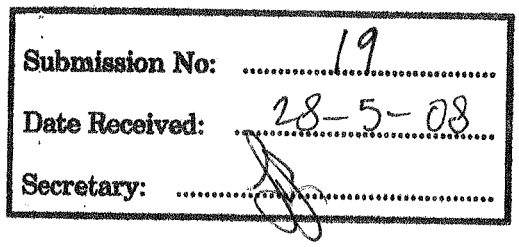

IAG
Insurance Australia Group

28 May 2008

Committee Secretary
Standing Committee on Climate Change, Water, Environment and the Arts
PO Box 6021
House of Representatives
Parliament House
CANBERRA ACT 2600
Email: ccwea.reps@aph.gov.au

Introduction

Insurance Australia Group (IAG) welcomes the opportunity to make a submission in relation to the Inquiry into Climate Change and Environmental Impacts on Coastal Communities.

IAG supports a consultative approach that engages with industry at all stages of the review process. IAG commends the Inquiry for its consultative approach to date.

Part One of this submission focuses on the impact of rising sea levels on coastal communities, and proposes for further discussion the concept of a coastal land value insurance scheme as one of the suite of strategies available to help coastal communities manage this risk. Part Two focuses on other impacts of climate change on coastal areas, and strategies to deal with climate change adaptation.

Insurance Australia Group

IAG is the leading general insurance group in Australia and New Zealand, and has a growing presence in Asia and the UK. The Group generates annual gross written premium of more than $7.5 billion.

The Group insures more than $1,000 billion worth of property. In Australia, it insures more than five million cars, two million homes, 250,000 businesses and 75,000 farms, and provides workers' compensation services to more than 200,000 employers. In New Zealand, it insures around 950,000 cars, 575,000 homes, 185,000 businesses and 235,000 rural risks.

IAG distributes its products through some of the leading brands in Australia and New Zealand: CGU nationally; NRMA Insurance in New South Wales, Queensland, ACT and Tasmania; SGIC in South Australia; SGIO in Western Australia; RACV in Victoria; and State and NZI in New Zealand. We also have interests in China, Malaysia, Singapore, Thailand and UK represented by China Automobile Association (CAA), AmAssurance, Alba, NZI Thailand, Safety Insurance, Equity Insurance Group and Hastings Group.

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IAG has a crucial interest in the long-term viability of insurance as a product valued by the Australian community. IAG believes that there are four principal ways in which the insurance industry can best meet these objectives. These are:

- Providing affordable products that price the risks underwritten realistically.
- Promoting risk awareness and risk reduction both for policyholders and in the community generally.
- Investing in robust risk control frameworks and management mechanisms that reduce operating expenses, make claims costs more predicable and facilitate sustainable profitability for shareholders.
- Committing to, and supporting, on a continuing basis, a comprehensive and clearly defined regulatory framework that ensures that customers understand what they are buying when they purchase a policy and protects policyholders against financial failure of an insurer.

Summary of Submission

- In coastal locations, land value can form a significant component of a property's overall value. Whereas the value of coastal buildings may be protected to some extent by insurance, the land value of properties is not insured at all.

  Accordingly, where land is inundated or eroded by rising sea levels, coastal landowners and lenders in the banking and finance sector face significant losses. Preliminary estimates of the value of property in Australia exposed to this risk range from $50 billion to $150 billion. The figure depends upon the extent of sea level rise assumed (in the order of 1 metre to 3 metres) and the effectiveness or otherwise of potential mitigation measures. Even if paid for over 50 years this amounts to a cost to replace those assets of some $1 billion to $3 billion per annum in real terms.

  In addition to the range of sea level increases this century modelled by the Intergovernmental Panel on Climate Change (IPCC), credible scientific evidence is emerging about the likelihood of polar warming leading to rapid land ice disintegration in Greenland and West Antarctica, with consequent sea level rises potentially in the order of 5 to 10 metres within the lifetime of children alive today.

  IAG considers these concerns are sufficiently credible that some risk management of this contingency is required. Obviously, if this contingency were to occur, the costs to the Australian economy would be far more severe than the estimates outlined above.

  IAG proposes for further discussion a coastal land value insurance concept as one of the range of strategies available to assist coastal communities to manage this risk. IAG considers it unlikely to be feasible for the private sector alone to be able to provide such an insurance scheme.

Recommendation: ***Government consider the development of a coastal land value insurance facility as one of the strategies available to assist coastal communities to manage the risk of rising sea levels.***

- Coastal communities in the heavily populated and rapidly growing region of southeast Queensland and northern New South Wales face increased cyclone activity as a result of climate change. Cyclones generate major damage to coastal property through wind damage, storm surge and water entry (rain and/or flood), and can cause injury and death.

  As a consequence of climate change, the increased level of energy available through warmer air and higher sea surface temperatures can sustain a more destructive level of cyclone behaviour.

  IAG-sponsored modelling of the effect of climate change on South East Queensland tropical cyclones (TCs) over the period 2000-2050 indicates

  - a marked increase of about 15% in the average number of TCs each decade in the most severe cyclone categories 4 and 5;
  - TCs that are more intense than ever previously experienced in the Australian region;
  - TC tracks that extend further south than previously; and
  - a southwards shift of over 2 degrees of latitude in the regions where TCs originate.

  Recommendation: ***Government note the likely development throughout the first half of this century of increased cyclone activity in southeast Queensland and northern New South Wales.***

- Even though the coastal areas of southern Queensland and northern New South Wales will become increasingly exposed to severe cyclone risk than previously, the cyclone building codes generally applicable since 1980 in coastal areas of Queensland north of Rockhampton do not apply further south. As a result, the damage caused by a cyclone in these more southern areas will be significantly magnified, as buildings are more vulnerable than in the more cyclone-resistant built environment further north.

  Further, until now, building code standards have focussed in principle on protecting life and safety. It is desirable to enhance building standards so that they also cost-effectively protect the property itself, and its owner's financial interest, without sacrificing safety performance.

  Recommendation: ***Government encourage a review of building standards to improve economic resilience and ensure they sufficiently address the increased risks caused by climate change.***

- Sydney represents Australia's largest coastal community, comprising around 4.3 million residents as at 30 June 2007.

  One consequence of climate change is that a warmer atmosphere and higher sea surface temperatures can enable greater quantities of moisture to be available in the air. Depending on local landforms and conditions, this can lead to greater hailstorm formation.

  IAG-sponsored climate change modelling of the Sydney Basin indicates an increase over 2000-2050 in the frequency and severity of hailstorms, which generate very significant damage to property and can cause injury and death. The Sydney hail storm of 1999, with 9cm hail stones, caused insured losses of $1.7 billion (1999 dollars) and is the largest insured event in Australia's history after allowing for consumer price inflation. One person was killed in this event, 500 injured and 500 people homeless, according to the Emergency Management Australia Disaster Database. The largest future climate hail produced by the model simulations reaches 17cm diameter, which is close to the current official largest hail recorded (Nebraska, USA, 2003).

  Recommendation: ***Government note the likely development throughout the first half of this century of increased hailstorm activity over the Sydney Basin and the costs to the community involved.***

- Private insurance serves a crucial role in underpinning the economic resilience of coastal (and other) communities to severe weather risks and climate change. However, market distortions caused by the current inefficient systems of taxes and charges on private insurance are inhibiting the uptake of private insurance. The arguments for swift reform of state based taxes on insurance are compelling.

  Recommendation: ***Government give urgent attention to the reform of taxation of insurance products via the next round of intergovernmental agreements.***

- Key insurance gaps facing coastal communities within the context of climate change are flood and storm surge risk. The industry is working with government to address the challenges of flood risk that impacts building and contents insurance, but significant solutions are yet to be implemented.

  Flood maps represent information that is of significant public interest and importance, and it would be inappropriate for governments to restrict in any way public access to flood map data. For all parties with a legitimate interest in a property – including potential purchasers, tenants, residents, developers and insurers – flood risk mapping data for individual properties should be up-to-date and transparently accessible at nominal cost.

  Recommendation: ***Federal, State and local governments work collaboratively with the insurance industry to address the challenges of flood risk via the development of comprehensive and accurate flood maps.***

- Government has a crucial role in encouraging and regulating risk-appropriate development of the built environment through review of building standards, sound land use planning codes, and providing an appropriate emergency services and natural hazards mitigation framework and funding.

  Land that is (or becomes) at unacceptable risk from hazards such as flood or coastal inundation including storm surge should not be zoned for residential or commercial use. Without sound and consistent government land use controls, there is little to prevent ongoing building and development on flood plains or in coastal locations of extreme vulnerability.

  Recommendation: ***Government introduce sound land use planning codes, and provide an appropriate emergency services and natural hazards mitigation framework and funding.***

- Revenues raised through the sale of emissions trading permits target an externality, namely the burden placed on society by the environmental damage caused by emission of greenhouse gases. It is sound public finance policy that revenues raised through the scheme should be applied to offsetting this burden by reducing the adverse impacts of greenhouse gas emissions. Accordingly, development of community resilience to adapt to climate change is one of the areas deserving priority consideration for application of these funds.

  Recommendation: ***A substantial proportion of funds raised through the sale of emissions permits be directed towards adaptation measures designed to build community resilience to climate change.***

Conclusion

If you wish to discuss these matters or make further inquiries please do not hesitate to contact me on (02) 9292 1538 or Nola Watson, Head of Government and International Relations on (02) 9292 9744.

Yours sincerely

A. M. Coleman

Tony Coleman
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Insurance Australia Group

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Part One: Coastal land value insurance

IAG proposes for further public consideration the concept of a potential new measure to help Australian communities adapt to climate change: an insurance fund into which owners of low-lying coastal land would pay a regular levy so as to provide compensation when rising sea levels cause their land to become permanently unusable.

Such a scheme could be operated by government alone, or in conjunction with the private sector. IAG considers that, for several reasons, it is unlikely to be feasible for the private insurance sector alone to operate such a scheme. Most importantly, the globally synchronized nature of the risk of rising sea levels eliminates the scope for geographic diversification of risk on which insurers and global reinsurers normally rely.

An appropriately designed scheme of this nature would introduce a "user pays" price signal to owners of vulnerable waterfront land that they should be responsible for funding the cost of potential compensation payable to them should that land become unusable rather than expecting future compensation to come from some other source.

Preliminary estimates of the value of property in Australia exposed to the risk of rising sea levels range from $50 billion to $150 billion. The figure depends upon the extent of sea level rise assumed (in the order of 1 metre to 3 metres) and the effectiveness or otherwise of potential mitigation measures. Even if paid for over 50 years this amounts to a cost to replace those assets of some $1 billion to $3 billion per annum in real terms.

Coastal vulnerability – overview

The concentration of Australia's population and assets along the coast makes our nation particularly vulnerable to the coastal erosion and inundation that will accompany increases in sea level. Added to this, waterfront landowners and lenders who finance such properties face an "insurance gap" because coastal land is an asset of significant value which landowners do not currently insure.

Coastal erosion and inundation are expected to worsen as sea levels rise.

A predicted impact of climate change is the inundation and/or erosion of valuable coastal land as sea levels rise. The IPCC Fourth Assessment Report (2007) anticipates a global sea level rise averaging at least 18-59 cm by 2100.

The IPCC figures exclude the additional risk, currently of unknown probability, that increases in polar temperatures could cause large land-based ice sheets (eg Greenland, West Antarctica) to either disintegrate or melt. Should this occur, it would result in sea level rises of up to several meters, possibly over a short time scale if large blocks of land-based ice become sea-borne or if ice "dam walls" break.

A factor that could accelerate the disintegration of Greenland's ice is the loss of the Arctic region's sea ice cap, which currently plays an important cooling role by reflecting the sun's energy away from the earth. Credible scientific evidence is emerging that the Arctic ice cap is disappearing very much faster than anticipated in the IPCC's latest report.

Even small rises in sea levels will exacerbate the existing problems of erosion or inundation of coastal land caused by high and king tides, storm surges, cyclones and tsunamis, and may compromise coastal storm water drainage systems. An example is a study by NATCLIM that models the extent of potential storm surge inundation in Melbourne's St Kilda area under different rising sea level scenarios. An illustrative overview of the modelled results is included in this submission, and is available at http://www.portphillip.vic.gov.au/attachments/o23359.pdf

As illustrated in Figure 1, the sea level at the coast is a variable that fluctuates significantly from time to time, reflecting:

- the underlying cyclical tidal level, plus
- storm surge caused by low air pressure during severe weather conditions, plus
- wind-driven waves; plus
- wave runup.

These four components of sea level are not experienced uniformly along the coast, but instead reflect the shape of the seafloor and surrounding bays, headlands and islands, as well as the nature of the onshore terrain. This coastal geomorphology in turn also changes over time, as a result of complex natural coastal processes as well as direct human intervention.

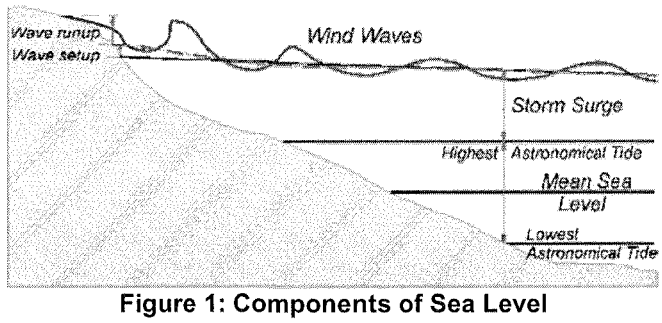

Figure 1: Components of Sea Level

(Source: K. L. McInnes, K. J. E. Walsh, G. D. Hubbert and T. Beer, *Impact of Sea-level Rise and Storm Surges on a Coastal Community*, Natural Hazards 30: 187–207, 2003 viewed at http://nome.colorado.edu/HARC/abstract/2003_30_xx.mcinnes_et_al.pdf)

Examples of locations that have experienced significant coastal erosion events in the past include:

Location	Year
Broadbeach, QLD	1967
Narrabeen, NSW	1974
Collaroy, NSW	1945
Forresters, NSW	1986
Byron Bay, NSW	1989
Pearl Beach, Broken Bay, NSW	1986
Callala, Jervis Bay, NSW	1974
Wamberal Beach NSW	1974, 1978

Australia's population is vulnerable due to its coastal concentration

Chen & McAneney (2006) estimate that approximately 6% of Australian addresses and population are within 3 km of the shore in areas less than 5 m above mean sea level. Within this overarching figure, the number, value and use of properties facing inundation from rising sea levels over the next several decades has not yet been estimated by IAG. Australian governments are conducting several projects to better assess (among other aspects of climate change) the extent of coastal asset vulnerability to rising sea levels. An early example is the NATCLIM report *Planning For Climate Change: A Case Study - City Of Port Phillip* which is available at http://www.portphillip.vic.gov.au/greenhouse_strategy.html.
An illustrative overview of this report's storm surge inundation modelling under a range of sea level rise scenarios is shown in Figure 2 (page 12).

Unfortunately, vulnerability mapping is not a simple matter of identifying the contour on a present-day elevation map corresponding to expected sea level rise. This is because the coast is likely to erode much further inland, depending on the geology of different locations. One longstanding rule of thumb, the Bruun Rule – which must be applied with caution – proposes an approximately linear relationship whereby coastal retreat is equivalent to a factor of 50 to100 times the vertical rise in sea level.

Existing estimates of coastal exposure, such as the Chen & McAneney figure above, appear to overstate the likely extent of exposure, as they may include many addresses that are unlikely to be threatened this century by sea levels of the size anticipated by the IPCC, in the absence of major contributions from land-based ice.

An unpublished report to the Insurance Council, "A national coastal vulnerability study" prepared by Risk Frontiers (2006), estimates the number of Australian addresses within 3km of the coast and with baseline elevations below 4, 5 and 6 meters. It estimates that more than 425,000 Australian addresses are below 4 meters above mean sea level and within 3km of the shore. Within the Greater Sydney region (Newcastle to Wollongong), 46,000 addresses are identified as being within 1km of the shoreline and with elevations less than 3m. The majority of these vulnerable addresses are located near sea-connected coastal waters – i.e. alongside lakes or lagoons, river banks and estuaries, rather than directly facing the open ocean. The report also notes that properties in coastal settlements that are also on riverine

floodplains (i.e. generally near the mouths of rivers) can be liable to both river and ocean inundation, often concurrently. The report particularly highlights the heavily populated Nerang River region on the Gold Coast, estimating it has around 15,000 properties vulnerable to both coastal and riverine flooding.

Australia faces an "insurance gap" because land values are not currently insured

Land value can represent the major component of a coastal property's overall value, especially for highly vulnerable expensive waterfront properties, yet land is not currently insured under home or building insurance policies.

A crucial question that arises is who, if anyone, should compensate waterfront property owners if a government authority deems that the property is no longer safe for use, or that intervention to protect the property against rising sea levels is not to be undertaken. Prof Jan McDonald of Griffith University canvasses a number of the legal considerations in her article *A risky climate for decision-making: The liability of development authorities for climate change impacts* (Environmental Planning and Law Journal, 2007).

Land value represents a substantial component of the assets securing mortgages on coastal properties. Accordingly it appears likely that the banking and finance sector faces considerable exposure to permanent inundation of coastal land. To the extent that this exposure may be protected by Lender's Mortgage Insurance, the relevant underwriters may also face significant exposure. It should be noted that Lender's Mortgage Insurance partially protects the lender in the event that a mortgage cannot be repaid, but does not offer any protection to the borrower.

International situation

Vulnerability of coastal assets to rising sea levels is a global problem. The OECD study "Ranking Of The World's Cities Most Exposed To Coastal Flooding Today and in the Future" identifies total assets and populations of large coastal port cities around the world currently exposed to flood, and those that will be at risk in 2070 as a result of further development coupled with rising sea levels. Nations whose cities will face major risk include China and the USA. A copy of this paper is available at http://www.oecd.org/dataoecd/16/10/39721444.pdf

A range of mitigation and adaptation measures

A coastal land value insurance scheme would involve establishing a fund into which owners of low-lying coastal land would pay a regular levy so as to provide compensation when (or if) sea hazards cause their property to become unusable.

Such a scheme would fit within the context of a range of other strategies and approaches available to government and coastal managers to reduce or adapt to the hazards threatening coastal land. Examples of such measures available include:

- investment in permanent engineering structures such as sea walls, groynes (structures which run perpendicular to the shoreline to interrupt tidal flows and/or

prevent sediment transportation along the shore), artificial reefs, flood barriers etc (note these are capital intensive, and run the risk of exacerbating the problem or creating unintended damaging consequences in other locations)

- active beach sand replenishment programs
- canals, dykes, pumps, levees, and importation of fill
- plantings (eg dune grasses, mangroves) to absorb the ocean's energy and/or stabilise erosion-prone surfaces
- sacrifice of land
- land buyback schemes

Some of the additional strategies focusing on protection of life and built property are effected through land use planning and zoning instruments. Strategies include:

- minimum floor heights and structural requirements for foundations
- deep setback of buildings from shoreline
- relocation of buildings or infrastructure (including capacity for emergency relocation of demountable buildings, such as is mandated in parts of Byron Shire, NSW)
- monitoring, emergency warning and evacuation procedures.

Scheme design: parallels with familiar concepts

In simple terms, all landowners covered under a coastal land insurance scheme could be required to pay an annual levy based on a percentage (say 2%) of land value into a fund for a fixed term of no more than (say) 50 years. Should the land become unusable, the landowner would receive the entire land value in compensation, and title to the land would revert to government. Under one possible public-private partnership model, this insurance could be sold via private insurers provided that the government gave an undertaking to pay the annual premiums into the scheme for the remainder of the original 50-year term for any land that was deemed unusable from the date that the land was deemed unusable (thereby providing a form of re-insurance to the scheme).

Alternatively the scheme could be wholly operated by government but this would expose the government to potentially very large peak compensation outlays at relatively short notice in future years which would coincide with more general demands on government for general community reconstruction and funding that would obviously arise in such circumstances. Hence, the public-private partnership model would provide a cost effective pre-arranged financing option that would cushion the impact of such a catastrophe on government finances.

The design of such a scheme could draw together elements of three diverse but familiar concepts:

- the **traditional whole of life insurance policy** is a long-term savings and insurance product which involves an individual paying a small regular premium, guaranteed to stay level for life, in return for a large sum insured payable on death. An insurance payment under the policy is inevitable, with the main uncertainty being the timing of death.

- **land taxes and mandated insurance schemes** such as national flood insurance schemes in other countries; and

- **Australian Reinsurance Pool Corporation** for terrorism insurance which blends private and public reinsurance for different layers of exposure.

Parallels between whole of life insurance and coastal land value insurance

Whole of Life Insurance	Coastal Land Value Insurance Fund
The risk of payment (death) increases with time as the person ages.	The risk of payment increases with time as the underlying sea level rises.
The insurer accepts a regular annual premium that stays level for as long as a person stays alive, ceasing at age 95.	Annual levy is payable over a finite long-term period, such as 50 years, stays "level" (maybe relative to some index), and ceases if the property becomes unusable.
In return, the insurer guarantees to pay out a fixed sum insured whenever the person dies.	The fund guarantees a defined compensation payment once the property becomes unusable
The insurer charges enough in the early years to build up and invest a fund so that it can pay everyone, regardless of whether they die early or late.	Payment is guaranteed regardless of how soon or late the property becomes unusable.
The insurer uses projections of population mortality, together with individual mortality risk factors (age, health, lifestyle) to calculate each person's premium.	The insurer uses rating factors such as regional sea level rise projections, storm / cyclone risk factors and individual properties' Digital Elevation Model data to rate risks.
The insurer buys reinsurance in case mortality experience turns out much worse than expected.	Reinsurance (ultimately with government) is in place in case destruction by high sea levels occurs much faster than expected.
Annual review process distributes emerging surplus via bonuses added to the sum insured.	Scope for a regular review process to promote equity as experience emerges.

Parallels with existing mandated insurance schemes

There are a variety of structures whereby members of the community are compelled to contribute towards the cost of compensating for contingent losses. Examples include CTP and workers compensation schemes, or national flood insurance schemes in other countries.

Land taxes are of course a familiar mechanism whereby governments use the value of land as a basis for calculating and collecting payments.

Parallels with Australian Reinsurance Pool Corporation

Commercial insurers responded to the 9/11 terror attacks by introducing terrorism exclusions, and government believed this would hamper commercial project development. In response, the Federal government introduced a terrorism insurance scheme - a hybrid public-private model that combines layers of terrorism risk retention:

- risk retained by property owners (the policy excess, plus any damage exceeding the government post-funding limit)
- risk retained by commercial insurers
- a government-backed reinsurance pool with a line of credit, and
- post-funding by government, up to a specified total, in the event of insured terrorism losses.

Scheme funding and operation: government or public-private partnership?

IAG considers for the following reasons that it is unlikely to be feasible for the private sector alone to be able to provide such an insurance scheme.

- Because rising sea levels are a significant global issue, this risk will be likely to impact globally at much the same time and is therefore likely to have a greater impact than the global private reinsurance market is equipped to manage in the absence of government financial backing.

  The world's private reinsurance markets rely on geographic diversification of risk, expecting that poor experience in some locations is likely to be offset by good experience in others. The global nature of climate-change-induced rising sea levels would severely limit the capacity for geographic diversification of this risk.

  Further, there is also expected to be some local correlation of risk, as groups of claims would be expected to emerge at the same time due to regional weather effects such as storms and storm clusters causing major erosion events.

- The extent to which government and the international community will restrict atmospheric concentrations of GHG and mitigate climate change remains unknown, as does the extent to which Australian governments will introduce adaptive measures to physically protect coastal land.

- "Wildcard" risks cannot be ignored, particularly the risk of rapid disintegration of major land-based ice sheets leading to rapid and significant increases in global sea level considerably in excess of current IPCC projections.

- Government has control over coastal hazard risk mitigation programs and the overall development, management, protection or sacrifice of coastal land. Government also has direct control over the land use planning instruments that, depending on scheme design, may trigger a claim by prohibiting future residential or commercial use of the land. Government thus has significant influence over the likelihood and timing of claims.

Accordingly, IAG envisages that a coastal land value insurance scheme could be operated and funded either by government alone, or could also draw on private sector involvement as outlined above.

The table below outlines design and funding implications of these two approaches.

Basis of funding and operation	***Government only, with no private insurer participation***	***Public-private partnership***
Responsibility for payment of regular levy into the scheme	Landowners would pay a regular levy up until the date of making a claim, at which time their levy would cease and title to their land would revert to government.	Landowners would pay a regular levy up until the date of making a claim at which time their levy would cease and title to their land would revert to government. Government would then take over the responsibility for meeting the regular levy payments into the fund for the remainder of the agreed term.
Risk capital	At the time of a claim, Government would be liable for the funding to pay any difference between the amount claimed and the balance of the fund accumulated up to the date of claim. This could have a	The private sector would provide the capital to pay any difference between the amount claimed and the balance of the fund accumulated up to the date of the claim. Private sector capital arrangements would be

Basis of funding and operation	*Government only, with no private insurer participation*	*Public-private partnership*
	substantial fiscal impact.	facilitated by the guaranteed future stream of levy payments from government.
Scheme coverage	Government could structure the scheme to allow either compulsory or voluntary participation. Mandating that all coastal property owners must take out such insurance could be problematic: there are still remote parts of Australia where owners might assess the value of the land as low, and there may be many persons who would consider the imposition of compulsory insurance as onerous and unnecessary.	Scheme participation would need to be compulsory. The challenges for insurers under a voluntary scheme arrangement would include: ▪ Anti-selection (whereby "freeloaders" do not elect to join the scheme until they are confident that a claim is imminent) ▪ If there is limited take-up under a voluntary scheme, satisfactory pooling of risk will not be achieved.

Further practical design considerations

Definition of the insured event

The proposed insurance scheme will require a clear definition of the circumstances under which a claim is payable due to actual or imminent permanent inundation by the sea. An appropriate trigger for an insurance claim under the scheme may be, for example, the introduction or new application of a government land use zoning instrument that prohibits residential or commercial occupation of the land.

As climate-change-related sea level increases emerge in future, land value might be lost as a result of:

- Physical erosion of the land, eg when some or all of the property (even one lying some metres above sea level) collapses into the sea due to wave action.
- Permanent submersion of some or all of the land due to erosion and/or increases in tidal levels.

- A government instrument that prohibits continued occupation of the land due to sea hazard.

- A government instrument prohibiting future building development on the property due to sea hazard.

Identification of properties to be included under the scheme

The proposed insurance scheme will require a clear definition identifying which properties are to be covered.

One appealing option would be to define scheme coverage using a simple elevation-based definition such as "properties lying within (say) 1 metre below the Highest Astronomical Tide mark".

Unfortunately, the expected unevenness of coastal inundation, being sensitive to different local conditions, means that such an approach may not distinguish adequately between land at high risk and land that is reasonably expected to remain safe.

In defining the scheme coverage, there are a number of promising avenues for further exploration.

As noted previously, Australian governments are conducting several projects to better map the extent of coastal asset vulnerability to rising sea levels. An illustration from one such study is presented on the following pages.

At least some coastal regulators at local government level have introduced planning instruments that recognise the risk of sea level rise, combining it with an understanding of elevations, local geomorphology and property elevations, tidal behaviour and storm risk (eg Pittwater Council).

Academic research to develop coastal risk contours (for example, Dr Peter Cowell, Insitutute of Marine Science and School of Geoscience, University of Sydney) may also provide a basis for identifying appropriate coverage of the scheme.

Images

City of Port Phillip / St Kilda foreshore – storm surge inundation modeling with rising sea levels

The aerial photograph in Figure 2 (page 12) shows Melbourne's St Kilda foreshore and surrounds, located on Port Phillip Bay. The inset box represents a digital elevation model of the same area and shows regions of low to high elevation above sea level.

The different blue-shaded regions mapped onto the photograph illustrate the extent of storm surge inundation modeled under a range of potential storm surge plus sea level rise scenarios. These are presented in the NATCLIM study *Planning For Climate Change: A Case Study - City Of Port Phillip.* (2007) which is available at http://www.portphillip.vic.gov.au/attachments/o23588.pdf

The NATCLIM report explains that past storm surge heights in the study area have been modeled at 1.25 m, and this is represented by the area shaded palest blue near the canal. Based on past events, allowances for increased wind speed and a range of possible future sea level rises, predictions of possible future storm surge levels in Port Phillip Bay include:

- A storm surge of 1.65 m with a 35 cm sea level rise (represented in the illustration by the next shade of blue)
- A storm surge of 2.06 m with an 80 cm sea level rise (represented by the second darkest shade of blue) and
- A storm surge of 2.31 m with an 80 cm sea level rise and a 10% wind speed increase (darkest blue region).

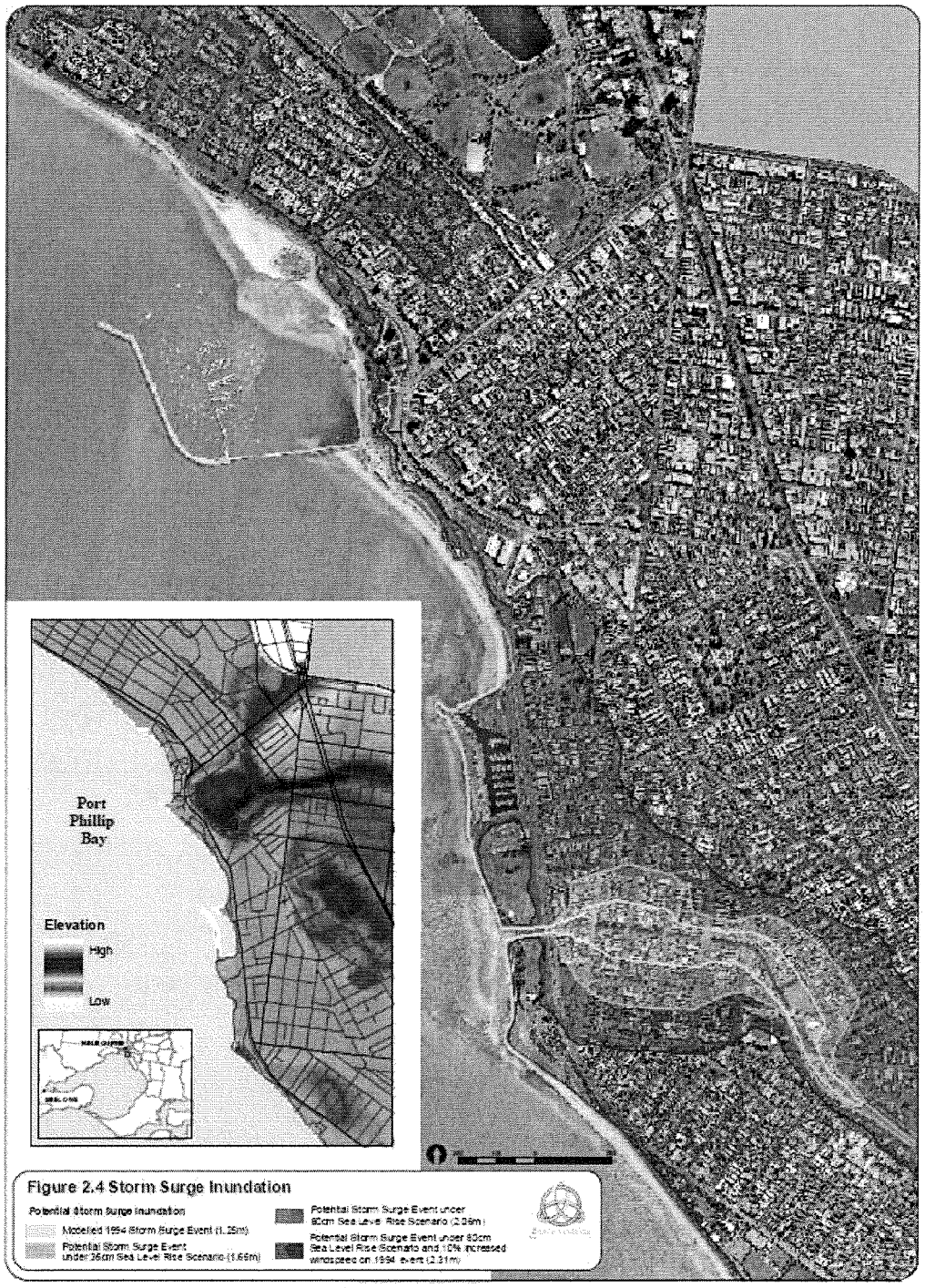

Figure 2: Port Phillip Bay inundation
Source: http://www.portphillip.vic.gov.au/attachments/o23359.pdf
See preceding pages for explanatory comments.

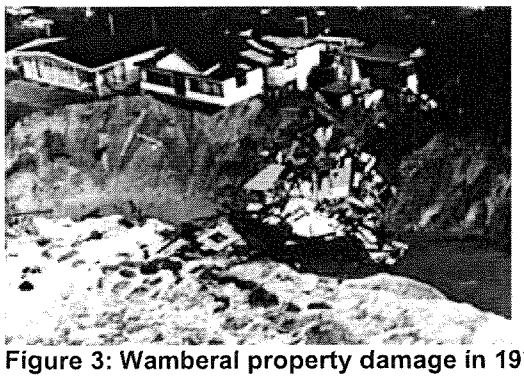

Figure 3: Wamberal property damage in 1978 due to beach erosion
Source:
http://www.environment.gov.au/coasts/publications/nswmanual/appendixc2.html

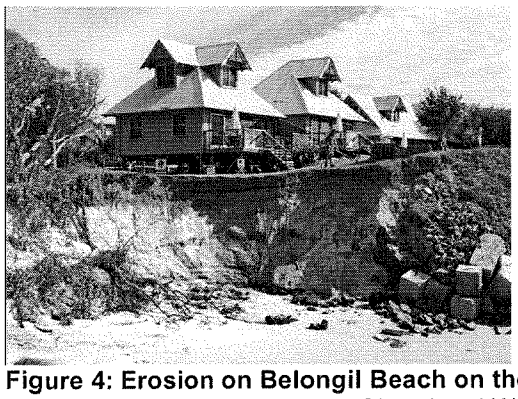

Figure 4: Erosion on Belongil Beach on the NSW Far North Coast
Copyright: NSW Department of Land and Water Conservation
Source:
http://www.abc.net.au/rn/backgroundbriefing/galleries/2007/2115895/belongil.htm

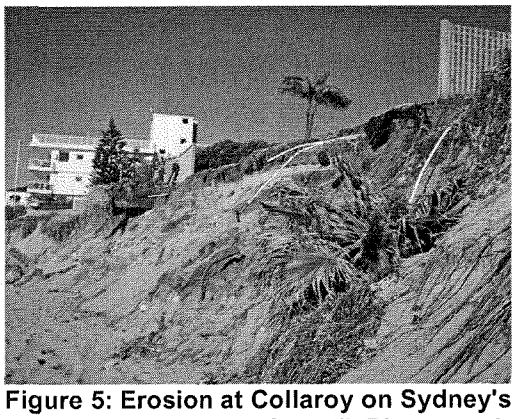

Figure 5: Erosion at Collaroy on Sydney's northern beaches
Copyright: Warringah Council; **Photographer:** Daylan Cameron
Source:
http://www.abc.net.au/rn/backgroundbriefing/galleries/2007/2115895/collaroy.htm

Part Two: Impacts of climate change on coastal areas and strategies to deal with climate change adaptation

Weather and climate are "core business" for the general insurance industry. At its most basic, insurers underwrite weather-related losses (including physical damages to insured property and interruptions to business continuity) by assessing, pricing and spreading the risk and then meeting claims when they arise.

A changing, less predictable climate has the potential to reduce insurers' capacity to assess, price and spread weather-related risk. It also has the potential to increase the overall cost of risks insured unless appropriate action is taken by the general community to mitigate and adapt to this risk.

Climate change also presents operational challenges to insurers and governments. Severe weather events such as cyclones or major hailstorms simultaneously damage tens of thousands (or more) properties, generating a sudden surge in demand for repair services and materials. Ensuring that sufficient capacity is available to meet such dramatic spikes in demand presents challenges for insurers and the wider community, particularly when transport, power and communications infrastructure might also be compromised and the workforce disrupted by the same weather event.

Insurers are not just concerned about these weather "mega-events". Insurance industry experience shows that even small increases in event severity (< 10%) can cause multiple increases in damages (UNEP Finance Initiatives, Climate Change & The Financial Services Industry Module 1 – Threats and Opportunities, 2002). IAG's analysis of our own experience shows that just a 25% increase in peak wind gust strength (from the 40-50 knot range up to the 50-60 knot range) can generate a 650% increase in building claims. This is because once wind gusts reach a critical threshold, entire roof sections are blown off or additional damage is caused by falling trees and flying debris. Yet below this threshold damage may be minimal.

Insurers often classify severe weather events in terms that reflect the likely frequency of events of similar severity (eg in very simple terms, as a "1 in 100 year event"). Such classifications are based in part on the analysis of past events and long-term weather records. A changing and less predictable climate reduces the adequacy of past weather records as a basis for the models used to estimate the return period for severe weather events.

Accordingly, IAG has for several years been sponsoring research to understand how current weather risks and claims distribution functions might be expected to change as temperatures rise. Two of the coastal regions on which this research has focussed are South East Queensland and the Sydney Basin.

South East Queensland Cyclone Risk

During 2006-07, Queensland's Gold Coast recorded the largest population increase of all Local Government Areas in Australia (ABS).[1]

Coastal communities in the heavily populated and rapidly growing region of South East Queensland and northern New South Wales face increased cyclone activity as a result of climate change. Cyclones generate significant damage to coastal property through wind damage, storm surge and water entry (rain and/or flood), and can cause injury and death.

IAG-sponsored modelling of the effect of climate change on South East Queensland tropical cyclones (TCs) over the period 2000-2050 is published in the paper Leslie, Karoly, Leplastrier and Buckley (2007), *Variability of tropical cyclones over the southwest Pacific Ocean using a high resolution climate model,* Journal of Meteorology and Atmospheric Physics. This research indicates:

- a marked increase of about 15% in the average number of TCs each decade in the most severe cyclone categories 4 and 5;
- TCs that are more intense than ever previously experienced in the Australian region;
- TC tracks that extend further south than previously; and
- a southwards shift of over 2 degrees of latitude in the regions where TCs originate.

These results are not intuitively surprising as, in simple terms, higher levels of heat energy in the air and at the sea surface as a result of climate change will be able to sustain higher levels of cyclone activity.

One of the potential cyclone tracks modelled by IAG is illustrated in Figure 6 below. This modelled potential track is notably severe in terms of the distance travelled over land. (Other tracks may be more severe in terms of their intensity and/or impact on dense population centres.) Within the area of maximum winds 30km on either side of this particular potential cyclone path, IAG estimates a population exceeding 1.6 million, more than 600,000 occupied dwellings, and total domestic building and contents insured exceeding $150 billion. Munich Re, a prominent global reinsurer, has estimated that insured losses from such an event would be in the order of $15 billion.

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1 http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/3218.0Main%20Features32006-07?opendocument&tabname=Summary&prodno=3218.0&issue=2006-07&num=&view=

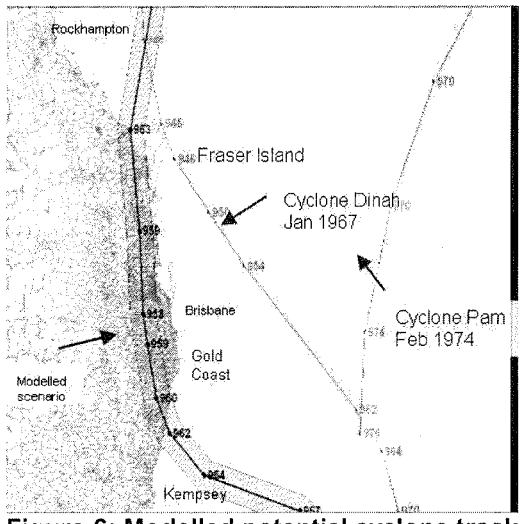

Figure 6: Modelled potential cyclone track

Sydney Basin Hail Risk

Sydney represents a major coastal community with around 4.3 million residents as at 30 June 2007 (ABS[2]).

IAG-sponsored climate change modelling of the Sydney Basin region is published in Leslie, Leplastrier, and Buckley (2007), *Estimating future trends in severe hail storms over the Sydney basin: A climate modelling study*, Atmospheric Research.

This research indicates a significant increase in the frequency and severity of hailstorms in the Sydney Basin region over the period 2000-2050. This result is not intuitively surprising, as Sydney's hail storm activity is greatest during the warmest months of the year, reflecting (in very simple terms) the capacity of warm air to hold more moisture and thus enable hailstone formation.

Hail storms generate major damage to property and can cause injury and death. The Sydney hail storm of 1999, with 9cm hail stones, caused insured losses of $1.7 billion (1999 dollars) and is the largest insured event in Australia's history after allowing for consumer price inflation. One person was killed in this event, 500 injured and 500 people homeless, according to the Emergency Management Australia Disaster Database. In 2007, a Sydney hail storm resulted in 30 people requiring treatment by ambulance officers after being injured by hail at an outdoor party.

The largest future climate hail produced by the model simulations reaches 17cm diameter, which is close to the current official largest hail recorded (Nebraska, USA, 2003).

2

http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/C0DC3A6796ACE31DCA25741A000DECF1/$File/32180ds0003_2001-07.xls#'Table 1'!A1

Hail formation is highly sensitive to local topography, so the results of this research cannot necessarily be generalised to other coastal locations.

Market distortions encourage underinsurance

Insurance Council research shows that nearly 25% of all Australian households do not have any form of home or contents insurance (*The Non-Insured: Who, Why And Trends*, May 2007, available at http://www.insurancecouncil.com.au/The-Non-Insured-Who-Why-and-Trends/default.aspx). IAG contends that this imposes an unwelcome burden on government and on coastal communities when coastal catastrophes occur, and that a major contributor to this situation is the current taxation arrangements which directly increase the cost of insurance.

The impact of combined Federal and State government taxes and charges on insurance premiums is to increase an insurance premium in metropolitan areas by up to 77.9% for business insurance, and up to 44.0% for home insurance. In rural Victoria the impost is even higher. (*IAG submission to the New South Wales Independent Pricing and Regulatory Tribunal (IPART) Review of State Taxation, 20 November 2007*. This document is available at http://www.iag.com.au/news/gov_submissions/docs/20071123a.pdf.)

Research by Access Economics, presented in the Insurance Council's 2008 Federal Government Budget Submission, finds that stamp duties on general insurance are amongst the least economically efficient taxes in Australia. (http://www.insurancecouncil.com.au/ArticleDocuments/42/2008%20Fed%20Budget%20Submission.pdf.aspx)

Further, in New South Wales, Victoria and Tasmania, fire services levies on insurance policies add significantly to the cost of insurance, distorting price signals and discouraging private uptake of insurance. As noted by the New South Wales Treasury,

> "The principle underpinning the Fire Services Levy is to ensure beneficiaries of the fire services contribute to funding the service. However, the presence of non-insurance and under-insurance indicates that a significant proportion of beneficiaries are either not contributing to funding the fire services or are under contributing.
>
> "As a means of matching contributions to fire risk, the levy performs poorly particularly for householders. Fire risk is only one element of insurance policies, and it is evident that there is not [a] strong correlation between fire risk and fire services levy contributions.
>
> "A weakness of the current arrangements is that the government is not able to ensure the extent of recovery from each type of insurance policy category is appropriate. However, even if this were addressed, the fact remains that insurance policies are much broader in scope than fire so that the premiums will substantially reflect risks other than fire risk.
>
> "It is also apparent that insurance is relatively highly taxed – with the fire services levy the highest impost. High tax levels are likely to discourage

insurance and lead to under-insurance with adverse consequences for resource allocation and economic growth."

(New South Wales Treasury submission to the New South Wales Public Accounts Committee Inquiry into Fire Services Funding, 2003, quoted in IAG's submission to IPART, Page 8. This document is available at http://www.iag.com.au/news/gov_submissions/docs/20071123a.pdf.)

IAG argues that there is a clear social and economic case for eliminating or at least reducing State insurance taxes and charges as a priority for any reform agenda. This case is based on recognition of the essential benefits of insurance to the economy and community generally and of the role of the tax system in encouraging insurance coverage.

Governments should recognise the essential benefits of insurance to the economy and community generally and implement a taxation system which does not penalise insurance relative to other more discretionary purchases.

Adaptation to climate change

IAG commends to the Review the recent public policy paper of the Insurance Council of Australia, *Improving Community Resilience To Extreme Weather Events,* which is available at http://www.insurancecouncil.com.au/ArticleDocuments/41/Improving%20Community%20Resilience%20to%20Climate%20Change%20160408.pdf.aspx

IAG recognises the crucial role of government in providing a comprehensive and clearly defined regulatory framework that promotes community resilience to risk and facilitates more affordable premiums and more predictable claims costs. Government has a particular role in encouraging and regulating risk-appropriate development of the built environment and providing an appropriate emergency services framework.

IAG suggests that key areas of government responsibility include:

- **Building standards.** IAG's post-event analysis of building damage after major cyclones such as Cyclone Larry demonstrates that the implementation of relatively low-cost mandatory cyclone building standards in the past (since 1980 in Northern Queensland) has significantly reduced the damage to properties built to comply with such standards.

  There is a crucial role for government to support community resilience by ensuring that new buildings in at-risk areas embody appropriate measures to withstand hazards such as cyclone, hailstorm and fire.

  In particular, as the regions at risk from cyclone are anticipated to spread further south, IAG recommends that the geographic extent of cyclone building standards be reviewed and extended.

  Further, until now, building code standards have focussed in principle on protecting life and safety. IAG suggests that it is desirable to enhance building

standards so that they also cost effectively protect the property itself, and its owner's financial interest, without sacrificing safety performance.

It is proposed that such an approach, in improving the resilience of the built environment to severe weather, would also enhance the community's economic and social resilience to climate change.

IAG notes that severe weather events can cause significant and costly physical damage to ancillary structures such as fences and sheds that are not currently covered by building standards. There is scope for further data analysis and research in this area in order to inform a review of the current situation.

- **Planning codes.** Government has a crucial role to play in risk-appropriate land-use planning and zoning. Land that is, or becomes, at unacceptable risk from hazards such as flood or coastal inundation including storm surge should not be zoned for residential or commercial use. Without sound and consistent government controls, there is little to prevent ongoing building in flood plains or in coastal locations of extreme vulnerability.

  This is a particular challenge for Local and State Government if not supported by a consistent Federal government approach to such matters.

- **Flood risk data.** Flood remains a significant community issue that stands to worsen with the various inundation predictions arising from current climate change models.

  IAG is an active participant in the general insurance industry's considerable work towards developing greater access to residential flood products for Australian communities when the risk of flooding is reduced to an acceptable level through mitigation measures.

  IAG contends that flood maps represent information that is of significant public interest and importance, and that it would be inappropriate for governments to restrict in any way public access to flood map data. For all parties with a legitimate interest in a property – including potential purchasers, tenants, residents, developers and insurers – flood risk mapping data for individual properties should be up-to-date and transparently accessible at nominal cost

- **Natural Disaster Relief Framework.** IAG supports the Insurance Council's recommendation for an urgent review of present funding levels and arrangements for the National Disaster Mitigation Program, with a view to adapting funding levels and mechanisms to suit the nature of the increasing hazard. Many public infrastructure and structural hazard mitigation projects take years to design and construct and therefore must be commenced well in advance of the hazard becoming a reality.