

July 19 2008

The Impact of a Rising Sea Level from a Local Perspective

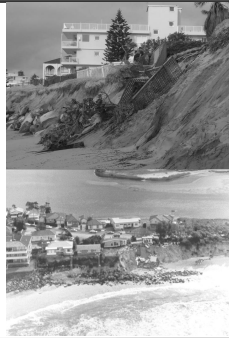
17th NSW Coastal Conference
Wollongong
5th November 2008

Doug Lord
Manager Coastal
NSW Department of Environment and Climate Change

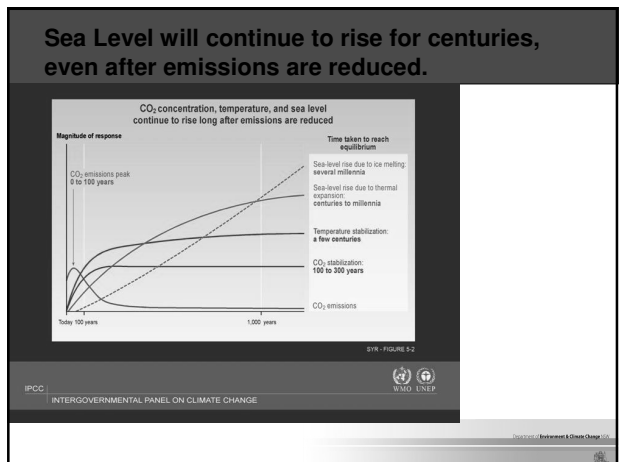
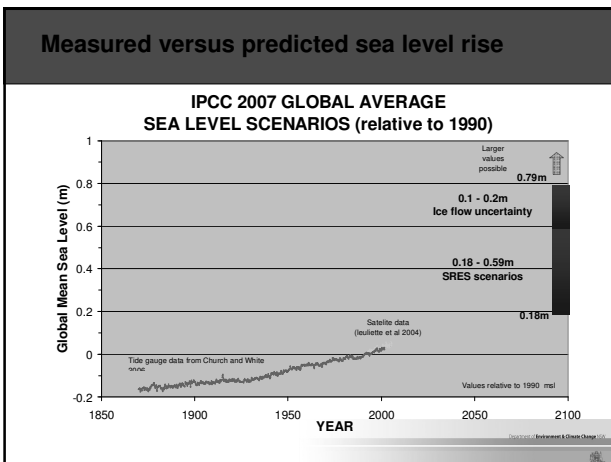
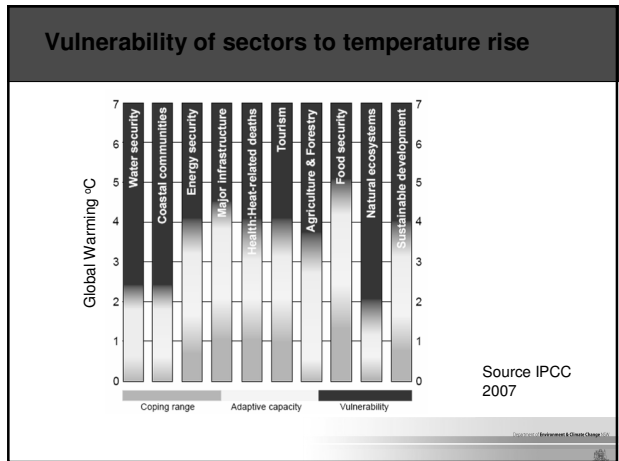
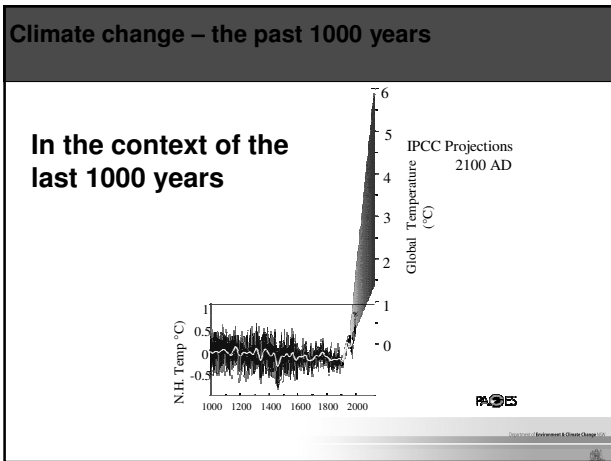
Department of Environment & Climate Change

Outline

- Review of the Science
- Coastal Erosion
- Flooding/Inundation
- Ecological Implications
- Key messages



Department of Environment & Climate Change



Impacts of sea level rise

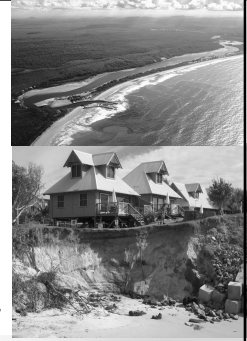
Sea Level Rise will result in:

- Foreshore recession and increased storm erosion
- Increased storm surge flooding
- Increased flooding of lower river reaches
- Stormwater flooding as drainage slopes decrease
- Submergence of sewerage infrastructure
- Saline intrusion into rivers and groundwater
- Loss of habitat (sandy beaches, estuaries, wetlands)



Impacts of sea level rise

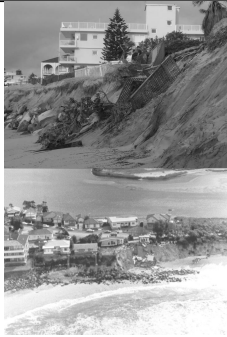
- Remobilisation of tidal deltas
- Loss of coastal lagoons
- Changes to mariculture
- Failure of coastal protection
- Wharves, jetties and boat ramps inoperable
- Loss of clearance under bridges
- Social dislocation (user vs user, neighbour vs neighbour)
- Community expense



"On the coast there will be more losers than winners"

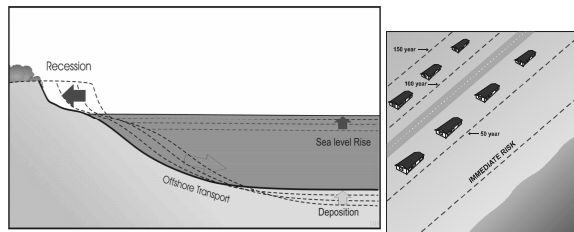
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Beach recession

as sea level rises the shoreline retreats



$$\text{Retreat} \approx \text{SLR} \times 1/\text{Slope}$$

Loss of recreational beach width due to SLR



Loss of recreational beach width due to SLR



Loss of recreational beach width due to SLR



Loss of recreational beach width due to SLR



**Loss of recreational beach width
Mitchell Street Stockton**



Wamberal Beach 1942

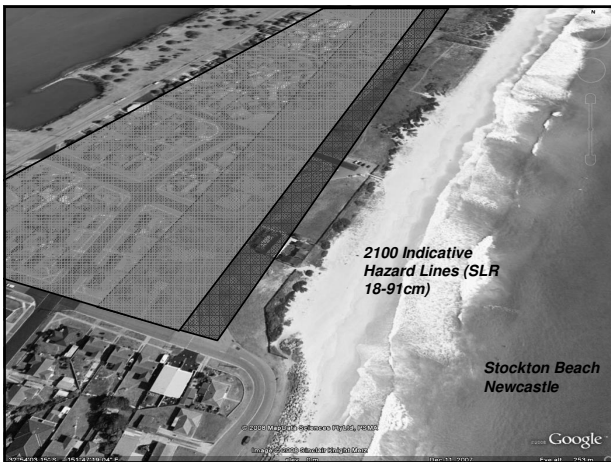
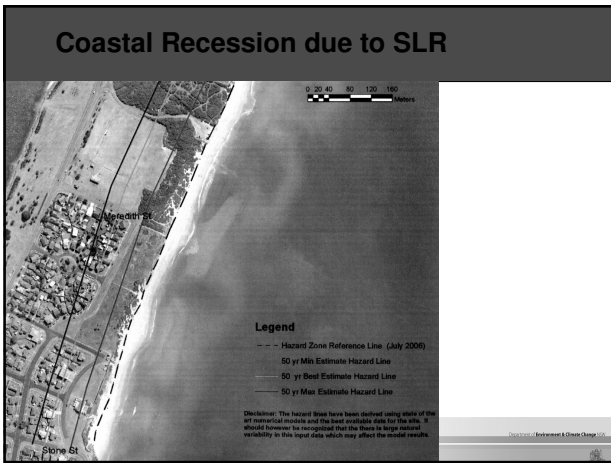
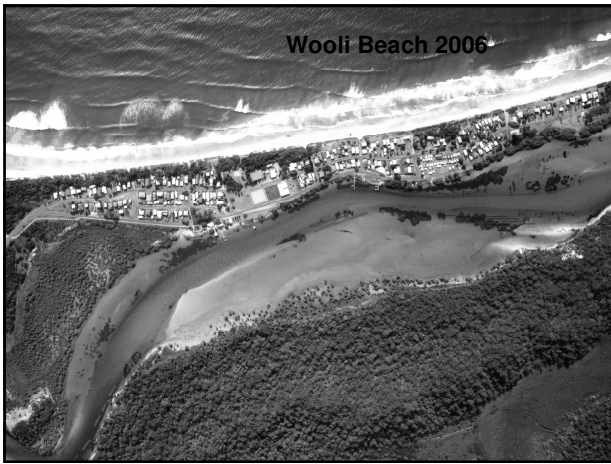


Wamberal Beach 2006



Wooli Beach 1941





Design dilemmas

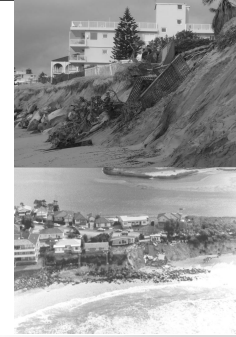
- For existing development, options are extremely limited protect/adapt or relocate.
- Do we act now or retro-fit a solution?
- In the short term protection/adaptation successes will occur. Ultimately, some protection options may be doomed to failure (tens to hundreds of years?).
- Real opportunities exist for “green field” developments.
- The “Precautionary Principle” which underpins ESD suggests a risk averse approach to planning for climate change (including sea level rise and flooding).

New development and infrastructure

- Analysis and decision making should be risk based.
- In the absence of certainty, a conservative approach should be adopted for consideration of climate change impact on natural hazards.
- Conservative decisions should not be seen as permanently sterilising land but rather as allowing time before locking in an outcome.
- May be politically unpalatable and does not satisfy all community expectations (individual rights).

Outline

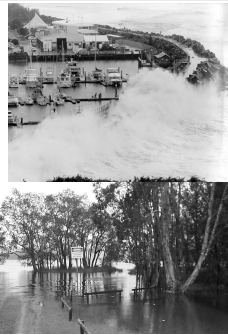
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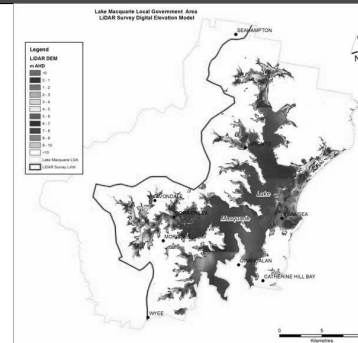
Implications for Design

Climate Change Impacts:

- Design parameters traditionally based on historical records/measurement/analysis.
- The playing field is no longer level, design parameters are changing
- Factor of safety for existing designs will change.
- Materials are increasingly difficult to source.



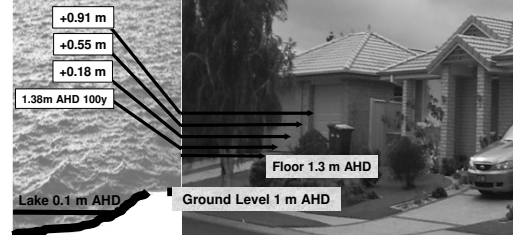
Lidar Data for Lake Macquarie Foreshores



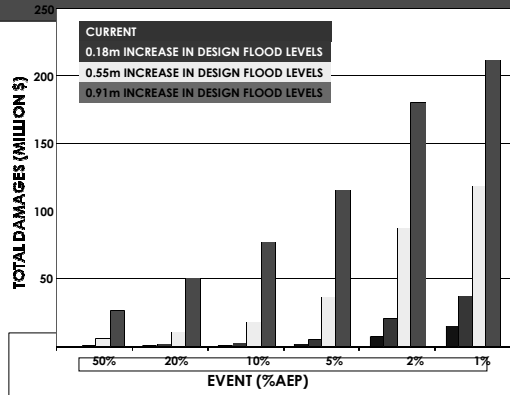
Swansea Channel, Lake Macquarie



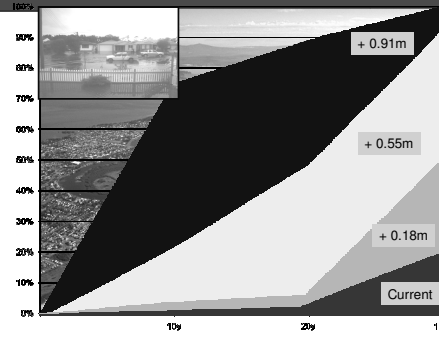
Lake Macquarie Direct Sea Level Impacts



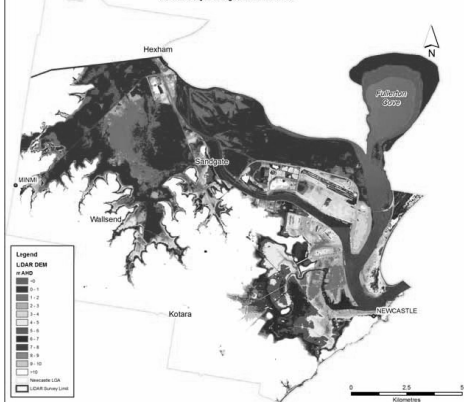
Impact of Ocean Rise on Flood Damages



Percentage of Buildings Inundated



Newcastle City Local Government Area
LiDAR Survey Area Digital Elevation Model



Tidal Flooding Islington 27/11/2003



Predicted tide
Fort Denison
1.99m at
11.33 am

27.11.2003 11:33

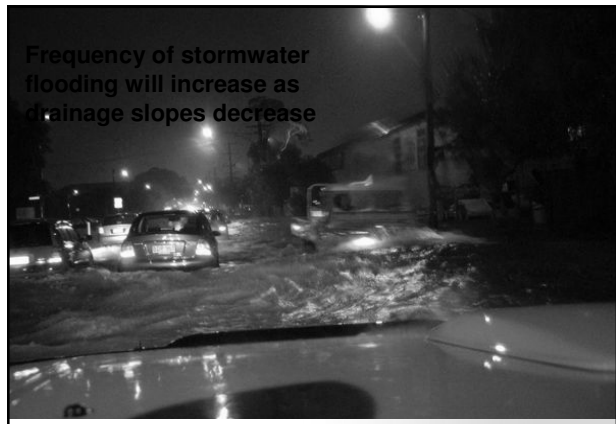
Tidal Flooding Carrington/Linwood 27/11/2003



Predicted tide
Fort Denison
1.99m at
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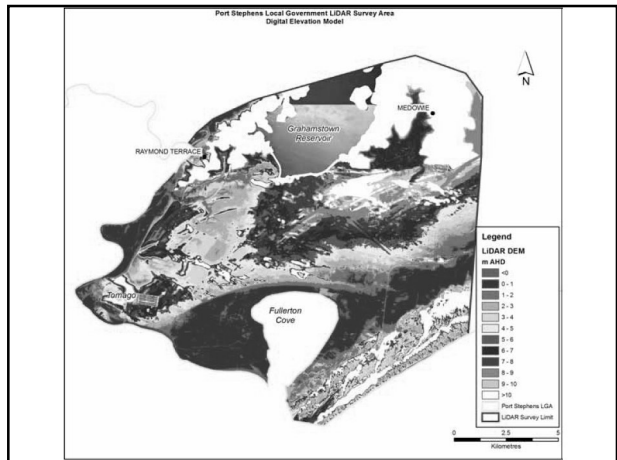
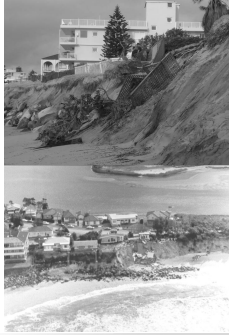
27.11.2003 10:51

Frequency of stormwater
flooding will increase as
drainage slopes decrease



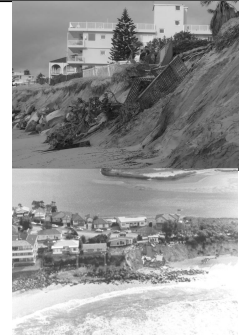
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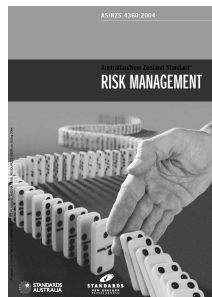
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Key messages

- Climate Change poses a **Risk Management** problem.
 - to limit loss of life and property
 - to limit environmental degradation
 - to ensure ecologically sustainable development for the future



Key messages

“To address sea level rise and its impacts requires partnerships between science, government, business and community sectors. These partnerships are required now and will need to be strengthened during the 21st century”.

Source:
John A Church et.al. “a post-IPCC AR4 update on sea level rise”.