that may hinder or prevent adaptation to the increased threat of coastal hazards associated with SLR', the

perceptions of both Mayors and Council employees invited an array of concerns. These are presented in the following discussion.

Mayors' perceptions on councils' weaknesses

The most common challenge in responding to SLR identified by Mayors was lack of budget to cover costs of SLR adaptation activities. Half (n=6/12) of the total responses given by Mayors included phrases such as 'cost of infrastructure", "funding," and "lack of money."

"The overwhelming cost of infrastructure [to protect existing towns and other infrastructure (causeways, breakwaters, levee banks etc.), built decades ago - particularly for small rural and remote councils.]" [Mayor ID 3, region not stated].

"The biggest risk is the lack of available resources [for us to educate the population and community.]" [Mayor ID 7, region 10 (South East)].

"Funding as may be required [from other levels of Government.]" [Mayor ID 11, region 8 (Yorke Peninsula)].

"Lack of money to implement plans [being ignored by other levels of government/ there (is) slow reaction time(s).]" [Mayor ID 12, region 7 (North Spencer Gulf)].

The next most common weakness identified by Mayors was the lack of understanding of the urgency to address SLR by stakeholders. A third (n=4/12) of Mayors indicated that adaptation to SLR is considered of lesser priority by stakeholders as captured in some of the response statements below.

Some respondent identified lack of immediate action by councils*:*

"Our biggest hurdle I believe is that the community and some councillors may not see the importance in this work. Without the elected members deciding to budget for these activities, nothing will get done. And if community groups put political pressure on councillors to focus on other areas and not this then it may slip as a priority. [Mayor ID 13, region 9 (Fleurieu and KI)].

"……., sea level rise is but one issue and for Councils to do nothing now will put the decision-making process in the urgent phase where mistakes will be made and cause further issues" [Mayor ID 2, region 9 (Fleurieu and KI)].

While others identified lack of commitment to SLR by the higher tiers of governments:

"[The biggest risk is the lack of available resources for us to educate the population and community.] And [a] failure by the state and federal governments to address and commit to long term goals and strategies to protect current and future assets in our region. As there is a lack of political will (courage) to start this process. [Mayor ID 7, region 10 (South East)].

Other less frequent responses from Mayors included bureaucracy in both action and decision-making (red tape) and [un]certainty of [SLR] predictions and time frames.

Council Employees perception of council weaknesses

Similar to Mayors, majority (60%, n=18/30) of Council employees indicated that the lack of- "funding", "budget" or "financial capacity" is a significant challenge for councils to address SLR adaptation initiatives. The below listed statements formed part of the Council employees' responses:

…"*The lack of funds to actively implement adaptation strategies."……* [Council employee ID 16, region 8 (Yorke Peninsula)].

"Lack of [awareness and] budget." [Council employee ID 2, region not stated].

"Council cannot afford to pay for this [we have a low rate payer base, and 100Kms of coastline.]" [Council employee ID 40, region 10 (South East)].

"Understanding responsibilities for funding and accessing the high levels of funding needed to take early adaptation and protection work before critical events and damage occurs" [Council employee ID 29, region 10 (South East)].

Council employees also indicated the lack of knowledge and awareness on SLR and associated risks as a challenge to coastal councils. This challenge was attributed to the unavailability of information resulting in lack of acknowledgement of potential risks from SLR. Over a quarter (27%, n=8/30) of Council employees identified lack of knowledge and awareness as a significant challenge to councils as highlighted by some response statements below:

One respondent felt that:

"(Lack of) knowledge and acceptance of the possible risks, particularly when many think it won't happen in their life time" [Council employee ID 27, region 9 (Fleurieu and KI)].

Other responses included:

"Lack of awareness [and budget."] [Council employee ID 2, region not stated].

"Ignorant management and Councillors" [Council employee ID 4, region 7 (Northern Spencer Gulf)].

"(Lack of) awareness/knowledge (has) potential impacts on our coastline .... [will partly be remedied by inundation/erosion maps being procured as part of Coastal Adaptation Study."] [Council employee ID 25, region 9 (Fleurieu and KI)].

Some council employees also highlighted the challenge of implementation of policies being at local government level while resources are with the state and federal governments. Within the range of responses given by Council employees on challenges facing coastal councils, lack of coordination and support from state and federal governments emerged as another significant factor as highlighted by the response statements below:

"Because this council does not have much coastal land under its care, it may be difficult to gain much monetary support for projects/programs that are focussed on managing coastal hazards." [Council employee ID 40, region 10 (South East)].

The above challenges were common among most respondents form different regions. However, other responses also captured issues such as public and councillors' perception which was seen to be a challenge to coastal councils and "*delaying mitigation works*" [Council employee ID 40, region 10 (South East)].

Chapter 5 – Discussion

5 Chapter 5: Discussion

5.1 Introduction

The conceptualization of this research was premised on establishing how Mayors and Council employees of coastal councils in South Australia perceive the readiness and preparedness of coastal councils in regard to risks from SLR. Mayors and Council employees are at the centre of decision making and policy implementation that directly influence local government policies including coastal policy in regard to climate change and SLR. Hence their perceptions are significant and have the capacity to influence the support for and effective implementation of policies for adapting to SLR. The study was also designed to establish if there are any differences in perceptions between Mayors and Council employees as well as to establish their level of satisfaction with their councils' preparedness for SLR. From the results in Chapter 4, it emerges that there are both commonalities as well as differences between Mayors and Council employees on their perceptions in regard to readiness and preparedness of coastal councils for adapting to SLR. Although Mayors appeared to be more satisfied with Councils' level of preparedness and readiness compared to Council employees, the overall perception from respondents was that councils are not fully prepared or ready for coastal climate adaptation.

As discussed in Chapter 2, the current worldview is that sea levels are rising and will continue to rise hence major asset losses are expected in future (Abel et al., 2011). Coastal zones therefore have to develop adaptive capacity and resilient infrastructure for future sustainability. South Australia's coastal areas will be affected by hazards associated with SLR. Coastal managers at local government level (including Mayors and Council employees) in the coastal areas of South Australia are entrusted with the responsibility of facilitating relevant adaptation measures for future sustainable coastal communities. However, according to literature, the course of action to reduce potential disaster and harm is largely influenced by peoples' perception and interpretation of risk. "Understanding how people interpret risks and choose actions based on their interpretations is vital to any strategy for disaster reduction" (Richard Eiser et al., 2012).

5.2 Awareness

How do Mayors and Council employees of South Australia coastal councils perceive risk of SLR? The research shows that Mayors and Council employees acknowledge and understand the concept of SLR and its associated elements despite their differences in satisfaction with the perceived levels of preparedness and preferred action to prepare for SLR. Possession of the right knowledge and understanding by these stakeholders who have capacity to influence councils' decisions can influence the course of action in regard to adapting to SLR. It is believed that the responsive policies are instituted on the best scientific knowledge (AECOM, 2013). There is even general support by Mayors and Council employees to prepare for SLR now, to prevent future damages to property and infrastructure. Such understanding and perceptions are a necessary operational platform for development and implementation of SLR adaptation frameworks as well as driving SLR adaptation policies within the coastal councils.

Although there is an acceptable level of awareness amongst the respondents, high levels of uncertainty prevail in respondents' perceptions on shared views. Most respondents are uncertain as to whether other council members share the same views as theirs in regard to climate change and SLR which may influence council's decisions. Level of authority and shared perceptions among participants to a decision-making process are important when it comes to making a decision. Policy development and implementation often requires input and negotiations between actors in the decision process. However, with Mayors holding influential positions through which they can exercise centralised control over decision making for councils, shared perceptions among Mayors and Council employees become an even more critical dimension to help support decisions made in councils.

5.3 Readiness

Level of preparedness and readiness for SLR by coastal councils, to an extent, is measured by institutional changes such as the development and implementation of coastal adaptation strategies and hazard risk assessments. The presence of institutional responses such as existence of plans influenced Mayors' level of satisfaction with council preparedness. On the contrary, Council employees, who are the key policy implementers, showed some dissatisfaction with the councils' level of preparedness despite the existence of institutional adaptation strategies in some council areas (e.g. Adapt West). It should be noted that the level of preparedness and readiness is determined by a number of factors which include among others, the level of implementation of SLR adaptation strategies and public response. The

polarised views expressed in this study has the potential to create a divide in decision making and prioritisation of strategies for adapting to SLR with Mayors upholding the view that current efforts are sufficient to address SLR while Council employees feel there is need to do more. These views however vary across regions, with some regions experiencing more divergent views between Mayors and Council employees while other regions have the two stakeholders sharing the same views.

Divergent views amongst respondents were also evident regarding whose responsibility it is to prepare for SLR. While only a small number of Mayors believed that local councils are responsible for preparing for SLR, larger numbers of respondents, both Mayors and Council employees perceived preparations for SLR as a state and/or federal governments' responsibility. This was further compounded by results showing that some respondents feel that preparing for SLR is both too costly and inconvenient for councils. Such misconceptions and attitudes among coastal managers who influence policy decisions can create some level of indecisiveness and inconsistencies in the development and implementation of adaptation strategies for SLR which may lead to abdication of responsibilities by councils.

5.4 Preference for adaptation

Whereas there may be sundry technical and scientific evaluations of the different available engineering and planning processes for adapting to SLR, a comprehensive state-wide assessment of preferred adaptation solutions for preparedness in South Australia's coastal councils has never been conducted. There have been groups and councils, several individual and ad hoc studies completed towards climate adaptation. SLR adaptation strategies in South Australia's coastal councils have been developed around the four common adaptation options: protect (e.g. seawalls, dunes, vegetation), accommodate (e.g. modified buildings that can be raised), avoid (e.g. identifying future "no build" areas and prevent new developments in those areas) and retreat (e.g. withdraw, relocate or abandon assets that are at risk). The adoption of each of the options depends on the perceived significance of the option by coastal managers. Of the four options, "protect", "accommodate" and "avoid" options are largely supported by Mayors and Council employees across the South Australia council regions. In some regions, these preferred adaptation options are partly being implemented although their implementations are countered by challenges. For instance adoption of modified building plans in the development plans often subject councils to legal action from developers.

Divergent views were evident in regard to the "retreat" options with most Council employees favouring the option while Mayors were opposed to the concept. A similar study by Larin, (2014), found out that relocating (which is a component of the retreat option) was also amongst the least favoured adaptation options by a Hawai'i coastal community. The difference in support for the retreat option is even more defined in some regions of South Australia than others. For instance, Mayors in the South East and Yorke Peninsula regions were opposed to the retreat strategy while Council employees favour its adoption. Such differences in perception between Mayors and Council employees in regard to the relevance of an adaptation option suggest a potential impasse in the adoption and implementation of such an option. Furthermore, Balston et al. (2012), suggest that planned retreat is the adaptation option that has seen the greatest advances in policy development nationwide. The lack of support for this option by Mayors therefore can ultimately act as a deterrent to the advances in the implementation of planned retreat.

5.5 Barriers to adaptation.

Although local government has been entrusted with the responsibility to manage coastal zones, it is apparent that the local governments are perceived to be inadequately resourced hence deterring their efforts to address strategies and policies. The findings of this research reflect differences in perceptions both within and between the groups of respondents (Mayors and Council employees) in regard to capacity of councils to prepare for SLR in terms of costs and convenience. Such divided perceptions presumably indicate a divide in prioritising preparations for SLR considering the limited financial resources. Abel at al., (2011) and McFadden (2010) show that local government have insufficient financial resources to initiate and implement responsive local strategies to future SLR. Financial constraints at local government level are one of the many common challenges that deter coastal development and SLR policy implementation in developed countries (Baker et al., 2012, McFadden, 2010).

In addition, coastal councils in South Australia are faced with lack support and feedback from higher levels of governance which compound challenges faced by local councils to manage coastal areas. According to NCCARF (2017), the lack of strong and clear support from state government to local government is a barrier to progressive action on adaptation. As such, in addition to appropriate distribution of authority and financial resources to local governments,

the higher tiers of governments should provide support to councils for effective preparation and adaptation to SLR.

Even though studies show that individual perceptions are largely influenced by personal exposure to a hazard event, it is not clear if the observation is also applicable to perceptions on threats from slow-onset events such as SLR (Larin, 2014). The lack of exposure to the effects of SLR and its perceived slow-onset can be attributed to the lack of concern by Mayors who believed SLR in South Australia's coast is either not changing or too slow to bother preparing for hence future projections being overly exaggerated. As presented in Chapter 2, the adaptive capacity of humans are largely influenced by the ability of decision-makers to manage information, what information they consider credible as well as the credibility of the decision-makers, themselves (Yohe and Tol, 2002, Cooper and Lemckert, 2012). These perceptions by key stakeholders who influence policy and decision making at local government level result in SLR being considered a non-immediate threat and ultimately relegating the SLR adaptation policies to a lesser priority level compared to other competing policies that are perceived to meet the immediate needs of communities. Consideration of adaptation policies as being of lesser priority contradicts the outcomes from the risk assessment for South Australian Councils undertaken by the Local Government Association of South Australia Mutual Liability Scheme (LGA MLS) (2009) which identified risks associated with climate change and adaptation to SLR in the coastal zone as high priority (Balston et al., 2012).

5.6 Limitations.

For ethical reasons, the questionnaire did not ask specifically which council respondents were from, but rather which council region. Responses were therefore classified according to coastal regions with each region constituting multiple councils. As such, the perceptions of Mayors could not be directly related to perceptions of Council employees within the same council. In some regions only one or no response were received for analysis. A regional analysis gives a generic impression across councils included in the region. A council-specific analysis on differences in perceptions between Mayors and Council employees would be relevant in giving insights as to which specific councils face possible impasse in decision making to implement SLR adaptation policies

The lack of an explicit measure for level of preparedness within the coastal councils presents another limitation to the current study. The study depended on participants' perceptions to

gauge preparedness through perceived institutional changes such as development and implementation of coastal adaptation strategies and hazard risk assessments. This presence of institutional changes can be assumed to provide an enabling environment associated with better SLR adaptation outcomes. However, as argued by Craft and Fisher (2016), presence of institutional changes does not guarantee better outcomes. Further limiting this study is the subjectivity of individual perceptions to gauging preparedness of councils. To mitigate this limitation, the survey instrument had multiple questions addressing the same concept.

Chapter 6 – Conclusion

6 Chapter 6: Conclusion

6.1 Perceived council preparedness and readiness and the risk from future SLR.

A number of factors from perceptions of Mayors and Council employees come in to play which renders coastal councils as not fully prepared for the projected SLR and the related impacts. The rift in perceptions of Mayors and Council employees about the level of preparedness of councils signals uncertainty on those who influence policies and decisions of coastal councils in regard to SLR. It can therefore be concluded that South Australia's coastal councils are perceived as not fully prepared to adapt to future changes presented by the rising sea levels hence coastal communities being at risk.

6.2 SLR as an intergovernmental problem.

Understanding and effective execution of roles and responsibilities by the three government is central to effective adaptation to SLR. A more robust engagement between the three tiers of Governments is recommended to act as a platform that creates consistent understanding and systematic approach to dealing with the impacts of SLR at the different levels. The research further supports the adaptation measures for coastal Councils proposed by the Local Governments Association of South Australia (2012) of developing a detailed SLR impacts and risk- based information paper to improve Mayors (and other elected members)' understanding of SLR issues. Further research could be undertaken to identify regional or council-specific challenges against the perceived level of preparedness so as to get an understanding of the different interventions that could be employed to enhance regional or councils' progress to adapting to SLR

6.3 Support for preparation and adaptation solutions at local councils.

The difference in perceptions by policy and decision makers calls for an integrated approach to addressing adaptation processes at the coastal front. It is critical for councils to be able to provide a common understanding of SLR and its associated impacts. Understanding SLR influences policy and decision makers' perception and capacity to objectively assess adaptation

strategies. Such understanding may presumably improve support for processes driving SLR adaptation from an informed perspective. Regular open and active discussions among policy and decision makers on the imminent hazards posed by SLR may provide a clear and better understanding of both the magnitude and urgency of risks from the projected SLR. The acknowledgement of the necessity to prepare for SLR now, to prevent future damages to property and infrastructure should be coupled with practicable action to facilitate preparedness for SLR by coastal councils.

6.4 Planning considerations and future work.

There is a deficit in research relevant to establishing the level of preparedness of South Australia's local councils in so far as adaptation to SLR is concerned. This study provides baseline information for future studies in relation to perception on preparedness of coastal councils on a broader perspective. As one of the first studies focusing on a nationwide research on perceptions of policy and decision makers, on council preparedness and readiness, this study should provide a baseline platform and information for future detailed and more region-specific or council-specific studies on preparedness and readiness for SLR.

7 Chapter 7: References

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Appendices

Appendix 1-Letter of Introduction

Assoc Prof Beverley Clarke
School of the Environment
GPO Box 2100
Adelaide SA 5001
Telephone +61 8 8201 2760
beverley.clarke@flinders.edu.au
Facsimile +61 8 201 3521
www.flinders.edu.au

LETTER OF INTRODUCTION

Dear Sir/Madam,

This email introduces Allira Taylor-Wilkins, an Honours student in the School of the Environment at Flinders University, South Australia. She is doing a research project leading to the production of a thesis and other publications on the subject titled: 'Understanding South Australian local government perceptions of risk to sea level rise'.

Allira is particularly interested in the perceptions of different local government stakeholders in regard to the need to prepare for Sea level Rise and whether there are any barriers preventing local governments to prepare for sea level rise.

Allira would like to invite you to assist with this project by completing an online questionnaire (the link is embedded as part of this message). No more than 20 minutes on one occasion would be required.

She is seeking your involvement in the research given your position as a Councillor of a South Australian Coastal Council. Your involvement will contribute a broad picture as to how South Australian local government is responding to sea level rise, and the preparedness of local government.

Attached is an Information Sheet, which provides more details about being involved in the project. Below is the link to the questionnaire.

If you have any questions or comments about the study, please do not hesitate to contact me via return email or phone (08) 8201 2760; beverley.clarke@flinders.edu.au.

Thank-you for taking he time to consider Allira's request. It is greatly appreciated.

If you have any questions or comments about the study, please do not hesitate to contact Allira:

Email: tayl0611@flinders.edu.au

Telephone: (08) 8201 5833

Thank-you for taking the time to consider my request. It is greatly appreciated.

Kind regards

Associate Professor Beverley Clarke

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number 7618). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au

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Appendix 2– Consent form for participation in Research

CONSENT FORM FOR PARTICIPATION IN RESEARCH

(by interview)

Understanding South Australian local government perceptions of risk to sea level rise

I .....

being over the age of 18 years hereby consent to participate as requested in the ..... for the research project on .....

1. I have read the information provided.
2. Details of procedures and any risks have been explained to my satisfaction.
3. I agree to audio recording of my information and participation.
4. I am aware that I should retain a copy of the Information Sheet and Consent Form for future reference.
5. I understand that:
   - I may not directly benefit from taking part in this research.
   - I am free to withdraw from the project at any time and am free to decline to answer particular questions.
   - While the information gained in this study will be published as explained, I will not be identified, and individual information will remain confidential.
   - I may ask that the recording be stopped at any time, and that I may withdraw at any time from the session or the research without disadvantage.

Participant's signature.....Date.....

I certify that I have explained the study to the volunteer and consider that she/he understands what is involved and freely consents to participation.

Researcher's name.....

Researcher's signature.....Date.....

NB: Two signed copies should be obtained. The copy retained by the researcher may then be used for authorisation of Items 8 and 9, as appropriate.

C:\Users\thom1217\AppData\Local\Temp\Consent Form Template (1) Taylor-Wilkins-1.doc
Updated 28 June 2006

Appendix 3– Ethics Approval Notice

Beverley Clarke

From: Human Research Ethics
Sent: Wednesday, 17 May 2017 4:16 PM
To: Allira Taylor-Wilkins (tayl0611@uni.flinders.edu.au); Beverley Clarke; Patrick Hesp
Subject: 7618 SBREC Final approval notice (17 May 2017)
Attachments: 7618 conditional approval response

Importance: High

Dear Allira,

The Chair of the Social and Behavioural Research Ethics Committee (SBREC) at Flinders University considered your response to conditional approval out of session and your project has now been granted final ethics approval. This means that you now have approval to commence your research. Your ethics final approval notice can be found below.

FINAL APPROVAL NOTICE

Project No.:	**7618**
Project Title:	Understanding South Australian local government perceptions of risk to sea level rise
Principal Researcher:	Ms Allira Taylor-Wilkins
Email:	tayl0611@uni.flinders.edu.au
Approval Date:	17 May 2017
Ethics Approval Expiry Date:	**31 December 2018**

The above proposed project has been **approved** on the basis of the information contained in the application, its attachments and the information subsequently provided with the addition of the following comment(s):

Additional information required following commencement of research:

1. Permissions
   Please ensure that copies of the correspondence granting permission to conduct the research from the individuals and/or organisations to be involved (e.g, Local Councils from which council employees will be interviewed) are submitted to the Committee *on receipt.* Please ensure that the SBREC project number is included in the subject line of any permission emails forwarded to the Committee. Please note that data collection should not commence until the researcher has received the relevant permissions (item D8 and Conditional approval response – number 10).

RESPONSIBILITIES OF RESEARCHERS AND SUPERVISORS

1

1. **Participant Documentation**
Please note that it is the responsibility of researchers and supervisors, in the case of student projects, to ensure that:

- all participant documents are checked for spelling, grammatical, numbering and formatting errors. The Committee does not accept any responsibility for the above mentioned errors.
- the Flinders University logo is included on all participant documentation (e.g., letters of Introduction, information Sheets, consent forms, debriefing information and questionnaires – with the exception of purchased research tools) and the current Flinders University letterhead is included in the header of all letters of introduction. The Flinders University international logo/letterhead should be used and documentation should contain international dialling codes for all telephone and fax numbers listed for all research to be conducted overseas.
- the SBREC contact details, listed below, are included in the footer of all letters of introduction and information sheets.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project Number 'INSERT PROJECT No. here following approval'). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au.

2. **Annual Progress / Final Reports**
In order to comply with the monitoring requirements of the *National Statement on Ethical Conduct in Human Research (March 2007)* an annual progress report must be submitted each year on the **17 May** (approval anniversary date) for the duration of the ethics approval using the report template available from the Managing Your Ethics Approval SBREC web page. *Please retain this notice for reference when completing annual progress or final reports.*

If the project is completed *before* ethics approval has expired please ensure a final report is submitted immediately. If ethics approval for your project expires please submit either (1) a final report; or (2) an extension of time request and an annual report.

Student Projects
The SBREC recommends that current ethics approval is maintained until a student's thesis has been submitted, reviewed and approved. This is to protect the student in the event that reviewers recommend some changes that may include the collection of additional participant data.

Your first report is due on **17 May 2018** or on completion of the project, whichever is the earliest.

3. **Modifications to Project**
Modifications to the project must not proceed until approval has been obtained from the Ethics Committee. Such proposed changes / modifications include:

- change of project title;
- change to research team (e.g., additions, removals, principal researcher or supervisor change);
- changes to research objectives;
- changes to research protocol;
- changes to participant recruitment methods;
- changes / additions to source(s) of participants;
- changes of procedures used to seek informed consent;
- changes to reimbursements provided to participants;
- changes / additions to information and/or documentation to be provided to potential participants;
- changes to research tools (e.g., questionnaire, interview questions, focus group questions);
- extensions of time.

To notify the Committee of any proposed modifications to the project please complete and submit the *Modification Request Form* which is available from the Managing Your Ethics Approval SBREC web page. Download the form from the website every time a new modification request is submitted to ensure

that the most recent form is used. Please note that extension of time requests should be submitted prior to the Ethics Approval Expiry Date listed on this notice.

Change of Contact Details

Please ensure that you notify the Committee if either your mailing or email address changes to ensure that correspondence relating to this project can be sent to you. A modification request is not required to change your contact details.

4. Adverse Events and/or Complaints

Researchers should advise the Executive Officer of the Ethics Committee on 08 8201-3116 or human.researchethics@flinders.edu.au immediately if:

- any complaints regarding the research are received;
- a serious or unexpected adverse event occurs that effects participants;
- an unforeseen event occurs that may affect the ethical acceptability of the project.

Kind regards
Andrea

Mrs Andrea Fiegert and Ms Rae Tyler
Ethics Officers and Executive Officer, Social and Behavioural Research Ethics Committee
Andrea - Telephone: +61 8 8201-3116 | Monday, Tuesday and Wednesday
Rae – Telephone: +61 8 8201-7938 | ½ day Wednesday, Thursday and Friday

Email: human.researchethics@flinders.edu.au
Web: Social and Behavioural Research Ethics Committee (SBREC)

Manager, Research Ethics and Integrity – Dr Peter Wigley
Telephone: +61 8 8201-5466 | email: peter.wigley@flinders.edu.au
Research Services Office |Union Building Basement
Flinders University
Sturt Road, Bedford Park | South Australia | 5042
GPO Box 2100 | Adelaide SA 5001

CRICOS Registered Provider: The Flinders University of South Australia | CRICOS Provider Number 00114A
This email and attachments may be confidential. If you are not the intended recipient,
please inform the sender by reply email and delete all copies of this message.

Appendix 4- Interview Information Sheet

Ms Allira Taylor-Wilkins
School of the Environment
Faculty of Science and Engineering

Earth Science Building,
Flinders Drive, Bedford Park SA 5042

GPO Box 2100
Adelaide SA 5001

Tel: +61 8 xxxx xxxx
Fax: +61 8 201 3521
Allira Taylor-Wilkins
tayl0611@uni.flinders.edu.au

CRICOS Provider No. 00114A

INFORMATION SHEET
(for interviews)

Title: Understanding South Australian local government perceptions of risk to sea level rise

Researchers:
Ms Allira Taylor-Wilkins
School of the Environment
Flinders University
Ph: 8201 5833

Supervisor(s):
Associate Professor Beverley Clarke
School of the Environment
Flinders University
Ph: 8201 2760

Professor Patrick Hesp
School of the Environment
Flinders University
Ph: 8201 3538

Description of the study:
This study will investigate the perception of local government officers (mayors and employees e.g. planners, environmental managers) and counsellors in regard to local government response to Sea Level Rise. Recent research in Australia and South Australia has raised a number of concerns in regard to the capacity of local government to act and urge action.

Purpose of the study:
This project aims to

- Establish the degree to which South Australian local coastal councils perceive they are prepared to respond to SLR and its impact
- Identify barriers to preparedness for sea level rise as perceived by local government employees and elected members

inspiring achievement

- Propose a series of recommendations based on commonly identified challenges in a bid to support local councils prepare for sea level rise.

What will I be asked to do?
You are invited to participate in a face-to-face interview with a researcher who will ask you a few questions about your views about local government and its role in coastal adaptation. Participation is entirely voluntary. The interview will take about 40 minutes. The interview will be recorded using a digital voice recorder to help with analysing the results. Once recorded, the interview will be transcribed (typed-up) and stored as a computer file on a password-protected computer at Flinders University.

What benefit will I gain from being involved in this study?
The sharing of your knowledge and ideas will help build a state-wide understanding of the readiness of local government to respond to sea level rise and of supports that could be put in place for coastal adaptation programs and strategies.

Will I be identifiable by being involved in this study?
You may not be anonymous but your contribution will be confidential. Once the interview has been typed-up and saved as a file, the voice file will then be destroyed. Any identifying information will be removed and the typed-up file stored on a password protected computer that only the supervisor (Associate Professor Beverley Clarke) will have access to. Your comments will not be linked directly to you.

Are there any risks or discomforts if I am involved?
The researcher anticipates few risks from your involvement in this study. Interviews will take place in a suitably private place (e.g. an appropriate room in your council building) and as assured above, you will be de-identified in any publications that originate from this study. If you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the researcher.

How do I agree to participate?
Participation is voluntary. You may answer 'no comment' or refuse to answer any questions and you are free to withdraw from the interview at any time without effect or consequences. A consent form accompanies this information sheet. If you agree to participate please read and sign the form and send it back to me at tayl0611@uni.flinders.edu.au.

How will I receive feedback?
On project completion outcomes of the project will be given to all participants who request it via email.

Thank you for taking the time to read this information sheet and we hope that you will accept our invitation to be involved.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number INSERT PROJECT No. here following approval). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au

Appendix 5– Survey instrument (Questionnaire) for Mayors

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council Mayors in South Australia

Thank you for taking the time to assist with this survey

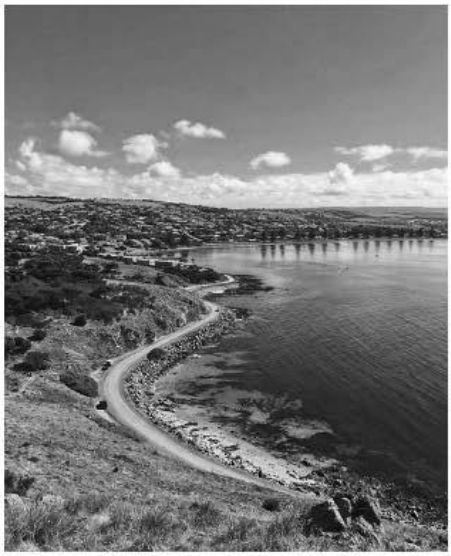
This study is designed to improve our understanding of local government stakeholders' perceptions regarding sea level rise, vulnerability to coastal hazards, and coastal adaptation strategies. Given your role as Mayor of a coastal council in South Australia, you are invited to participate. Survey questions will explore your views regarding climate change and sea level rise, as well as your council's role and progress toward adaptation planning. The survey comprises five parts and should take approximately 20 minutes to complete. Your identity will remain anonymous as your answers cannot be linked back to you.

Your involvement will help to contribute to a broad picture about how South Australian local government is responding to threats associated with a changing climate. It will provide some insight into the readiness of local government to respond to coastal hazards, and help identify whether, and what kind of, support is needed to develop and implement coastal adaptation plans and strategies.

This research is part of a study being undertaken at Flinders University, South Australia. If you have any questions or comments about the study, please do not hesitate to contact:

Dr Nicole Pelton
Email: nicole.pelton@flinders.edu.au
Telephone: 0435 168 248

1



2

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council Mayors in South Australia

Part One - Perceptions on Climate Change and Sea Level Rise

The following questions seek your views about climate change, and sea level rise in particular.

1. Please indicate the extent to which you agree or disagree with each of the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
The environment is a major concern for me	○	○	○	○	○
The coastal area under the care and control of my council is in good health	○	○	○	○	○
I am concerned about our climate changing	○	○	○	○	○
The likelihood that sea level will rise in South Australia has been greatly exaggerated	○	○	○	○	○
Today's climate is being affected by human activities	○	○	○	○	○
Future climate will be affected by human activities	○	○	○	○	○
Climate change is natural, therefore we should not worry about it	○	○	○	○	○
I am concerned about sea level rise	○	○	○	○	○
I have a good understanding about the concept of sea level rise	○	○	○	○	○
I have a good understanding about the causes of sea level rise	○	○	○	○	○
I have a good understanding of future sea level rise predictions for my region	○	○	○	○	○

4

2. In your opinion, do you think the following people within your council generally share your views about climate change?

	Never	Rarely	Sometimes	Always	Often
Other Councillors	○	○	○	○	○

Comments

Council staff ○ ○ ○ ○ ○

Comments

Community living in the council area ○ ○ ○ ○ ○

Comments

3. In 50 years, do you think the sea level will be higher, lower, or the same as today?

- ○ No change
- ○ lower
- ○ much lower
- ○ higher
- ○ much higher
- ○ Don't know
- ○ Other (please specify)

5

4. What do you think will be the main cause(s) of long-term changes to sea level for South Australia? (Please check all that apply)

- [ ] Subsidence of land
- [ ] Ocean temperature increase
- [ ] Extreme storm events
- [ ] Other natural phenomena
- [ ] Glaciers melting
- [ ] Irrelevant as the sea level is not changing
- [ ] Don't know
- [ ] Other (please specify)

5. Please select the time frame in which you believe sea level rise may start to be a problem: for your house, for council's coastal residents and infrastructure, and for South Australians more broadly.

	It is already a problem	1-10 years	11-20 years	21-30 years	31-40 years	41-50 years	More than 50 years	It won't be a problem
My house	○	○	○	○	○	○	○	○
Seaside residents and infrastructure	○	○	○	○	○	○	○	○
South Australia	○	○	○	○	○	○	○	○

Comments

6. In your personal opinion, to what extent do you agree or disagree with each of the following statements about preparing for changes in sea level:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
Sea level rise is too slow to bother preparing for	○	○	○	○	○
Sea level rise is unlikely to affect council's coastal region in the future	○	○	○	○	○
Preparing for sea level rise is too costly for council	○	○	○	○	○

6

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
Preparing for sea level rise is inconvenient for council	○	○	○	○	○
It is too difficult for council to prepare for sea level rise	○	○	○	○	○
Preparing for sea level rise now will help to prevent damage to homes and infrastructure in the council's coastal region in the future	○	○	○	○	○
I do not know how council can prepare for a rise in sea level	○	○	○	○	○
I feel council is responsible for preparing for sea level rise	○	○	○	○	○
It is the responsibility of state government agencies to prepare the community for sea level rise	○	○	○	○	○
It is the responsibility of federal government agencies to prepare the community for sea level rise	○	○	○	○	○

Comments

7

7. In your opinion, do you think the following people in your council generally share your views about preparing for changes in sea level?

	Never	Rarely	Sometimes	Often	Always
Other Councillors	○	○	○	○	○

Comments

Council staff ○ ○ ○ ○ ○

Comments

Community living in the council area ○ ○ ○ ○ ○

Comments

8

9. In general, how strongly do you support the following adaptation approaches to protect council and community assets and infrastructure from the sea?

	Strongly Oppose	Somewhat Oppose	Neutral	Somewhat Favour	Strongly Favour
New developments of private and public infrastructure and assets should not be permitted in areas likely to be affected by sea level rise and associated hazards	○	○	○	○	○
Building heights for new or replacement dwellings should be raised to ensure that flood risk is reduced	○	○	○	○	○
More resilient and adaptive building types should be enforced	○	○	○	○	○
Rebuilding of damaged structures in defined retreat areas should be limited, e.g. planning scheme prevents rebuilding after extreme events	○	○	○	○	○
Existing development in areas vulnerable to coastal hazards should be relocated	○	○	○	○	○
Urban development should be consolidated by favouring infill and redevelopment of existing urban areas to minimise urban sprawl into highly vulnerable coastal areas	○	○	○	○	○
Sea walls should be constructed to prevent beachfront infrastructure from being undermined and lost through excessive beach erosion	○	○	○	○	○
Existing sea walls or breakwaters should be improved to better cope with impacts of rising sea levels	○	○	○	○	○

10

	Strongly Oppose	Somewhat Oppose	Neutral	Somewhat Favour	Strongly Favour
Groynes should be constructed to interrupt wave-driven longshore sediment transport to reduce erosion and/or accretion	○	○	○	○	○
Submerged artificial reefs should be constructed to reduce wave energy and therefore wave erosion of shorelines	○	○	○	○	○
Beaches should be actively replenished with sand to maintain beach width and reduce landward erosion	○	○	○	○	○
Coastal dunes should be revegetated to increase stability of dunes and combat sea level rise, storm surge and associated erosion	○	○	○	○	○
Construction of hard shoreline defences should be limited, prohibited or delayed	○	○	○	○	○
Structures such as levees should be removed to allow landward migration of coastal habitat	○	○	○	○	○
Larger setback buffers should be implemented in infrastructure and development planning regulation to allow landward migration of coastal habitat	○	○	○	○	○

Comments

11

10. In your opinion, how likely is it that the following people would agree with you regarding the types of coastal adaptation responses described above?

	Never	Rarely	Sometimes	Often	Always
Your family	○	○	○	○	○
Comments					
Your friends	○	○	○	○	○
Comments					
Community living in council area	○	○	○	○	○
Comments					
Council staff	○	○	○	○	○
Comments					
Other Councillors	○	○	○	○	○
Comments					
Coast Protection Board	○	○	○	○	○
Comments					
State government MPs	○	○	○	○	○
Comments					

12

11. If the council decided not to protect a strip of threatened coastal foreshore properties, what in your opinion would be the most preferred option?

- ◯ The property owners should abandon their asset without compensation
- ◯ The council should be purchasing land parcels to be made available to property owners abandoning their asset
- ◯ The state government should buy property owners out under a 'compulsory acquisition' strategy
- ◯ Land owners should be encouraged to relocate structures through various measures, e.g. tax benefits, voluntary surrender, land-swaps or conservation easement schemes
- ◯ Other (please specify)

12. In the event that a strip of coastal properties in the council required the protection of a sea wall, who do you think should cover the cost of that sea wall?

- ◯ The affected property owners
- ◯ Council
- ◯ South Australian government
- ◯ Federal government
- ◯ The cost should be shared between the affected property owners and the council
- ◯ The cost should be shared between the council and the state government
- ◯ Other (please specify)

13. Do you think the public should be actively involved in deciding what should be done to safeguard against the potential impact of sea level rise? (Select the statement that best suits your position)

- ◯ The public should be consulted and actively involved
- ◯ The public should not be actively involved but should be consulted
- ◯ The public does not need to be consulted or involved
- ◯ Irrelevant as sea level rise won't be a problem for council's coastal region
- ◯ No opinion

Comments

13

14

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council Mayors in South Australia

Part Three - Perceptions on Council Preparedness and Capacity for Coastal Adaptation

The next set of questions ask your opinion on various aspects of council preparedness and capacity for coastal adaptation.

14. How satisfied are you with the development and implementation of your council's coastal adaptation strategy? Please provide your reasoning.

Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
◯	◯	◯	◯	◯

Please provide a reason for your choice.

15. How satisfied are you with your council's approach to coastal hazard risk assessment? Please provide your reasoning.

Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
◯	◯	◯	◯	◯

Please provide a reason for your choice.

16. How would you rate your understanding of council's legal liability with respect to coastal hazards associated with sea level rise?

Poor	Below Average	Neutral	Good	Excellent
◯	◯	◯	◯	◯

Comments

17. In your opinion, has council made poor decisions regarding development in areas vulnerable to sea level rise within the coastal zone?

- ◯ No, as sea level rise does not pose a threat to this council
- ◯ No, as council is acting in accordance with state government planning regulations
- ◯ Yes, occasionally poor decisions have been made
- ◯ Yes, council often makes poor decisions regarding development in areas vulnerable to sea level rise
- ◯ Other (please specify)

18. In your opinion, should planning controls for development in areas vulnerable to sea level rise be more strict? Please provide reasoning for your answer.

- ◯ Yes
- ◯ No
- ◯ Don't know

Please provide reasoning for your answer.

19. Which level of government should be responsible for approving coastal development in areas vulnerable to coastal hazards? Please provide reasoning for your answer.

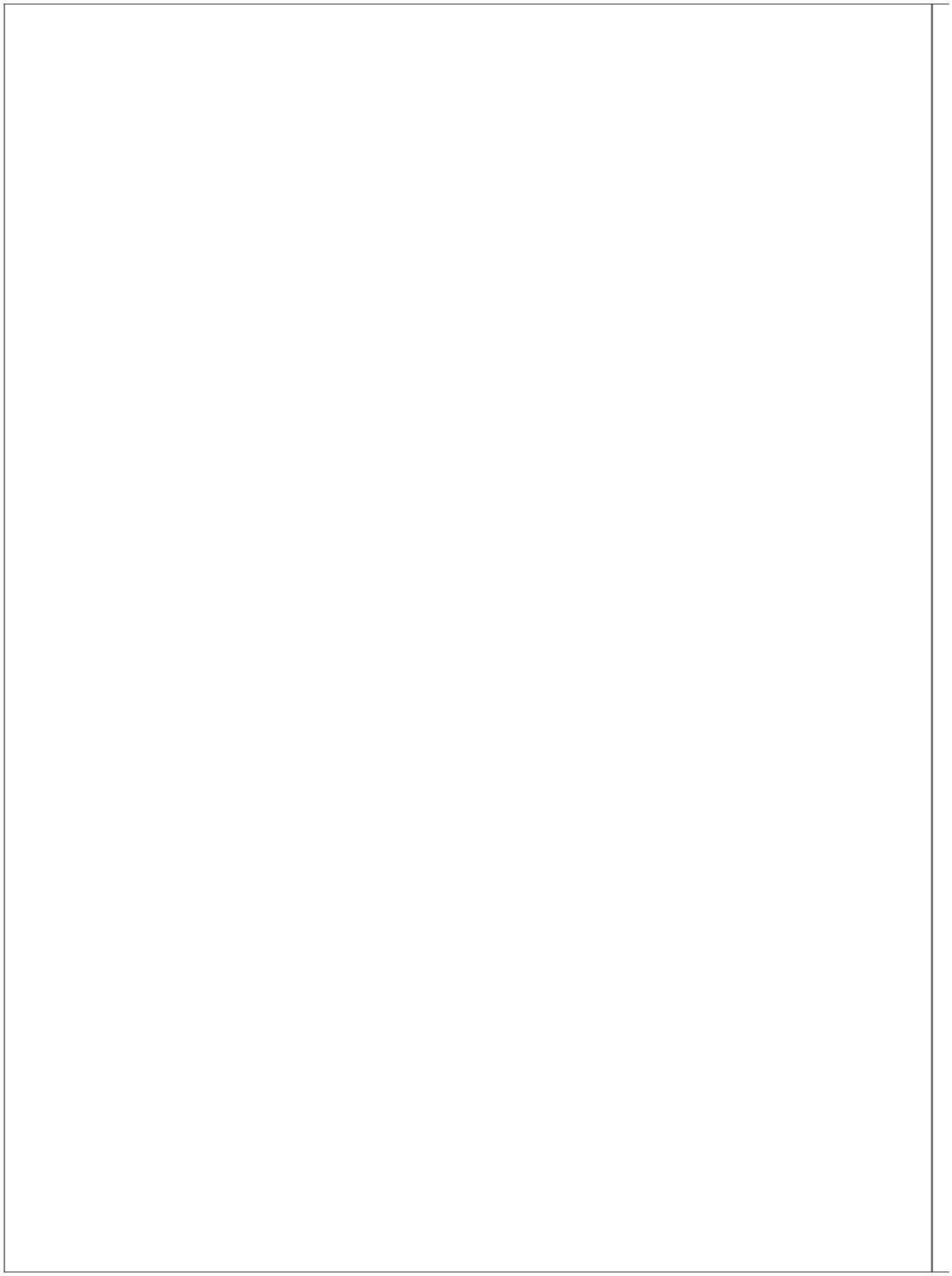
- ◯ Local government
- ◯ State government
- ◯ Other
- ◯ Don't know

Please provide reasoning for your answer.

20. At present, what do you perceive to be ***council's strengths that will enable adaptation*** to the increased threat of coastal hazards associated with sea level rise?

21. What do you perceive to be the most significant ***challenge(s) council is currently facing that may hinder or prevent adaptation*** to the increased threat of coastal hazards associated with sea level rise?

17



18

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council Mayors in South Australia

Part Four - Intentions Towards Coastal Adaptation

This section explores your intentions with regard to gathering and acting on information about sea level rise and climate change adaptation.

22. Please rank how likely or unlikely it is that you will take the following actions in the next six months?

	Very Unlikely	Unlikely	Neutral	Likely	Very Likely
Improve your knowledge of sea level rise predictions for the council area	○	○	○	○	○
Seek information on various coastal adaptation options to respond to sea level rise and associated hazards in the council area	○	○	○	○	○
Advocate for council to undertake a coastal hazard risk assessment	○	○	○	○	○
Advocate for council to adopt a coastal adaptation strategy	○	○	○	○	○

Comments

19

23. From what source would you seek information about the above? e.g. where/what/who would you consider to be an authoritative source of information about sea level rise and associated hazards, and adaptation options? Please provide your reasoning.

20

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council Mayors in South Australia

Part Five - About You

This last section seeks some characteristics about you, the person completing this survey. Anonymity is assured.

24. By what gender do you identify?

- ◯ Male
- ◯ Female
- ◯ Other

25. Please select your age category from the list below:

- ◯ 18 to 24
- ◯ 25 to 34
- ◯ 35 to 44
- ◯ 45 to 54
- ◯ 55 to 64
- ◯ 65 to 74
- ◯ 75 or older

26. Please select from the list below the highest level of education you have attained:

- ◯ Completed primary school
- ◯ Completed secondary to Year 10
- ◯ Completed secondary to Year 11
- ◯ Completed secondary to Year 12
- ◯ Completed vocational/technical course
- ◯ Completed undergraduate university course
- ◯ Completed postgraduate university course
- ◯ Other (please specify)

27. Please select the council region from the list below:

- ◯ Metropolitan North (Playford, Salisbury, Port Adelaide Enfield)
- ◯ Central Metropolitan (Charles Sturt, West Torrens)
- ◯ Metropolitan South (Holdfast Bay, Marion, Onkaparinga)
- ◯ Northern Gulf St Vincent (Adelaide Plains, Wakefield)
- ◯ West Coast (Ceduna, Elliston, Streaky Bay)
- ◯ Eyre Peninsula (Franklin Harbour, Cleve, Tumby Bay, Port Lincoln, Lower Eyre Peninsula)
- ◯ Northern Spencer Gulf (Whyalla, Port Pirie, Mt Remarkable, Port Augusta)
- ◯ Yorke Peninsula (Barunga West, Copper Coast, Yorke Peninsula)
- ◯ Fleurieu and KI (Yankalilla, Victor Harbor, Alexandrina, Kangaroo Island)
- ◯ South East (The Coorong, Kingston, Robe, Wattle Range, Grant)

28. How long have you been an elected member of this coastal council? (Add up total years disregarding any gaps)

- ◯ Less than 1 year
- ◯ 1-3 years
- ◯ 4-6 years
- ◯ 7-10 years
- ◯ 11-20 years
- ◯ Over 20 years

Other (please specify)

29. In total, how long have you lived in this council area? (Disregard any periods living elsewhere)

- ◯ Less than 1 year
- ◯ 1-3 years
- ◯ 4-6 years
- ◯ 7-10 years
- ◯ 11-20 years
- ◯ Over 20 years

Other (please specify)

30. Do you own a house located less than approximately 1 km from the coastline in South Australia? (Select all that apply)

- ☐ Yes, my main residence in this council area
- ☐ Yes, my holiday home in this council area
- ☐ Yes, my main residence in another council area
- ☐ Yes, my holiday home in another council area
- ☐ No

Other (please specify)

31. Using the comment box below, please make any additional comments you feel are important with regard to this topic.

Thank you very much for completing this survey.

Appendix 6 – Survey instrument (Questionnaire) for Council Employees

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council staff in South Australia

Thank you for taking the time to assist with this survey

This study is designed to improve our understanding of local government stakeholders' perceptions regarding sea level rise, vulnerability to coastal hazards, and coastal adaptation strategies. Given your employment within a coastal council in South Australia, you have been invited to participate. Survey questions will explore your views regarding climate change and sea level rise, as well as the role and progress toward adaptation planning of the council you are employed by. The survey comprises five parts and should take approximately 20 minutes to complete. Your identity will remain anonymous as your answers cannot be linked back to you.

Your involvement will help to contribute to a broad picture about how South Australian local government is responding to threats associated with a changing climate. It will provide some insight into the readiness of local government to respond to coastal hazards, and help identify whether, and what kind of, support is needed to develop and implement coastal adaptation plans and strategies.

This research is part of a study being undertaken at Flinders University, South Australia. If you have any questions or comments about the study, please do not hesitate to contact:

Dr Nicole Pelton
Email: nicole.pelton@flinders.edu.au
Telephone: 0435 168 248

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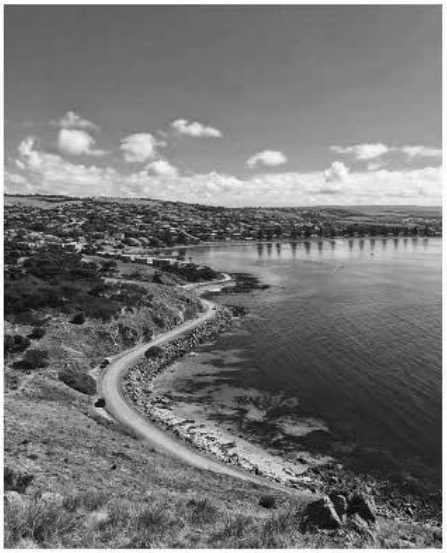


2

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council staff in South Australia

Part One - Perceptions on Climate Change and Sea Level Rise

The following questions seek your views about climate change, and sea level rise in particular.

2. In your opinion, do you think the following people within your council of employment generally share your views about climate change?

	Never	Rarely	Sometimes	Always	Often
Mayor	◯	◯	◯	◯	◯

Comments

Councillors ◯ ◯ ◯ ◯ ◯

Comments

Other council staff ◯ ◯ ◯ ◯ ◯

Comments

Community living in the council area ◯ ◯ ◯ ◯ ◯

Comments

3. In 50 years, do you think the sea level will be higher, lower, or the same as today?

- ◯ No change
- ◯ lower
- ◯ much lower
- ◯ higher
- ◯ much higher
- ◯ Don't know
- ◯ Other (please specify)

5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
Preparing for sea level rise is too costly for council	○	○	○	○	○
Preparing for sea level rise is inconvenient for council	○	○	○	○	○
It is too difficult for council to prepare for sea level rise	○	○	○	○	○
Preparing for sea level rise now will help to prevent damage to homes and infrastructure in the council's coastal region in the future	○	○	○	○	○
I do not know how council can prepare for a rise in sea level	○	○	○	○	○
I feel council is responsible for preparing for sea level rise	○	○	○	○	○
It is the responsibility of state government agencies to prepare the community for sea level rise	○	○	○	○	○
It is the responsibility of federal government agencies to prepare the community for sea level rise	○	○	○	○	○

Comments

7

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council staff in South Australia

Part Two - Perceptions on Coastal Adaptation Options

The following questions explore your thoughts about options for adapting to the impacts of climate change in the coastal zone.

8. Please rate your level of support for the following broad categories of adaptation responses to increased risk in the coastal zone due to sea level rise:

	Strongly oppose	Somewhat oppose	Neutral	Somewhat favour	Strongly favour
Avoid: Identify future 'no-build areas' and use planning tools to prevent new development in areas at risk now or in future.	○	○	○	○	○
Accommodate: Continue to use coastal land but accommodate changes by adopting more resilient and adaptive building types, e.g. buildings with piled construction that can be raised above future flood levels.	○	○	○	○	○
Protect: Use hard structures (e.g. sea walls) or soft solutions (e.g. dunes and vegetation) to protect land from the sea.	○	○	○	○	○
Retreat: Withdraw, relocate or abandon assets that are at risk; ecosystems are allowed to retreat landward as sea levels rise.	○	○	○	○	○

Comments

9

9. In general, how strongly do you support the following adaptation approaches to protect council and community assets and infrastructure from the sea?

	Strongly Oppose	Somewhat Oppose	Neutral	Somewhat Favour	Strongly Favour
New developments of private and public infrastructure and assets should not be permitted in areas likely to be affected by sea level rise and associated hazards	○	○	○	○	○
Building heights for new or replacement dwellings should be raised to ensure that flood risk is reduced	○	○	○	○	○
More resilient and adaptive building types should be enforced	○	○	○	○	○
Rebuilding of damaged structures in defined retreat areas should be limited, e.g. planning scheme prevents rebuilding after extreme events	○	○	○	○	○
Existing development in areas vulnerable to coastal hazards should be relocated	○	○	○	○	○
Urban development should be consolidated by favouring infill and redevelopment of existing urban areas to minimise urban sprawl into highly vulnerable coastal areas	○	○	○	○	○
Sea walls should be constructed to prevent beachfront infrastructure from being undermined and lost through excessive beach erosion	○	○	○	○	○
Existing sea walls or breakwaters should be improved to better cope with impacts of rising sea levels	○	○	○	○	○

10

	Strongly Oppose	Somewhat Oppose	Neutral	Somewhat Favour	Strongly Favour
Groynes should be constructed to interrupt wave-driven longshore sediment transport to reduce erosion and/or accretion	○	○	○	○	○
Submerged artificial reefs should be constructed to reduce wave energy and therefore wave erosion of shorelines	○	○	○	○	○
Beaches should be actively replenished with sand to maintain beach width and reduce landward erosion	○	○	○	○	○
Coastal dunes should be revegetated to increase stability of dunes and combat sea level rise, storm surge and associated erosion	○	○	○	○	○
Construction of hard shoreline defences should be limited, prohibited or delayed	○	○	○	○	○
Structures such as levees should be removed to allow landward migration of coastal habitat	○	○	○	○	○
Larger setback buffers should be implemented in infrastructure and development planning regulation to allow landward migration of coastal habitat	○	○	○	○	○

Comments

11

	Never	Rarely	Sometimes	Often	Always
State government MPs	◯	◯	◯	◯	◯

Comments

11. If the council decided not to protect a strip of threatened coastal foreshore properties, what in your opinion would be the most preferred option?

- ◯ The property owners should abandon their asset without compensation
- ◯ The council should be purchasing land parcels to be made available to property owners abandoning their asset
- ◯ The state government should buy property owners out under a 'compulsory acquisition' strategy
- ◯ Land owners should be encouraged to relocate structures through various measures, e.g. tax benefits, voluntary surrender, land-swaps or conservation easement schemes
- ◯ Other (please specify)

12. In the event that a strip of coastal properties in the council required the protection of a sea wall, who do you think should cover the cost of that sea wall?

- ◯ The affected property owners
- ◯ Council
- ◯ South Australian government
- ◯ Federal government
- ◯ The cost should be shared between the affected property owners and the council
- ◯ The cost should be shared between the council and the state government
- ◯ Other (please specify)

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council staff in South Australia

Part Three - Perceptions on Council Preparedness and Capacity for Coastal Adaptation

The next set of questions ask your opinion on various aspects of council preparedness and capacity for coastal adaptation.

14. How satisfied are you with the development and implementation of the coastal adaptation strategy by the council you work for? Please provide your reasoning.

Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
○	○	○	○	○

Please provide a reason for your choice.

15. How satisfied are you with the approach to coastal hazard risk assessment by the council you work for? Please provide your reasoning.

Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
○	○	○	○	○

Please provide a reason for your choice.

16. How would you rate your understanding of council's legal liability with respect to coastal hazards associated with sea level rise?

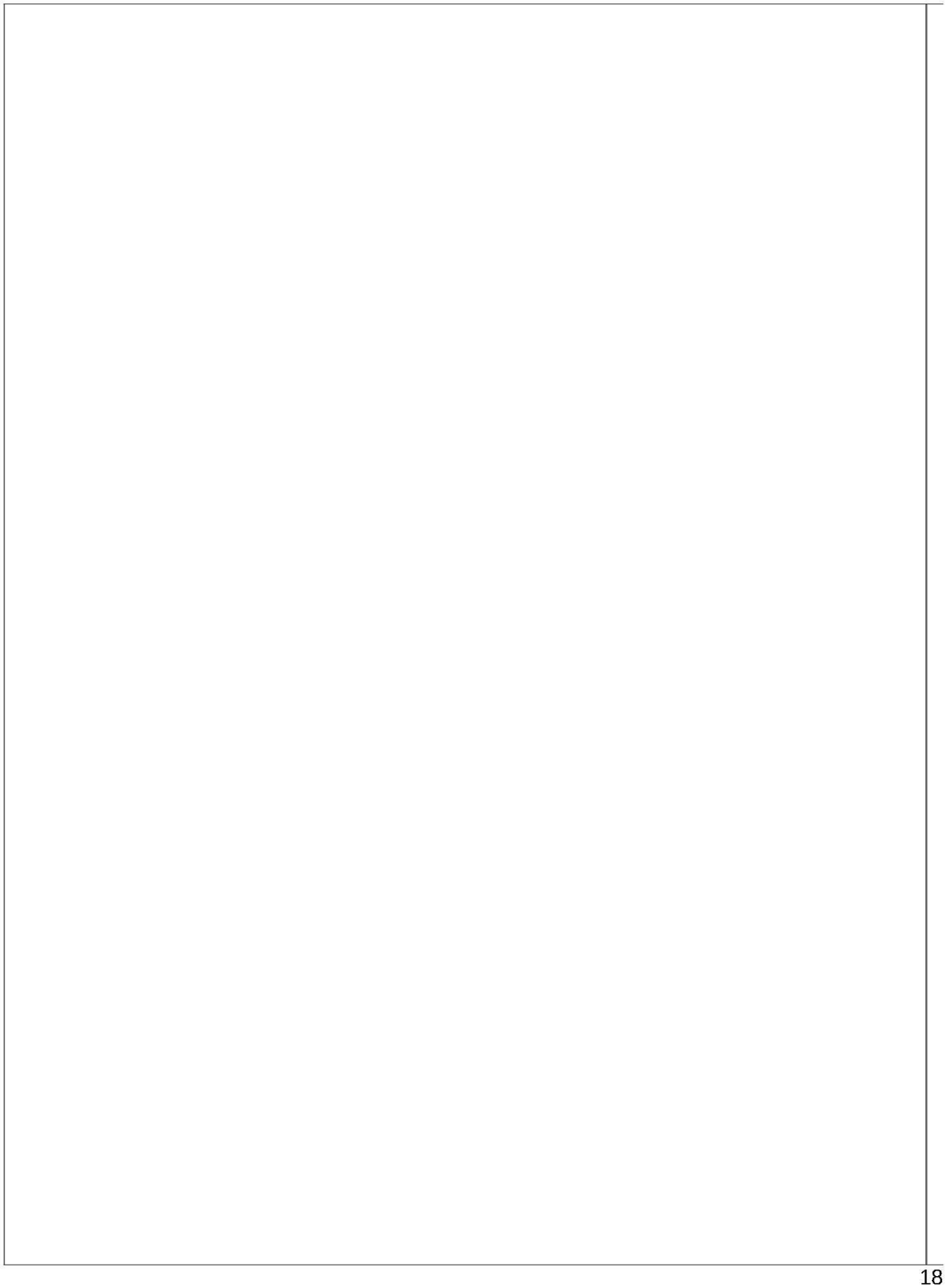
Poor	Below Average	Neutral	Good	Excellent
○	○	○	○	○

Comments

20. At present, what do you perceive to be ***council's strengths that will enable adaptation*** to the increased threat of coastal hazards associated with sea level rise?

21. What do you perceive to be the most significant ***challenge(s) council is currently facing that may hinder or prevent adaptation*** to the increased threat of coastal hazards associated with sea level rise?

17



18

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council staff in South Australia

Part Four - Intentions Towards Coastal Adaptation

This section explores your intentions with regard to gathering and acting on information about sea level rise and climate change adaptation.

22. Please rank how likely or unlikely it is that you will take the following actions in the next six months?

	Very Unlikely	Unlikely	Neutral	Likely	Very Likely
Improve your knowledge of sea level rise predictions for the council area	○	○	○	○	○
Seek information on various coastal adaptation options to respond to sea level rise and associated hazards in the council area	○	○	○	○	○
Advocate for council to undertake a coastal hazard risk assessment	○	○	○	○	○
Advocate for council to adopt a coastal adaptation strategy	○	○	○	○	○

Comments

19

23. From what source would you seek information about the above? e.g. where/what/who would you consider to be an authoritative source of information about sea level rise and associated hazards, and adaptation options? Please provide your reasoning.

20

Understanding perceptions of vulnerability and adaptation to sea level rise: Survey of coastal council staff in South Australia

Part Five - About You

This last section seeks some characteristics about you, the person completing this survey. Anonymity is assured.

24. By what gender do you identify?

- ◯ Male
- ◯ Female
- ◯ Other

25. Please select your age category from the list below:

- ◯ 18 to 24
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- ◯ 45 to 54
- ◯ 55 to 64
- ◯ 65 to 74
- ◯ 75 or older

26. Please select from the list below the highest level of education you have attained:

- ◯ Completed primary school
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- ◯ Completed secondary to Year 12
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- ◯ Completed postgraduate university course
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27. Please select the council region from the list below:

- ◯ Metropolitan North (Playford, Salisbury, Port Adelaide Enfield)
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- ◯ Northern Spencer Gulf (Whyalla, Port Pirie, Mt Remarkable, Port Augusta)
- ◯ Yorke Peninsula (Barunga West, Copper Coast, Yorke Peninsula)
- ◯ Fleurieu and KI (Yankalilla, Victor Harbor, Alexandrina, Kangaroo Island)
- ◯ South East (The Coorong, Kingston, Robe, Wattle Range, Grant)

28. With respect to your role at council, please select your area(s) of expertise: (Select all that apply)

- [ ] CEO
- [ ] Senior Management
- [ ] Middle management
- [ ] On-ground staff
- [ ] Planning/Development
- [ ] Engineering/Works
- [ ] Assets/Infrastructure
- [ ] Policy/Strategy
- [ ] Environment
- [ ] Coast/Estuarine/Marine
- [ ] Other (please specify)

29. How long have you worked for this coastal council? (If multiple roles, add up total years and disregard any periods elsewhere)

- ◯ Less than 1 year
- ◯ 1-3 years
- ◯ 4-6 years
- ◯ 7-10 years
- ◯ 11-20 years
- ◯ Over 20 years

Other (please specify)

30. In total, how long have you lived in this council area? (Disregard any periods living elsewhere)

- ◯ I do not reside in the council area I work in
- ◯ Less than 1 year
- ◯ 1-3 years
- ◯ 4-6 years
- ◯ 7-10 years
- ◯ 11-20 years
- ◯ Over 20 years

Other (please specify)

31. Do you own a house located less than approximately 1 km from the coastline in South Australia? (Select all that apply)

- ☐ Yes, my main residence in this council area
- ☐ Yes, my holiday home in this council area
- ☐ Yes, my main residence in another council area
- ☐ Yes, my holiday home in another council area
- ☐ No

Other (please specify)

32. Using the comment box below, please make any additional comments you feel are important with regard to this topic.

Thank you very much for completing this survey.

25