

ENCLOSURE 1

Climate Change – Issues Paper

Ordinary Meeting of Council

24 January 2007

Climate Change – Issues Paper

INTRODUCTION

The 2005-06 Management Plan required that the current scientific research on climate change be evaluated and the implications for Wyong Shire be considered. This Issues Paper discusses the status of the latest international and regional climate change data and research and the extent to which that research may inform management decisions in Wyong Shire in the face of the anticipated adverse impacts of climate change and global warming.

Although it is now widely accepted that human induced climate change is happening, there is still much uncertainty as to the rate and range of the impacts. This uncertainty has carried with it a decided unwillingness by many governments and communities to commit to the challenge of global warming. However, increasingly, community concern is forcing a change. This has been triggered by three recent events: the prolonged drought and the media attention surrounding the releases of the Stern Report from the UK and Al Gore's film; *An Inconvenient Truth*. There is a now desire for a greater understanding of the risks of major global and local impacts and recognition of the need for preparedness.

This change of heart was reflected by Rupert Murdoch in July 2006, who stated '*...until recently, I was somewhat wary of the warming debate, I believe it is now our responsibility to take the lead on this issue.....the planet deserves the benefit of the doubt*'.

Over time, our socio-economic and natural systems have demonstrated an extraordinary capacity to adapt to a wide range of climates, however, it is the rate of change and the associated impacts that climate change may have on existing settlements and our natural resources which should be of concern to us. While considerable inroads have been made to provide us with an understanding of what impacts climate change might bring, the range of projected changes is still relatively broad and we are unsure as to the capacity of the human and natural systems to adapt to the various threats. What is becoming clear is that the longer adaptation measures are delayed the more costly resulting effects and adaptation measures will be. It is also important to recognise that many of the changes required are economic decisions that can have positive economic effects and that present business opportunities.

This Paper presents issues for consideration by Council in determining the risks of imminent climate change for Wyong Shire under the following headings:

- * Current projections for a changing climate.
- * Potential Impacts in Wyong Shire:
 - the built environment (including infrastructure),
 - human aspects (including health), and
 - the natural environment.
- * Mitigation measures.

- * Adaptation measures:
 - legal liability,
 - social and inter-generational equity, and
 - information gaps.
- * Advice and direction to the community.
- * Conclusion and Recommendations.

PROJECTED CLIMATE CHANGES

Much of the information on projected global changes to climate comes from *The Third Assessment Report* of the Intergovernmental Panel for Climate Change (IPCC 2001) and nationally from the CSIRO. The IPCC is universally regarded as the most authoritative source of information on climate change and is a key part of the international regime for assessing the impacts and developing effective responses.

The increase in greenhouse gases in the atmosphere has already begun to have impacts on the climate, on natural ecosystems and human societies and will become more serious over the coming decades. The following table indicates the accelerated increase in carbon dioxide in the atmosphere over recent time in comparison to the levels over the past 400,000 years.

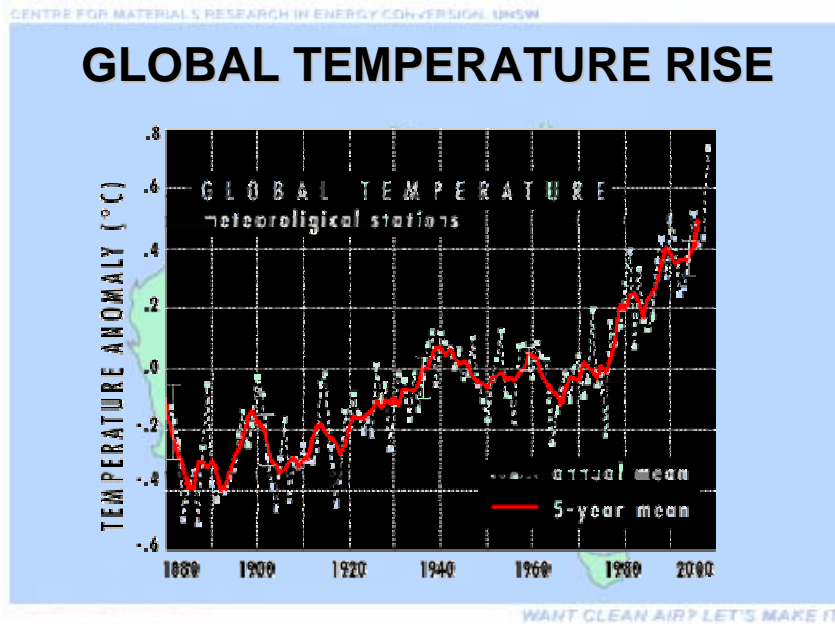


Source: http://www.lgsa.org.au/resources/documents/Karl_Sullivan_Climate_Change_and_Insurable_Risk.pdf

Rising Temperatures

In 2005, Australia recorded its warmest year on record since reliable temperature observations began in 1910 with an average temperature of 22.89°C that is 1.09°C above the standard 1961-90 averaging period with some mean monthly records increasing to +2.58°C (BOM 2006).

In a global context, the warmest ten years on record have occurred since 1990. Mean global temperatures for 2005 were 0.48°C above normal putting 2005 amongst the four warmest years globally since records commenced in 1861. The 20th century has been the warmest in the northern hemisphere in the past 1800 years (Pittock 2005).



Source: Sorrell, 2005

Projections of anticipated range of temperature increases for NSW based on IPCC scenarios are as follows:

	2030	2070	2100	
Temperature increases (relative to 1990)	0.4-2.0° C	1.0-6.0° C	1.4 – 5.8° C	Rising

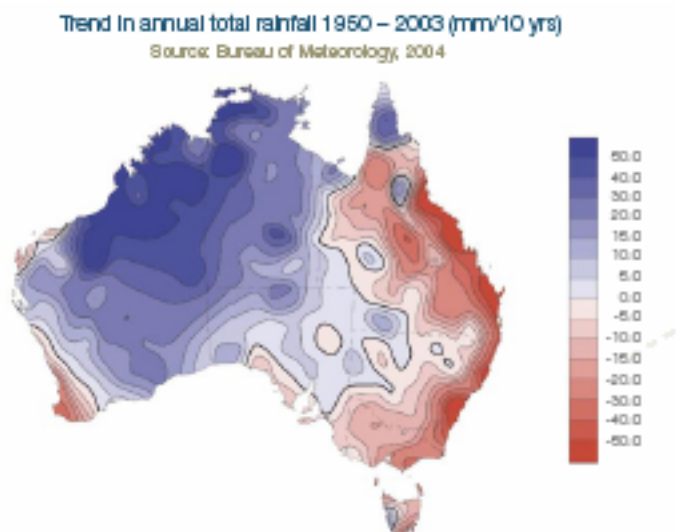
average temperatures are expected to lead to an increase in the frequency of hot days. It is projected that by 2030 Sydney will experience from 4-6 days >35°C compared to an annual average today of 3 days, by 2070 the frequency of days >35°C is expected to increase to between 4-18 days. Sydney will experience a 50% increase in the number of 40°C days by 2030 and a four-fold increase by 2070.

Changing Rainfall Patterns in Coastal NSW

Climate change is also contributing to decreasing rainfall over much of Australia with preliminary data showing that the average total rainfall throughout Australia was about 399mm compared with a long term average of 472mm. Lack of rainfall on the Central Coast has led to the continuation of the current multi-year drought, contributing to the current water supply crisis.

CSIRO (2004a) modelling shows that annual-average rainfall is likely to decrease, with a trend toward a strong decline for coastal NSW in winter. There is a trend for an increase in summer rainfall. This information indicates the relevance of future stormwater harvesting programs and the importance of capturing all available water beyond necessary environmental flow requirements. Warmer temperatures and greater surface evaporation will see more severe droughts in Australia, while observed changes in atmospheric circulation will result in decreasing rainfall tendencies in southern Australia (Pittock 2003).

The following figure shows the changes in rainfall patterns since 1950. Much of the east coast of Australia has experienced a reduction in rainfall, with the darkest red areas showing those areas that have lost >50 mm/decade.



Source: The Australian Climate Group 2004

Projections of anticipated changes to average rainfall to southeast Australia based on IPCC scenarios are as follows:

	2030	2070
Rainfall changes (relative to 1990)	-10% - +5%	-35% - +10%

Extreme Weather Events

The CSIRO (2004a) projections for changes in extreme climate indicate that south-east NSW has the highest likelihood of an increase in annual extreme events, coinciding with increasing intensity of extreme rainfall. However, a decrease in the number of extreme events and the intensity of rainfall is expected to occur in the winter months. This concurs with the trend of reduced rainfall anticipated for the winter months.

The IPCC (2001) states that the human environments most vulnerable to coastal and riverine flooding, landslides or intense storms are those expected to be most affected by climate change. Hence, the question of whether Wyong Shire will experience an increase in extreme weather events is pertinent with its significant areas of floodplain under high development pressure. There is some uncertainty due to conflicting information in the research as to whether increased storminess will be an issue in Wyong. The following table (cited in The Australian Climate Group's report (2004) shows the dramatic increase in risk of damage as a result of small variations in average rainfall or temperature. With this in mind, it is recommended that clarification of the data should be sought as to its local applicability and the extent of the risk

A change in average temperature or rainfall increases the risk of extreme weather

Source: Mills et al, 2001

	Change in Temperature or Rainfall	The Impact
Storms	2.2°C mean temperature increase	→ Increase of 5-10% in cyclone wind speeds
Floods	25% increase in 30 minute precipitation	→ Flooding return period reduced from 100 years to 17 years
Droughts	1.3°C maximum temperature increase and less cloud	→ 25% increase in evaporation leading to increased bushfire risk
Bushfires	1°C mean summer temperature increase	→ 17-28% increase bushfires

Sea Level Rise

Global sea level rises between 100-250 mm over the 20th century are linked to the enhanced greenhouse effect and are expected to continue into the decades ahead (AGO, BOM 2006). Recent comparisons of CSIRO modelled and recorded tidal gauge data indicate a global average sea level rise of 1.8mm -1.9mm/yr (+0.2mm) from 1950 - 2000. This is almost a 100mm increase in 50 years. Sea level rise is due to thermal expansion from warmer sea surface temperatures and the melting of ice sheets and glaciers in the Arctic and Antarctic peninsular. By 2100 these changes are projected to lead to a sea level rise of between 90mm – 880mm coupled with a global average warming of 1.4 to 5.8°C compared to 1990 levels (CSIRO 2004b).

Projections of anticipated sea level rises based on IPCC scenarios are as follows:

	2025	2050	2100
Sea level rise (relative to 1990)	0.03 – 0.14m	0.05 - 0.32m	0.09 – 0.88m

POTENTIAL IMPACTS OF CLIMATE CHANGE IN WYONG SHIRE

As mentioned in the Council Report, local data will be critical to developing an adaptation strategy that is robust and meaningful for Wyong. The IPCC and CSIRO data will be updated in 2007 and will be the basis upon which future local scenarios may be constructed. In the mean time we can look forward to the Department of Planning LIDAR survey study to provide some insight into the implications of sea level rise at a localised scale for numerous scenarios and the coastline hazard studies can continue to inform the relevant coastal management decisions. Climate change will impact on the built environment (including infrastructure), the natural environment, and human aspects (including health) in the following ways:

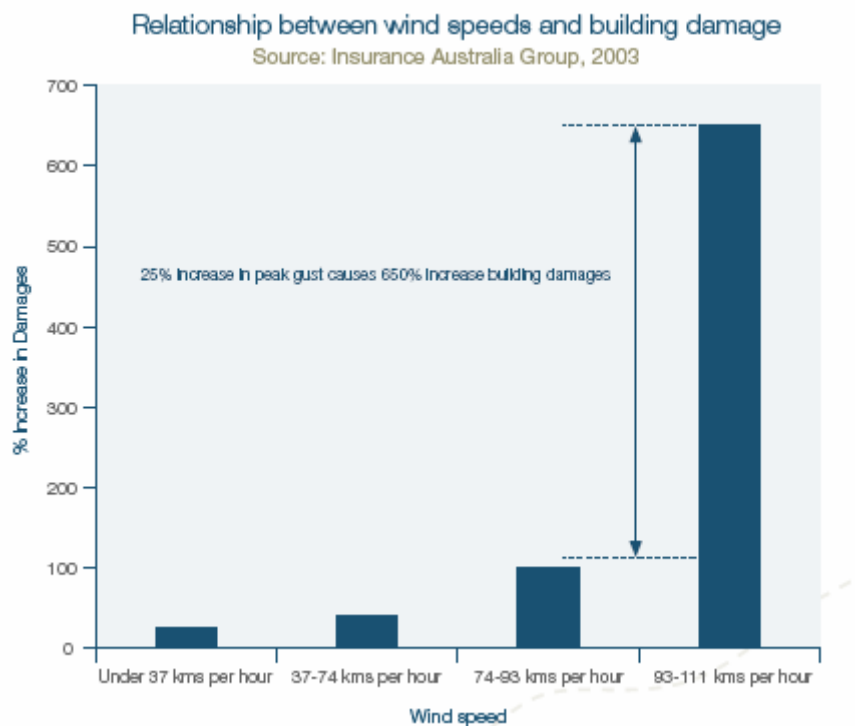
Projected changes	Impacts upon the Built Environment	Impacts upon the Natural Environment	Impacts upon the Human Aspects
<p>Reduced rainfall Increased seasonal variability More intense storms</p>	<p>Increasing frequency and intensity of drought conditions</p> <p>Less security of water supply resources</p> <p>Dam storage not sufficient</p> <p>Greater competition between users</p> <p>Agriculture</p> <p>Storm damage and local flooding</p>	<p>Reduced water availability for ecosystems, potentially leading to increasing eutrophication and algal blooms</p> <p>Increased pressure to reduce environmental flows at a time when they are needed more.</p> <p>More intense storms may increase soil erosion.</p> <p>Changes in flood regimes may lead to morphological changes in streams.</p>	<p>Increased incidence of illness due to food contamination and water borne faecal contaminants and other pathogens.</p> <p>Greater competition for water between users</p> <p>Higher insurance claims for storm damage and/or increased cost of insurance.</p> <p>Need to change building design rules</p>
<p>Higher temperatures</p>	<p>Rising evaporation rates will reduce moisture balance, increasing vulnerability to water supply shortages</p> <p>Damage to infrastructure</p> <p>Housing design</p>	<p>Degradation of viable habitat</p> <p>Limited capacity of some species to disperse to new locations</p> <p>Disruption to connectivity Reduction/loss of some species</p> <p>Shift in distribution of some species – increase in feral distribution</p> <p>Reduced ability to adapt and survive</p> <p>Reduced resilience of ecosystems</p> <p>Changes to fire regimes</p>	<p>Increase in the incidence of asthma (dust, smoke, organisms)</p> <p>Possible increased cost of agricultural production and/or changed products.</p> <p>Increase in death from heat events</p> <p>Increased demand for air conditioning (more energy use)</p> <p>Energy supply not sufficient as demand increases and supply failures increase</p> <p>Interruption to essential services, reduced community accessibility and mobility*</p>

Projected changes	Impacts upon the Built Environment	Impacts upon the Natural Environment	Impacts upon the Human Aspects
Flood risk	Damage to infrastructure	Altered river flows and flooding zones	Changed spread of diseases (such as dengue fever), pests and weeds
Sea level rise	Stormwater and sewerage systems inundated with frequent sewage overflow.	Increased erosion and sedimentation	Increased cost of storm damage to property and infrastructure
	Erosion and flooding of transport networks	Loss of coastal EECs	Changes in insurance company assessments, costs and restrictions
Extreme events	Increased cost of storm damage to property and infrastructure	Increased pressure on dune system- increased saltwater intrusion	Changes in economic sustainability of some activities
	Increased deterioration of infrastructure (shortened lifespan)	Coastline erosion and shoreline recession	Loss of public space and existing facilities
	Risk to underground telecommunications systems*	Marine inundation of coastal wetlands	Damage to places of cultural significance
	Seafront infrastructure (seawalls, jetties) at risk	Landward migration of mangrove habitat from tidal inundation	Interruption to essential services
Extreme events	Changes in land use options, including some areas becoming unsuitable for development, urban consolidation occurring in others	Loss of saltmarsh	Reduced community accessibility and mobility to recreation and tourist areas*
	Increased collateral damage from flying debris*	Coastal erosion and shoreline recession	Decrease in tourism and associated economic loss*
	Flooding of buildings and underground car parks*	Increased risk of landslips	Increase exposure to injury and restrict mobility and community activities
	Undermining of building foundations and footings*		Risk of personal injury from extreme weather events*
Bushfire risk	Increased intensity and frequency means greater impact on the urban fringe.	Simplification of ecosystems and communities,	Increased asthma from smoke.
	Asset protection zone design	Loss of biodiversity	Increased risk to personnel.
			Reconsider approach to fire management and increased investment in equipment.

Sources: Allen Consulting Group (2005); * Smec in PIA (2004)

Insurance

There is growing concern about climate change from the international insurance and finance industries. A coastal risk assessment for New South Wales undertaken by the Department of Natural Resources (2005) puts the value of coastal properties at risk from coastal erosion/inundation conservatively at \$1 billion over a one hundred year planning period, highlighting the need to fully understand the extent of the risk and the need to adapt accordingly (cited in McInnes *et al*/2006). Based on the theory that small variations in rainfall and temperature can increase the likelihood of more extreme events, the following graph indicates how small increases in wind speed can amplify the extent of damage to buildings and infrastructure because they are traditionally designed to factor in historical weather events.



Source: The Australian Climate Group 2004

The following slide demonstrates the increased vulnerability (and costs) from climatic hazards over the last decades of the 20th century. While these increased costs are partly due to the higher frequency of climate hazards, they are mostly attributable to increased exposure of populations and investment in locations more vulnerable to climate change impacts such as low lying coastal zones, riverine floodplains and areas subject to storm surge (Pittock 2003). What is interesting to note is the difference in economic losses and insured losses, leaving the enormous deficit to taxpayers to fund. That is a matter of individual choice and the gap is closing. The bigger threat is that insurance will be more expensive or denied.

Increases in Disasters 1960s to 1990s

	1960s	1970s	1980s	1990s	Ratio 1990s/ 1960s
# Weather-related	16	29	44	72	4.5
# Non-weather	11	18	19	17	1.5
Economic losses	50.8	74.5	118.4	399.0	7.9
Insured losses	6.7	10.8	21.6	91.9	13.6

Water Supply

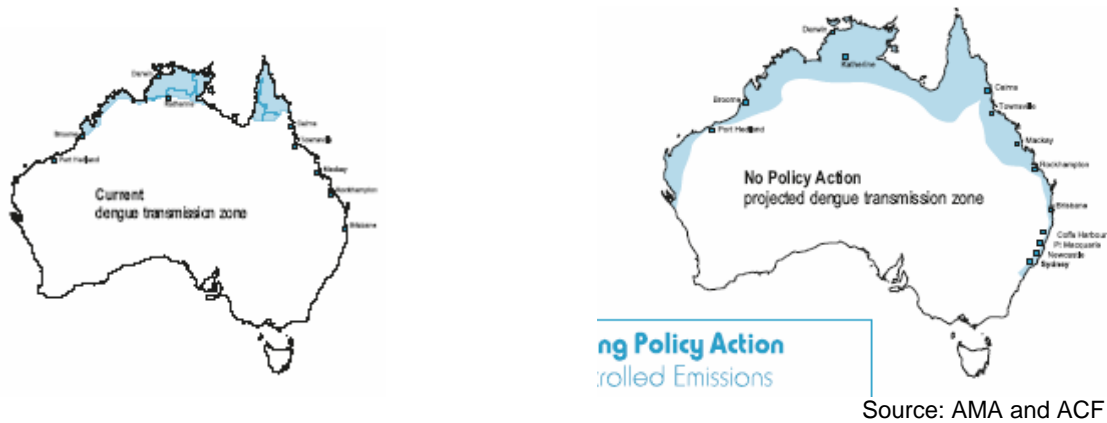
Australian climate is one of the most variable in the world. Hence water supply is often under stress from drought, increasing population pressure and water demand. Under projected climate change scenarios of increasing frequency and intensity of droughts and higher summer temperatures (higher evaporation loss) there may be even less security in the supply of water resources with increasing competition between users. Water quality too, may be compromised due to increasing soil erosion following drought, lower flows, and warmer temperatures, which may lead to increasing eutrophication and algal blooms. A less secure water supply will increase pressure to reduce allocations for environmental flows, potentially affecting the survival of water dependent ecosystems.

Streams that feed into the Central Coast water supply system are already stressed due to the decline in rainfall from the continuing drought. This will be further exacerbated by rising evaporation rates as a result of hotter temperatures projected over all parts of Australia from climate change. This will result in greater reductions in moisture availability and will intensify the water crisis for those areas already vulnerable to water shortages. Research suggests that increased evaporation rates will occur throughout all seasons, with a 0 - 10% increase by 2030 and a 0 - 32% by 2070 (<http://www.cana.net.au/water/cities/nsw.html>).

Public Health Issues

Climatic conditions have wide-ranging effects on human health. Already around 1,100 people are estimated to die each year due to high temperatures in Australian capital cities and heat related deaths are expected to increase due to climate change (AMA and ACF 2005). Diseases such as dengue fever could be more widespread as the geographic range of disease carrying insects is increased by climate change. The elderly, the very young, and those living in isolated communities will be more vulnerable to heat stress.

Extreme weather events will increase exposure to injury and will restrict mobility and community activities (AGO 2005). The following maps show current dengue transmission zone (left hand side) and projected dengue transmission zone for the year 2100 based on two plausible uncontrolled emission scenarios.



Other potential health related impacts include food and water-borne diseases as high temperatures promote the contamination of food and high levels of faecal contaminants and other pathogens are transported into waterways following extreme weather events (AMA and ACF 2005). The incidence of asthma is expected to rise as it is known to be associated with increased average temperatures, humidity, rainfall and sunshine (AGO 2005; AMA and ACF 2005).

Lifestyle and Amenity

The use of many open community spaces and sporting grounds located in the low-lying or foreshore areas of the coastal strip may be restricted as future impacts of climate change such as sea level rise and extreme weather events are realised. Coupled with higher temperatures, these impacts may restrict recreational access to foreshore areas, reduce people's willingness to walk and ride bicycles and coincidentally increase the usage of air-conditioning in motor vehicles and homes (PIA 2004). The economic benefit that the natural assets of Wyong Shire bring to a community will need to be factored into the assessment of costs of future adaptation measures.

Social and Inter-Generational Equity

Consideration needs to be given to how the costs of adaptation measures will be borne. Responses need to be prioritised and debt? minimised to ensure future generations are not burdened with the actions or inactions of adaptation measures. Such costs may include relocation, upgrading of buildings and infrastructure, land acquisition and resettlement. The issue of accessibility to and affordability of insurance may require consideration. Will insurers continue to cover the areas most vulnerable to climate change? Will the costs be borne equitably across the community? (PIA 2004).

While climate change, per se, is not visible there is no apparent urgency to act, but to defer action is inconsistent with the principles of sustainability and intergenerational equity. Local governments have a moral, and a legal obligation to consider climate change.

The Natural Environment

Many species and communities will not be able to adapt to climate change as they will have limited distribution capacity. The increased rate of degradation of viable habitat will affect thresholds for survival. Conservation management actions may need to consider species' resilience thresholds, thereby focussing on more 'at risk' ecosystems (ALGA 2005). This may include maintaining the effective connectivity and size of remnant habitats to allow for species movement. Council's bushland management may need to be incorporated into a more regional approach to protect biodiversity (ALGA 2005, PIA 2004) with consideration given to the continuing functionality of wildlife corridors which contain the many floodplain vegetation communities located on the coastal plains.

Equally, decreased rainfall, and increased evaporation rates may also result in increased risk of bush fires in bushland already under stress from weed invasion, fragmentation and habitat destruction due to land clearing. Council and the Rural Fire Service have extensive databases and up to date mapping that detail the fire regimes of many bushland remnants in the Shire. These can be used to carry out further risk assessments to identify those bushland remnants most vulnerable.

The following natural ecosystems in Australia have been identified by the IPCC as vulnerable to climate change:

- * species or ecosystems already stressed or marginal eg. threatened species;
- * remnant vegetation;
- * significantly modified systems;
- * ecosystems already invaded by exotic organisms;
- * areas where physical areas set constraints eg. low lying areas, shorelines, islands; and
- * mountain tops (cited in PIA 2004).

Many of the ecosystems mentioned above occur in Wyong Shire and the potential for their loss due to climate change should be considered based not only on their intrinsic value but also the value of services they bring to the community, for example, clean drinking water, shade and shelter, health and lifestyle benefits, tourism.

Reviews published in 2003 indicate that there is already a systematic change in behaviour (breeding times, flowering) and distribution of animals and plants showing an average of 1.6km per decade shift in range toward the poles due to global warming. Combining this trend with continuing habitat destruction, many species will be at risk of local extinction due to the disruption in connectedness of species within ecosystems. In Australia these studies relate to a southern movement of bats and birds, and semi-arid reptiles and vertical movement of alpine mammals (Pittock 2005; Hughes 2003).

At a local scale, there is evidence that sea level rise may already be impacting on foreshore vegetation communities in Brisbane Water and Lake Macquarie and Sydney Olympic Park.. Landward transgression of mangroves, displacing saltmarsh communities is already widely reported in the literature to be responsible for the losses of up to 80% of saltmarsh in the estuaries of Qld, NSW, Victoria and SA over the past five decades (Saintilan & Williams 1999 cited in Hughes 2003). Broadly, the degree of saltmarsh lost to mangroves corresponds to the amount of sea level rise this century (Saintilan unpub 2006).

Typically, in the Tuggerah Lakes estuary as saltmarsh vegetation attempts to migrate landward to adapt to increasing sea level it is squeezed against the footpaths and roadways at the urban interface and lost. Together with the pressures of urban foreshore development, sea level rise has contributed to an estimated 85% loss of saltmarsh and fringing vegetation around Tuggerah Lakes estuary.

With respect to adaptation measures for retention of saltmarsh, planned realignment or seawall removal may be required to allow for saltmarsh retreat areas. Local saltmarsh rehabilitation projects should consider the potential implications for dispersal of mangrove propagules in their design. Targeted education will also be necessary to inform the community of the need for such changes.

ADAPTATION OPTIONS FOR CONSIDERATION

Councils are legally obliged to consider climate change in a number of their relevant plans, i.e. Coastline Management Plan, Estuary Management Plan, Floodplain Management Plans. However, it may be prudent to review the modelling that underpins some of the Floodplain Management Plans as some were undertaken as long ago as 1984 and did not take into account the projected changes to rainfall patterns or the probable maximum flood level (PMF) associated with climate change scenarios (Wallace pers comm.). Further assessment of needs in relation to climate change impacts may be necessary for protection of water supply, infrastructure and community assets and future development.

Planning can play a key role in responding to the potentially severe and likely consequences of climate change. Given the timing horizons for infrastructure replacement, decisions made today need to factor in the likelihood of their being affected by climate change in the future. It may be necessary to restrict or withdraw development from high risk foreshore areas, where land use may be changed from residential to tourism or recreational (PIA 2004).

The risks may be ameliorated by changes to zonings, engineering works, building design and planning regulations such as setbacks. It may be possible to incorporate an assessment framework used in the process of flooding risk management into a climate change adaptation strategy. Policies and plans, evaluation and monitoring strategies, awareness and capacity building activities can be developed once the information has been collated (ALGA 2005).

Development of adaptation strategies will place Council in a position to better manage the environmental and community impacts of climate change in our region.

Potential Liability

It is important that Council consider the legal implications of any adaptation measures and to ensure decisions made are defensible in court, and to determine council's liability if they introduce inappropriate measures (ALGA 2005) or fail to take appropriate action.

Discussion over the extent of Council's liability needs to determine whether Council has a duty of care to members of the public in relation to climate change. Is it at risk if it does nothing to address adaptation or it introduces inappropriate measures? Compensation and common law negligence may both be issues of concern where liability for climate change may apply to Councils (PIA 2004). Examples which may have the potential for liability include:

- * *“approving development:*
 - *which may in future be affected by sea level rise or other impacts of climate change;*
 - *which is not appropriately designed for future climate change.*
- * *constructing and operating infrastructure:*
 - *which may in future be affected by sea level rise or other impacts of climate change;*
 - *which is not appropriately designed for future climate change.*
- * *introducing a planning scheme that:*
 - *allows or encourages development in locations affected by rising water levels, future flooding or other impacts of climate change;*
 - *does not have appropriate development design requirements for future climate change.*
- * *Council officers providing incorrect or misleading advice to a member of the public in relation to climate change issues or impacts.” (PIA 2004)*

The Planning Institute of Australia (PIA 2004) advises that while potential liability for climate change will be a matter for each individual council and its circumstances, at a minimum each Council would have to:

- *“Identify any risks;*
- *Assess the likelihood of each risk, if any;*
- *Consider the likely impact or consequences of each risk; and*
- *Devise a reasonable response to each risk in all of the circumstances.”*

Measures to minimise the risk to life, and property should be part of the overall assessment process and PIA further suggests that many councils will already have in place risk assessment methodologies (such as those for flooding) which they could apply to climate change.

In terms of liability, planning at a regional and local level, and adoption of a sensible adaptation strategy, will form an important component in demonstrating that Council has adopted a reasonable response to deal with the uncertainty of climate change.

Information Gaps

The importance of local scale data in highlighting the risks associated with climate change has already been stated. Council needs to gain a better understanding of the nature and the extent of vulnerability in its communities, so that appropriate adaptation responses can be identified and implemented. Consultation with state agencies and research institutions may be able to assist in providing guidance and information on specific areas or species at risk (PIA 2004). Such information might include local and regional data and studies specific to different geographical regions, economic and social circumstances and the degree of vulnerability (PIA 2004). Meanwhile there will be benefits gained in information sharing at a regional level where local land use planning, regional NRM planning and infrastructure planning can be considered in an integrated way (ALGA 2005). The cost and affordability of implementing adaptation measures will also require continuing investigation.

MITIGATION MEASURES (CURRENT AND THOSE UNDER CONSIDERATION)

Wyong Council is currently undertaking a number of initiatives to reduce our greenhouse emissions, these include:

- * Implementation of the Energy Savings Action Plan which identifies areas that Council can reduce its demand and consumption of energy (progress and details outlined in a separate Report to Council).
- * Council is gradually increasing its proportion of 4 cylinder and LPG vehicles in its transport fleet.
- * Through its development approval process, Council implements the State Government design, water and energy efficiency program BASIX.
- * Council is currently exploring a methane capture and re-use facility at Buttonderry landfill site to reduce the incidence of fugitive methane emissions.

Initiatives currently being considered by Council include:

- * Offsetting greenhouse emissions from Council's transport fleet through Greenfleet which provides a carbon dioxide (CO₂) offsetting program of tree planting throughout the Shire at a cost of \$42,138 per annum for a total of 18,000 trees per annum.
- * Further changes to the Fleet Policy to provide incentives to increase the uptake of 4 cylinder and LPG vehicles, or alternatively considering financial disincentives to discourage the less fuel efficient 6 cylinder vehicles.
- * An increase in the commitment to the proportion of accredited renewable energy purchased through GreenPower to offset is electricity consumption. Council currently commits to 6% of its energy to be sourced through renewables such as wind or solar.

ADVICE AND DIRECTION TO THE COMMUNITY

As the principle consent authority and a major land manager and business in its own right Council has two important roles to play in ensuring that the broader community has access to accurate information about climate change and in setting a management standard for others to follow.

Because of the potentially dramatic changes to the Earth, climate change has become a popular topic in all media but unfortunately most reports deal with extreme change and fail to address the more likely lesser levels of change. The community can be confused about what may or may not happen and the focus on disaster tends to close people's minds to the possibility that disaster can be avoided or at least prepared for. Council needs to involve all sectors of the community in planning for climate change and indeed Council needs guidance from the community about appropriate actions. This is a communication and education task that can be undertaken at several levels through partnerships with local community groups and Council.

By committing to practical 'in house' changes and disseminating information about such changes, Council can demonstrate the effectiveness of their actions and set standards for others to follow. Wyong Council should set itself a goal of being a leading practitioner in climate change response.

It is important to also recognise that many of the actions to climate change may be too big for Council; however it can partner with adjacent councils and other state agencies to lobby other levels of government for funding and action.

CONCLUSION AND RECOMMENDATIONS

Climate change is a global issue, and it is easy to feel powerless in the face of the enormity of the problem, but it is incumbent upon every individual, every corporation and every community to do what it can now to reduce the severity of future impacts. If we can commit to steep cuts in global emissions now, it is anticipated that we can limit the average global temperature increase to 2°C above pre-industrial averages, and the impacts will be reduced accordingly.

The following recommendations will assist Council in addressing the issues associated with climate change.

- * Undertake gap analyses in relation to the adequacy of:
 - the modelling underpinning the Floodplain Management Plans currently being developed;
 - seeking appropriate legal advice and developing the relevant Plans to offer protection to Council in terms of legal liability; and
 - the risk assessments undertaken to date to ensure they anticipate the changes and consequences of climate change at a local scale.

- * Subject to the results of the Department of Planning LIDAR survey:
 - identify those areas of operation and geography at greatest risk;
 - develop a suitable suite of adaptation measures; and
 - determine the costs and benefits of the adaptation strategy.

- * Offsetting greenhouse emissions from:
 - Council's transport fleet through continued participation with the Greenfleet program; and
 - Council's electricity consumption through committing to increasing the proportion of accredited renewable energy purchased through GreenPower as detailed in Attachment 4. .
- * Commit to a serious reduction in greenhouse emissions through further changes to the Fleet Policy.
- * Seek to fill the information gaps:
 - by development of a decision-making framework to enable decisions on issues such as adaptation to climate change, energy reduction strategies and other sustainability issues to be made in an integrated and cohesive manner rather than in an ad hoc fashion;
 - by continual dialogue with state and national research bodies, with a particular focus on the potential for regional and local impacts;
 - identify those areas of Council operation, local business operation and private activities contributing most to greenhouse gas emissions; and
 - be more inclusive of the community, providing people with realistic global and local information on climate change, including informing them of Council's actions.

The extent of the impacts and the long term sustainability of the planet will depend on a serious global effort to reduce greenhouse gas concentrations, reform our use of energy and our ability to adapt. Even so, the lag effect will ensure that greenhouse gases will remain in the atmosphere and continue to impact upon our climate for many decades to come. Our capacity to adapt is limited and adaptation is costly so we need to look at global scale mitigation measures to significantly reduce our emissions and plan our approach to adaptation today. At the end of the day – our children and grandchildren will see the inevitable results of our continuing greenhouse emissions long after we have gone.

Note 1: Much of the information on projected global changes from climate change comes from The Third Assessment Report of the Intergovernmental Panel for Climate Change (IPCC 2001) and nationally from the CSIRO. The IPCC is universally regarded as the most authoritative source of information on climate change and is a key part of the international regime for assessing the impacts and developing effective responses.

Note 2: A Fourth Assessment Report is due for release in early 2007.

Note 3: This Issues Paper does not include comment on the unquantifiable potential for future large-scale abrupt and possibly irreversible changes. Such global catastrophic events such as disintegration of the Earth's great Ice Sheets in Greenland and west Antarctica, which would lead to 'rapid' sea-level rises of several metres over coming centuries, reversal of the carbon land sink, and slowing or stopping of the Gulf Stream and heat transport to western Europe, with possible regional effects elsewhere including North America (CSIRO 2004a; Pittock 2003).