

Lake Macquarie
City Council

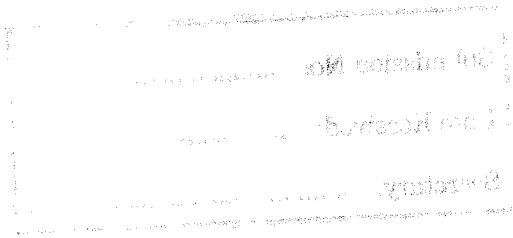
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Submission by Lake Macquarie City Council

Inquiry into climate change and environmental impacts on Australian coastal communities

The House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts

28 May 2008



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1. Summary

Climate change is expected to have significant impacts on the coastal and estuarine areas of Lake Macquarie City. Like many other highly-populated coastal cities the area is particularly vulnerable to sea level rise and problems from intensification of resource such as water scarcity, land clearing, waste disposal and loss of natural habitats. Unsustainable land use, lifestyles, and increasing associated human pressures undermine the natural regenerative ability of the coastal ecosystem to absorb human-induced climate change impacts.

Council is addressing both mitigation and adaptation aspects of climate change through establishing a 3% reduction in greenhouse gas emissions per year and implementing programs in environmental security, ecosystem enhancement, and sustainable living.

Council's submission outlines current initiatives being implemented in the City, and the region, involving Council in partnership with the Lake Macquarie community and specific government and non-government stakeholders.

This submission outlines eight detailed recommendations in the section on mechanisms to promote sustainable local and regional coastal communities (refer to section 6). Further recommendations are included throughout the submission and include:

- The need for rigorous analyses, particularly quantitative in nature, to enhance our understanding of the vulnerability of coastal communities to climate change related risks. Council is beginning to undertake such studies and reviews but does not have the resources to complete comprehensive analyses.
- The need for National policy or standards with consistent State Government policies would greatly assist Local Government;
- The need for funding structures less closely aligned with the current Catchment Action Planning process which does not necessarily align with or reflect specific coastal management needs, making it difficult to access these potential funds.
- Additional Federal Government support would assist Local Government to effectively implement sustainable waste management initiatives designed to minimise waste to landfill and maximise resource recovery (see section 6).
- The need for Commonwealth assistance and support to assess and manage Key Threatening Processes and impacts exacerbated by climate change and identified in Lake Macquarie City Council's State of Environment report.

Finally; the City, and indeed the nation, continues to exhibit consumption patterns that are above the global average and utilise a disproportionately high amount of natural capital that is unsustainable (Global Footprint Network, www.footprintnetwork.org). These practices show little sign of abatement and are the major drivers of global warming and associated climate change. Clearly, strong incentives and leadership will be required to bring about the necessary footprint reduction (mitigation) and adaptation measures required.

Lake Macquarie City Council is pleased to submit the following response regarding impacts of climate change on coastal communities to the House of Representatives.

2. Background

Lake Macquarie City is located just south of Newcastle approximately 150 kilometres north of Sydney. The local government area is 748.7 square kilometres and contains Australia's largest saltwater coastal lake of 110 square kilometres. The Lake has an area and volume twice that of Sydney Harbour and 174 kilometres of foreshore. The City contains 28 kilometres of coastline stretching from Catherine Hill Bay in the south to Glenrock State Conservation Area in the north.

It has a wide range of shorelines including rocky headlands, bluffs, sandy beaches, rock platforms, and coastal lagoons.

The City has a current resident population estimated at 193,092 (30 June 2007) and a growth rate of 0.6% per year. The State Government's Lower Hunter Regional Strategy 2006 promotes an additional 36,000 dwellings in Lake Macquarie City over the next 25 years.

Climate change is expected to have significant impacts on the natural ecosystems and human communities in Lake Macquarie City, particularly because of its low-lying topography and because of water exchange between Lake Macquarie and the ocean. Problems include those recently identified in a Sydney Coastal Councils Group report (Feb 2008, available from: <http://www.sydneycoastalcouncils.com.au/index.htm>) such as "water scarcity, more frequent and intense storms and bushfires, sea level rise, coastal zone erosion and inundation, the spread of disease and pressure to infrastructure".

Residents of Lake Macquarie are accustomed to a typical Australian lifestyle, exhibiting consumption patterns that are above the global average and utilise a disproportionately high amount of natural capital that is unsustainable (Global Footprint Network, www.footprintnetwork.org). These practices show little sign of abatement and are the major drivers of global warming and associated climate change.

3. Existing policies and programs related to coastal zone management, taking in the catchment-coast-ocean continuum

3.1 Local Policies and Programs

Lake Macquarie City Council has been proactive in management of the Coastal Zone, being one of the first Local Government Areas to prepare and implement a Coastline Management Study and Coastline Management Plan as well as an Estuary Management Study and Estuary Management Plan. These were prepared in accordance with the NSW State Government's Estuary and Coastal Management Manuals and with financial assistance from the State Government. Other relevant planning documents that Council has prepared include a Stormwater Management Plan and a Catchment Management Strategy for Jewells Wetland Catchment. Full implementation of these Plans has proven difficult due to lack of resources and funding.

An overall landuse strategy for the City, 'Lifestyle 2020', was developed in 2000 and the Lake Macquarie Local Environmental Plan 2004 was derived from this. A development control plan (DCP No.1) followed and was implemented in 2004. These documents address climate change related impacts on coastal communities through their endeavours to manage land use within the City, including:

- managed urban growth to improve the sustainability of existing urban centres
- urban development that supports public transport and minimises private transport
- conservation zones over much of the City's coastline, foreshore and natural areas (including areas of high biodiversity value such as wetland vegetation communities)
- planning for coastal recession over a 100 year planning period.

Whilst these documents lack specific objectives targeting climate change, they effectively reduce urban sprawl and development of bushland sites, increase accessibility, and decrease private vehicle use, consistent with initiatives to reduce drivers of climate change. Accordingly, they implement strategies that reduce contributions to climate change through promotion of liveability and sustainability.

Lake Macquarie City Council has been proactive in addressing the issue of sea level rise. In May 2008, Council resolved to publicly exhibit a proposal to adopt a predicted sea level rise figure for the year 2100 of 0.91 metres. This figure corresponds with the NSW Department of Environment and Climate Change projected upper sea level rise figure. It will provide the basis for Council's preparedness for sea level rise in order to assist Council staff to proceed with risk assessment, policy development, planning, and development decisions. The Council report contains eight recommendations addressing planning and preparatory strategies to manage sea level rise, flooding, and climate change adaptation. A fact sheet providing further background information is available

([http://www.lakemac.com.au/downloads/Fact%20Sheet%20Sea%20Level%20Rise%20 2 .pdf](http://www.lakemac.com.au/downloads/Fact%20Sheet%20Sea%20Level%20Rise%202008.pdf))

Following recent developments in climate change science, measurements and understanding of threats both to and from the environment, a number of Council's plans now warrant review in order to strengthen their focus on climate change effects. This includes investigation of increasing climate change risks to the City's population and ecosystems (adaptation) as well as investigations of urban development and human activities that exacerbate the climate change phenomenon and mitigating strategies. Rigorous analyses, particularly quantitative in nature, are required in order to enhance our understanding of the vulnerability of coastal communities to climate change related risks. Council is beginning to undertake such studies and reviews but does not have the resources to complete comprehensive analyses.

Council has recently restructured its Environmental Systems department to analyse, develop and implement programs that tackle sustainable development issues, particularly with regard to climate change. Strategies will act on three fronts: Environmental Security (focusing on climate change adaptation, natural disasters, and environmental health), Ecosystem Enhancement (terrestrial and aquatic environments), and Sustainable Living (climate change mitigation). An Environmental Risk team has been set up to attempt to quantify risks to and from the environment and to prioritise actions, preferably operating in a proactive manner.

In line with findings of the UK government 2006 Stern Report into Climate Change (http://www.hm-treasury.gov.uk/media/4/3/Executive_Summary.pdf) Lake Macquarie City Council feels strongly that urgent efforts are required to minimise inevitable climate change effects through emissions reductions and behaviour changes, despite time lags in observable benefits. Accordingly, Lake Macquarie City Council has set a target of 3% carbon emissions reductions per year for the next 30 years.

Lake Macquarie City Council has recognised the importance of inclusivity in tackling climate change – essentially a problem created by, and affecting, all members of society and human activity locally and globally. Future programmes therefore will give weight to community empowerment initiatives and focus on partnering with key stakeholders from a range of sectors including business, industry, NGOs, community groups, academic institutions and other government agencies. Council currently runs a number of community awareness programmes and workshops to encourage sustainable living, including CLAMS (Communities Learning About Marine Shores), Estuary Watch (foreshore and estuary monitoring), WaterWatch and workshops in home improvements such as installing water tanks, solar passive design, organic and native gardening and chemical-free cleaning. Funding for these programs is sourced from a combination of very limited operational budget and grant funds.

3.2 Regional Policies and Programs

At a regional level, federal funding filters down to Local Government through the Hunter Central-Rivers Catchment Management Authority and catchment action planning process. The Hunter Central-Rivers Catchment Action Plan does not necessarily align with or reflect specific coastal management needs, making it difficult to access these potential funds.

Council is currently participating in a Hunter Central Rivers Regional Environment Management Strategy Climate Change project. The project focuses on developing partnerships and case studies with industry and, through consultation, identifying the nature and format of information needed by stakeholders in risk assessment and adaptation planning.

3.3 State policies and Programs

At a State level, Lake Macquarie Council was active in formally requesting, on 28 October 1998, to be included in the NSW 1997 Coastal Policy, in support of State coastal management initiatives. Some seven years later the State Government included the City in the NSW 1997 Coastal Policy and State Environmental Planning Policy No 71 – Coastal Protection, on 18 November 2005.

Council is an active member of the NSW Local Government and Shires Association reference group developing a Climate Change Action Pack and other capacity building activities (details available at: <http://www.lgsa-plus.net.au/www/html/1903-climate-change-action-pack.asp>).

4. The environmental impacts of coastal population growth and mechanisms to promote sustainable use of coastal resources

Population growth focused along our coastline will result in intensification of resource use in the coastal zone including pressure for increased water provision, land clearing, waste disposal, infrastructure expansion and sewerage and effluent removal.

4.1 Impacts of land clearing

Despite planning policies that encourage sustainability, the rate of land clearing in Lake Macquarie has not yet shown signs of slowing. The rate of native vegetation clearing in Lake Macquarie City between 2001 and 2004 was 347 hectares per year. This is clearly unsustainable. Major causes of clearing include coal mining and extractive industries, urban and rural development and infrastructure expansion.

Clearing land has immediate consequences for vegetation and associated wildlife communities and is a major contributor to climate change. Development in the coastal zone also results in increasing the area of impervious surfaces resulting in increased run-off and potential for erosion and contamination of local water bodies. This degradation of the natural environment can reduce the area's economic as well as ecosystem value by undermining the environment's capacity to absorb and assimilate pollution, through negative impacts on public health, or by reducing aesthetics with consequences for tourism and recreation.

In Lake Macquarie City, there are 104 State listed threatened species and 34 Nationally listed threatened species likely to occur. There are 11 recorded State listed Endangered Ecological Communities, one Endangered Population and 26 Key Threatening Processes. Clearing associated with urban development places additional pressure on these species, communities and populations as well as exacerbating threatening processes.

Legislation governing land clearing is complex and enforcement is inherently difficult. There is a clear need to implement incentives for landowners to maintain and manage native vegetation and introduce disincentives for clearing native vegetation. Such incentives should be introduced preferably through the tax system rather than mechanisms such as biodiversity banking (see point 6 below).

Planning mechanisms to deal with sustainable use of coastal resources are addressed in this document in points 3 above (existing mechanisms) and 6 below (suggested mechanisms). It is important that any tree planting programs aimed at mitigation of climate change are also aimed at rehabilitation of biodiversity and should include indigenous species.

4.2 Impacts on wastes

Council currently provides a range of waste management services to the community including weekly residential mixed waste collections, fortnightly recycling collections, 6 month bulky and green waste collections, public place recycling as well as other services throughout the year that target certain components of the waste stream (metals, chemicals, e-waste, oils etc.). In 2006/07 Lake Macquarie's sole landfill site received 584.01 kg of waste per capita. Additionally 153.73 kg per capita of waste was diverted from landfill through our resource recovery initiatives.

Whilst Council aims to decrease rates of landfilling and increase resource recovery, clearly an increase in population growth will place existing landfill operations under strain and put pressure on Council's ability to deliver current waste management services.

Increased waste to landfill will result in more emissions from landfilled waste, most notably that of methane that has a greenhouse gas potential around 23 times that of carbon dioxide. Increased numbers of waste and recycling services and / or frequency of services will be required to accommodate the increasing population. The life expectancy of waste management infrastructure, such as the landfill site, materials recovery facility, and a proposed alternative waste treatment facility, will be shortened, requiring replacement and / or augmentation to satisfy the community's waste service needs. An increase in these services, as well as the increase in waste volume itself, will contribute to climate change and environmental impacts on the community.

Additional Federal Government support would assist Local Government to effectively implement sustainable waste management initiatives designed to minimise waste to landfill and maximise resource recovery (see point 6).

4.3 Impacts on water

Growth in population will inevitably lead to increased pressure on already scarce water resources. Water supplies, storages and infrastructure may be susceptible to extreme rainfall events. Expected greater variation in natural rainfall events may exacerbate flooding and, during dry periods, problems encountered from increasing temperatures. Increasing populations will require upgrading and more extensive sewage facilities. Water delivery systems may require upgrading and additional encasing and protection as result of sea level rise impacts necessitating action to avoid corrosion and degradation of infrastructure.

Changes in water availability will have profound effects on natural as well as human systems, with loss of certain habitats and changes in salinity affecting community survival and species distributions.

5. The impact of climate change on coastal areas and strategies to deal with climate change adaptation, particularly in response to sea level rise

Climate change impacts, outlined below, pose significant challenges for growing coastal communities:

5.1 Natural disasters including floods, wind storm events and extreme weather

We expect a higher frequency of flooding events and potentially more extensive penetration of floodwaters, exacerbated by higher sea levels (and potentially higher estuary water levels). Wind storms and extreme weather such as those experienced in the Hunter Region June 2007 storm/flood event are also likely to increase in frequency and intensity.

Council is continually working towards the primary objective of the NSW Flood Policy to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods utilising ecologically sustainable methods. Council's Floodplain Management Committee and Environmental Systems Department oversee the undertaking and completion of flood studies, floodplain management studies/plans and implementation programs for the numerous catchments which feed into Lake Macquarie waterway. To enable these, Council relies heavily on grant funding from State/Federal floodplain management/natural disaster grant programs.

Impacts on human activity include rising costs of remediation, loss of life or health, lost economic activity/livelihoods, increased property damage and potentially suppressed house prices for vulnerable properties.

Ecosystem impacts include loss of vegetation and wildlife, with reduced ecosystem resilience due to reduced recovery time for ecosystems between more frequent events and heightened intensity of storms and flooding. Flooding results in sediment transport and deposition that can smother extensive areas of estuarine habitat, seagrass beds and plant communities, leading to changes in the benthic environment. This can have potential knock-on effects for fisheries due to loss of breeding habitat essential to many coastal fish species.

It is anticipated that climate change will exacerbate a number of Key Threatening Processes identified in Lake Macquarie City Council's State of Environment reporting.

5.2 Bushfires

It is expected that a climate-change induced increase in fire regimes. A higher frequency and intensity of fires will have economic consequences through damage to property, including businesses and residences, and infrastructure. Degradation of the natural environment will have negative economic repercussions through damage to tourism and recreation.

Ecologically, changed fire regimes will generate a change in species mix in the City's more common vegetation communities favouring shrubs and species that are more fire resistant, recover quickly from fire and have a shorter time frame for setting seed. Certain vegetation communities which require low to no fire frequencies such as the rainforest and wetland communities are likely to decline. Most of these communities are already listed as endangered ecological communities. There is likely to be loss of some threatened species due to increased fire frequency and intensity.

5.3 Temperatures

Increasing ambient temperatures are expected to result in health problems, particularly for susceptible parties (young, old, sick) placing increased stress on health services. Incidences of mental health problems are also expected to rise. This can have broader consequences for society such as increased crime rates. Installation of air conditioning to combat heat stress will worsen the problem of global warming given the high energy consumption and greenhouse gas emissions from air conditioning units. Heat stress may lead to decreased productivity and performance in the workplace.

Rising ambient temperatures will result in higher likelihood of bushfires and hotter fires. Fires are therefore more likely to spread further and faster, resulting in greater economic damage to infrastructure and buildings and more extensive ecosystem damage (see above). Spread of weeds and possibly some diseases is likely to increase with the increase in temperatures and disturbance from more frequent natural hazards.

Increases in temperature and rising nutrient levels from population increase can potentially lead to increased occurrence of blue-green algae outbreaks. As well as potential health problems,

these would significantly impact on recreational activities and tourism as the natural environment degrades.

5.4 Sea Level Rise

It is anticipated that there will be a significant decline in the City's biodiversity through loss of vegetation communities that inhabit areas close to the water table or sea level. These vegetation communities (salt marshes, wetland vegetation, rainforests) are listed as endangered ecological communities and will be inundated from sea level rise. They depend on microhabitat features and there is little opportunity for them to colonise adjacent areas. With some additional funding these impacts could be quantified using the LiDAR information already provided by the State Government.

Fauna that depend on these vegetation communities as seasonal food sources will decline. Rock platform biodiversity and biomass may be significantly affected under regimes of combined higher temperatures, increased wave action and higher water levels, since many species inhabiting these areas are specialists.

As well as these vegetation communities, soft sediment shorelines and intertidal ecosystems will be especially vulnerable because as well as direct sea-level rise challenges they face additional impacts from extreme weather events. Loss of sandy beaches is expected around the 174km foreshore of Lake Macquarie as well as many coastal beaches and dune systems. Habitats supporting shore birds will be effected and/or lost. Some of our coastal shore birds are threatened and/or migratory species (covered by international agreements and the Environment Protection and Biodiversity Conservation Act 1999). They rely on coastal dunes, sand islands and salt marshes to breed. Loss of mud flats, sand spits and sandy shores due to sea level rise will have a considerable impact on coastal bird populations and fish nursery grounds.

Economic costs of sea level rise are diverse. A shift in fish breeding grounds will impact on fish and prawn production. Loss of marine nursery habitat could potentially lead to collapse in fin fish and crustacean fisheries. The recreational value of our coast for fishing, diving and beach excursions is huge. This natural coastal environment will be lost to sea level rise if there is no plan to accommodate the shift in water levels. In some areas development has taken place so close to the water's edge that there is no buffer for accommodation to occur.

According to Council's mapping in June 2007, based on LiDAR data, there would be approximately 4,700 lots inundated adjacent to the Lake Macquarie waterway foreshore in the event of a 0.91m sea level rise, as projected for 2100. Consultant Webb McKeown & Associates has indicated in a recent report that over 3,700 buildings would be inundated in the event of a 1 in 100 year flood event exacerbated by a 0.91m sea level rise for buildings located near Lake Macquarie waterways.

Council has recently resolved to publicly exhibit a proposal to adopt the figure of a 9.1m rise by 2100 as a basis for Council decisions relating to policy, planning and development. Further, Council resolved to support the application of principles in the proposal in preparations for sea level rise that include risk assessments, community awareness, and policy and development decisions. Currently Council is engaged in community consultation, liaison with relevant government agencies and discussions with adjoining councils and resultant submissions will be assessed and reported back to Council.

The NSW Department of Planning "LiDAR report" (available from the NSW Department of Planning's website at http://www.planning.nsw.gov.au/plansforaction/climatechange_mapping.asp) also mentioned significant impacts of projected sea level rise on wetlands, roads and transport systems and on sites of archaeological significance such as indigenous middens.

5.5 Ecosystem Adaptation

Council has had solid policies on native vegetation corridors since 2004 and requires development to provide native vegetation buffers to endangered ecological communities, foreshore and coastal areas. Corridors will allow mobile species to move and possibly colonise other habitats. Buffers allow some degree of migration and colonisation. The historical pattern of development of the City, however, means that in many areas buffers and native vegetation corridors do not exist or require rehabilitation. The resources to do this are limited.

Council attempts to achieve a balance between development and conservation, thereby avoiding degradation of endangered ecological communities, maintaining areas important for biodiversity and maintaining native vegetation to provide ecosystem services such as respiration of CO₂. However, justifying the retention of adequate buffers is difficult in the development negotiation process as there is inadequate data to determine buffer widths. When buffers are retained the burden of ownership and management often falls on Council.

6. Mechanisms to promote sustainable coastal communities

There is an overarching need for the Commonwealth Government to work with Local Government to address issues related to Climate Change and sustainable communities. In particular, Commonwealth funding, policies, and programs should:

1. demonstrate bold, strong leadership in addressing the causes of climate change and acting urgently to minimise our ecological and carbon footprints, including embracing radical departures from current practices that exacerbate climate change, where necessary
2. urgently promote and prioritise activities that address the cause of the problem and are not only remedial. Commonwealth support should aid the implementation of progressive local government strategies to address climate change and promote sustainability. For example, encourage and urgently prioritise:
 - greenhouse gas emission reductions
 - development of renewable energy sources
 - development of attractive public transport systems and encourage their use
 - behaviour changes through community education and empowerment
 - the retention and rehabilitation of native vegetation on private land
 - education and programmes that encourage reduced consumption of goods, particularly those with high embedded energy costs
3. allow quantitative investigations into impacts and risk management, so effective and appropriate plans for change can be developed; plan for worst case scenarios
4. assist Local Government to effectively implement sustainable waste management initiatives designed to minimise waste to landfill and maximise resource recovery (see point 4.2). Particular support is required in implementing:
 - regulated extended producer responsibility (EPR) for targeted waste types including plastic bags, tyres, TV's and computers (E-Waste), hazardous wastes
 - container deposit legislation
 - increased hypothecation of the waste levy into waste management related initiatives

5. address land clearing for urban development and infrastructure with incentives for maintaining native vegetation on private land and disincentives for clearing native vegetation
6. support public ownership of sensitive coastal lands and improve their long term management
7. support and enhance Council's environmental education programs in particular ways in which the community can reduce their impact on local natural environments. Lake Macquarie City Council runs a number of environmental education programs that promote sustainable coastal communities and help residents live a more sustainable lifestyle but these funded on an ad hoc basis that undermines commitment to long-term delivery and hence their efficacy
8. assist in the protection of coastal biodiversity for example: funds for acquisition of sensitive sites, assistance with the establishment and maintenance of the Proposed Coastal Wetland Park

7. Governance and institutional arrangements for the coastal zone

7.1 Governance

There is a complex and inconsistent governance process for decision-making in NSW. Recent years have seen a lack of support for integrated and sustainable management and planning has emerged from the State Government. This is exemplified by:

- The Lower Hunter Regional Plan 2006 which promotes urban development in a number of environmentally sensitive bushland sites throughout the City including Catherine Hill Bay and land around the Link Road. Development of these areas that are remote from urban centres and public transport and involve clearing large areas of bushland is viewed as contrary to sustainability principles. Certain components of this plan will undermine Lifestyle 2020 and any progress Lake Macquarie Council has made towards sustainability.
- The State Government dismantling the NSW Coastal Council. A body that was responsible for implementing the NSW 1997 Coastal Policy and for providing advice to State and Local Government as well as local communities on coastal issues.
- The length of time it has taken the State Government to finalise the review the current Coastline Management Manual. The draft Coastal Zone Manual is a revision of the existing NSW Government Coastline Management Manual and has been in draft form for several years.
- The lack of recognition of coastal issues in the Lower Hunter and Central Coast Catchment Action Plan.
- The lack of recognition of coastal issues and climate change in the Standard Local Environmental Plan (LEP) template. The State Government has directed that all Councils convert their planning instruments to this Standard LEP template over the next 3 years. There is no specific coastal zone in the template.
- The State Governments opposition to the inclusion in the LMLEP 2004 of more stringent controls on regulating tree and native vegetation clearing than currently exist in the Native Vegetation Act 2003.

- Implementation of Part 3A of the Environmental Planning and Assessment Act 1979 which allows the State Government to override any local planning instruments in place, with reduced opportunities for public involvement and court challenges.

A report to Sydney Coastal Councils Group in February 2008 (available from <http://www.sydneycostalouncils.com.au/index.htm>) found that currently few statutory obligations are placed on councils to address climate change. Consideration of climate change impacts is included in objects clauses and as matters for consideration, but there is currently no requirement to make 'climate friendly' decisions.

Local Government is looking to the State and Federal Government for guidance on responses to, and proactive approaches to mitigate, climate change and sea level rise. National policy or standards with consistent State Government policies would greatly assist Local Government.

There is a need for better coastal planning and this should be done by Local Government funded directly from the Commonwealth.

7.2 Funding/Resources

Local Government has suffered a decrease in resource base over the last two decades and does not have the resources to research and manage many of the issues raised above.

There is a mismatch between community expectations of services that Local Government should be providing in coastal protection and management and the funding that is available to deliver these expectations. To enable the success and sustainability of Council's climate change initiatives, it is considered a priority that State and Federal grant funding is offered on an annual basis.

8. Conclusion

Lake Macquarie City Council is vulnerable to the effects of human-induced climate change and unsustainable use of natural capital both locally and in a global sense through imported goods and services. A growing population will only exacerbate this already unsustainable situation.

Ecological modernisation and changes in land use, lifestyles, consumption, and waste services are required to address the causes of climate change and will require strong leadership. Commonwealth, State and Local approaches to adapt to climate change should be consistent and explored collaboratively.

Lake Macquarie City Council is currently engaged in a number of programs related to coastal management and climate change at local, regional, and state levels, however, there is a need for expansion of these activities. Council's approach to dealing with climate change is progressive, as demonstrated by the recent exhibition of Council's proposal to adoption a projected upper sea level rise figure for 2100 for planning, policy and development decisions. Council's success in managing these issues is very much dependant on support from both State and Federal Government. This support should be in the form of

- strong mechanisms to curb greenhouse gas emissions and other unsustainable human activities
- adequate and consistent guidelines, policies and frameworks at State and Federal levels addressing adaptation to climate change

- removal of policies, practices and plans that hinder or limit progressive Local Government initiatives
 - financial and technical support.
-