



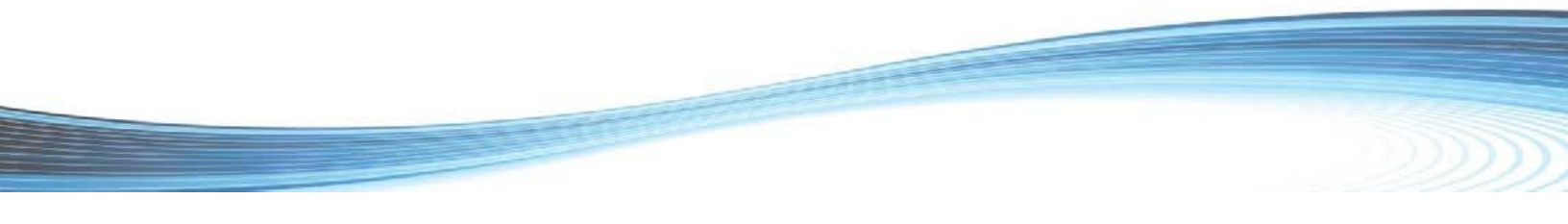
Sydney Coastal Councils Group & CSIRO

Mapping & Responding to Coastal Inundation

Project Launch Final Report



The Southern Function Room, City of Sydney Council
Level 4, 456 Kent Street, Sydney
Thursday 4 October 2012 8.30am – 1.30pm



“Mapping and Responding to Coastal Inundation”

Given that it is impossible to stop climate change impacts and resultant sea level increases and more intense significant storm events; Local, State and Federal authorities are faced with the need to consider key areas at immediate to medium threat. This information needs to then be applied to planning mechanisms and management strategies to cope with future impacts of increased coastal inundation and erosion directly impacting existing, redeveloped and new development within their coastal landscape areas.

This project maps areas of risk, utilising sophisticated modeling together with Councils own information sources (e.g. LiDAR technology) to determine risk and develop consistent model planning and management responses in consultation with relevant state government agencies and the broader community.

This project has been made possible with joint funding by the Australian and NSW Governments under the Natural Disaster Mitigation program.



Project Objectives

- Enhance the capacity and knowledge of local governments and other decision makers in the region to prepare for and adapt to climate change (specifically focusing on sea level rise and extreme water levels, eg storm surges),
- Develop an approach to climate change assessment and adaptation with a particular focus on relevant planning provisions in identified immediate and future coastal inundation (flood) zones and potential beach erosion escarpments,
- Develop and distribute associated community risk disclosure information and corresponding community and stakeholder education programs to better inform communities of the degree of risk(s).

Project Stages

Stage One: Effect of Climate Change on Sea level Rise and Extreme Sea Levels - A set of high resolution hydrodynamic model simulations have been produced in order to obtain current climate, as well as storm tide return level estimates and sea level rise considerations.

Stage Two: Development of planning guidance to integrate sea level rise and extreme sea level events into relevant planning strategies of the SCCG:

- Assess existing planning strategies (Australia and Internationally) ¹
- Identify gaps in information, knowledge, capacity or external barriers
- Develop model provisions, actions and implementation strategies

¹ The SCCG engaged the Environmental Defender's Office NSW (EDO) to conduct a comparative assessment of:

1. Australian State and Territory planning and coastal legislation and policies that address sea level rise, coastal erosion, coastal inundation and storm surge; and
2. regional and international jurisdictions.

The results of this analysis are presented in the report prepared by the EDO, a copy of which can be downloaded by clicking on the following link: [Audit of Sea Level Rise, Coastal Erosion and Inundation Legislation and Policy](#)

Stage Three: Develop and distribute community risk disclosure information and corresponding community and stakeholder education program:

- Assess existing education strategies within Australia and Internationally for addressing and communicating sea level rise and flooding impacts.
- Consultation with member councils and targeted community groups and individuals to identify gaps in information, knowledge and capacity as well as internal and external barriers for message transfers.
- Utilising outcomes of stage 1 and 2 and incorporating the above to develop and deliver freely available educational tools that build the understanding and capacity of relevant stakeholders.

MAPPING AND RESPONDING TO COASTAL INUNDATION

The Southern Function Room, City of Sydney Council

Level 4, 456 Kent Street, Sydney

Thursday 4 October 2012

8.30am – 1.30pm



8.30	REGISTRATIONS OPEN	
9.00	INTRODUCTION & WELCOME	Mr Geoff Withycombe, Executive Officer SCCG Dr Matthew Inman Program Leader CSIRO – Urban Systems
9.15	A LEGAL PERSPECTIVE	Ms Kirston Gerathy Partner HWL Ebsworth Lawyers
9.45	MODELLING AND MAPPING COASTAL INUNDATION (Stage 1)	Dr Felix Lipkin, Research Officer CSIRO- Marine and Atmospheric Research
10.45 – 11.15	MORNING TEA	
11.15	AUDIT OF SEA LEVEL RISE, COASTAL EROSION AND INUNDATION LEGISLATION AND POLICY (Stage 2 – Preliminary)	Ms Rachel Walmsley Policy & Law Reform Director NSW EDO
11.40	INCORPORATING COASTAL INUNDATION AND SEA LEVEL RISE INTO LOCAL AND REGIONAL PLANNING RESPONSES (Stage 2)	Dr Matt Inman Project Leader CSIRO- Sustainable Ecosystems
12.05	SUPPORTING LOCAL GOVERNMENT TO COMMUNICATE COASTAL INUNDATION (Stage 3)	Ms Anne Leitch Communications Advisor CSIRO - Climate Change Adaptation Flagship
12.45	PANEL SESSION (Questions - Implementation)	All Presenters
1.25	CONCLUDING REMARKS	Mr Geoff Withycombe, Executive Officer SCCG
1.30	LUNCH / NETWORKING	
2.00	FORUM CLOSE	

PROGRAM

A LEGAL PERSPECTIVE

Ms Kirston Gerathy

Partner | HWL Ebsworth Lawyers

Expertise: Climate Change and Sustainability, Government, Planning and Environment

Kirston Gerathy is a specialist Planning and Environment lawyer with a particular emphasis on the strategic, regulatory and environmental aspects of development and infrastructure projects. Kirston is highly skilled at working with multi-disciplinary teams to ensure project outcomes are achieved.

Kirston is recognised for her successful approach to the conduct of environmental litigation, and has been involved in a number of significant and seminal cases in both the Land & Environment Court and the Court of Appeal concerning land use development. Kirston has particular experience advising clients in relation to heritage conservation and the regulatory and compliance regimes relating to pollution of the environment. She regularly advises in relation to large-scale infrastructure augmentation including sewage treatment plants, water reclamation and supply and stormwater utilities.

Kirston has a special interest in managing ecological sustainability and biodiversity conservation issues including preservation of wetlands, native vegetation and threatened species.

Frequently retained in relation to release and renewal projects, Kirston has in depth experience in assisting clients to achieve strategic planning goals through the preparation of s94 contributions plans, local environmental plans, development control plans, voluntary planning agreements and management guidelines to facilitate sustainable development in conjunction with essential infrastructure, roadworks and public domain improvements.


MODELLING AND MAPPING COASTAL INUNDATION

Dr Felix Lipkin

Research Officer I CSIRO

Felix is a spatial scientist with CSIRO's Urban Systems Program and his key areas of research involve the development and use of 3D physical models of the built and natural environments to model energy demand, impact from natural hazards and urban sustainability.


For this project, Felix worked with Kathy McInnes and led the inundation mapping component of Stage One = 'Effect of Climate Change on Sea Level Rise and Extreme Sea Levels'



www.csiro.au


Mapping and Responding to Coastal Inundation Data Sources, Modelling and Mapping

04 October 2012



Content

- The Team
- Introduction
- Data Sources
- Interpolation
- Mapping onto High Resolution Topography
- Uncertainty in LiDAR Data
- What data you have!




The Team

- Dr. Matthew Inman – Project Leader

Effect of Climate Change on Sea-Level Rise and Extreme Sea Levels – (Stage 1 Team)


- Dr Kathleen McInnes – Technical Lead/Surge and Tide Modeling
- Felix Lipkin – GIS Mapping and Data Analyst
- Julian O’Grady – Wave Modeling



Stage 1

- Key Activities

- 1. Extreme event identification and analysis:**
Extreme sea level events are identified from episodes of elevated sea levels in tide gauge records.
- 2. Numerical Modeling of Stormtide:**
Detailed modeling of selected events. Modeling of tide, meteorological and wave forcing.
- 3. Numerical Modeling of 1 in 100 year storm:**
A plausible storm will be constructed that is based on historical storm data to produce a sea-level consistent with a 1-100 year event.
- 4. Inundation Analysis:**
Spatial Analysis of Inundation will be developed for input GIS software.



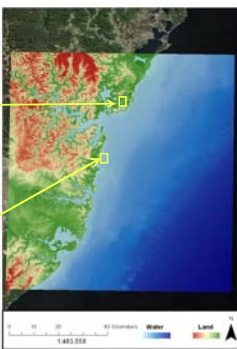

Bathymetric and Topographic Grid

Topography

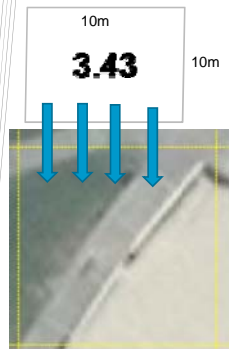


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2.1	1.2	2.3	2.4	2.6
1.3	3.2	3.2	1.2	2.3

Bathymetry

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-2.1	-1.2	-2.3	-2.4	-2.6
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Each Grid

LiDAR (Light Detection And Ranging)

CSIRO

Sonar(SOund Navigation And Ranging)

CSIRO

Data Sources

Table 6: Sources of topographic and bathymetric data used in the development of a seamless elevation dataset for Australia

ID	Provider	Resolution	Linear Vertical Accuracy	Horizontal Datum	Vertical Datum	Feature Type	Year	Format
A	Mandurah Coastal	City 2m	± 0.1m	GD54M	AGD	Australian	2008	ArcInfo
B	Geelong Coastal	City 2m	± 0.1m	GD54M	AGD	Australian	2007	ArcInfo
C	Subiaco Coastal	City 2m	± 0.1m	GD54M	AGD	Australian	2008	ArcInfo
D	Hornsby Coastal	City 2m	± 0.1m	GD54M	AGD	Australian	2008	S, Y, Z
E	Port Phillip	City 2m	± 0.1m	AGD	-	Common	1984	S, Y, Z
F	Dalhousie	City 2m	± 0.1m	WGS84	-	S, Y, Z	2008	S, Y, Z
G	Port Phillip	City 2m	± 0.1m	WGS84	-	S, Y, Z	2008	S, Y, Z
H	Department of Environment	City 2m	± 0.1m	WGS84	-	-	-	S, Y, Z

CSIRO

And for all remaining areas...

Australian Bathymetry and Topographic Grid

- Sourced from Geosciences Australia
- Derived in 2009 and of a 250m resolution
- Used for deep Ocean Bathymetry

CSIRO

Topography LiDAR

Hornsby City Council
Sourced from Hornsby City Council
2m GRID and derived in 2008

High : 276.527
Low : -0.376826

New South Wales Coast, Sydney 2007, Sydney 2008, ALS Sydney Hydrologically enforced dataset. Collected by AAM Hatch Developed by SKM

CSIRO

Sydney Harbour

- Sydney Ports Corporation Multi-beam data - 0.5m Resolution and Collected in 2010.
- Data is re-sampled to 5 m using aggregation of maximum values.
- Values are multiplied by -1 so the depths are represented by negative numbers. (Fort Denison = 0)
- A Low Pass filter is applied twice in order to seamlessly integrate with surrounding GA Bathymetric Dataset.

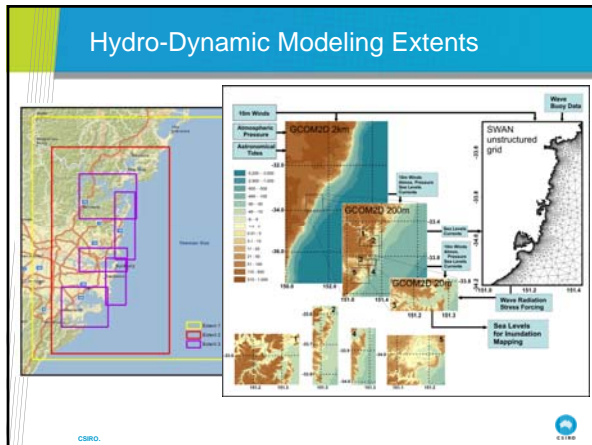
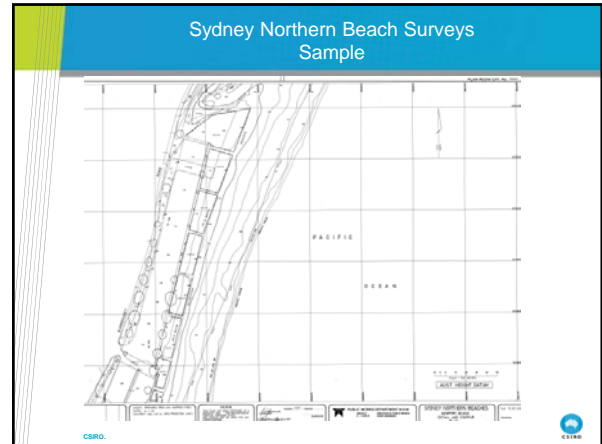
CSIRO

Sydney Northern Beach Surveys

Acquiring near shore bathymetry involved liaising with the NSW Public Works. They provided an extract from their SASIS (Surveying and Spatial Information Services) of all hydrological surveys conducted over the case study area. Data was provided as PDF's maps and the Office of Environment and Heritage were able to provide the digitized contour lines.

Department of Commerce - S.A.S.I.S. Section
PLAN REGISTER - No. 8 of 2014
Plan Number: the SYDNEY - Survey Type: HYDROGRAPHIC SURVEY - Created by Plan No. 8 of 2014

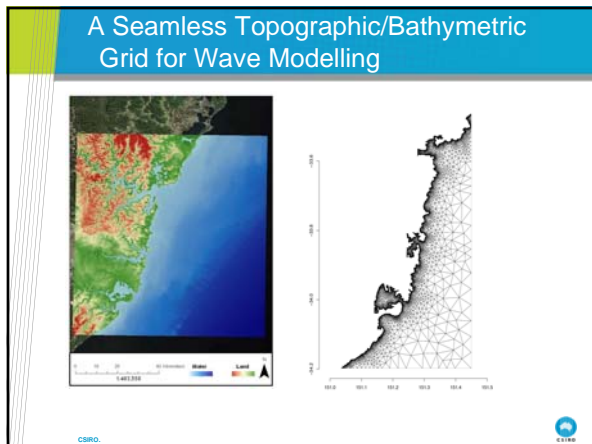
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Interpolation

For areas of low resolution data the ANUDEM thin spline interpolation Method was used and the high resolution datasets, mosaicked onto the interpolated low-resolution grid with a 600m overlap using a GIS function that performs weighted averaging on a cell by-cell basis according to the proximity to the edges of the overlap area

- It is a multi-resolution approach
- It is designed to work intelligently with contour inputs
- A derivative of an established approach (Gesch and Wilson (2002))



Selection of recent events for modelling

- Data sources
 - Fort Denison tide gauge data
 - Sydney Wave Rider Buoy (33° 46' 54" S, 151° 25' 29" E)
- Available wave parameters:
 - Significant wave height (Hs),
 - Peak wave period (Tp1)
 - Wave direction (Wd)
- Events ranked by:
 - Total Sea Level
 - Significant Wave Height
 - Residual Sea Level

Sources of Atmospheric data

- CSFR winds and mean sea level pressure data
 - Spatial Resolution: 0.313x0.312 degree
 - Temporal Resolution: hourly.
 - Availability: 1979-2010
- NCEP winds and mean sea level pressure data
 - Spatial Resolution 1.875x1.9 degrees
 - Temporal Resolution 6-hourly.
 - Availability 1948-2010
- Coastal meteorological sites
 - Sydney Airport
 - Williamtown
 - Newcastle

Modeled Water Levels

Mapping onto High Resolution Topography

The 1-in-100 year storm and 90 cm sea-level rise water level data overlaid on top of aerial photography red line marks out PSMA delineated shoreline boundary and yellow points are terrestrial LiDAR below 4m. Water Heights are assigned to the shoreline by querying the closest 20m cell for a water level per design storm.

Mapping to High Resolution Topography

16% Difference
873984 m² more Inundation.

Uncertainty in LiDAR Data

To portray the uncertainty in potential inundation levels calculated from elevation data, the absolute vertical accuracy of the data must be known at a 95% confidence (Gesch 2009.) L.E., at 95% confidence = $1.96 \cdot RMSE = 1.96 \cdot 0.15\text{cm} = 0.30\text{m}$

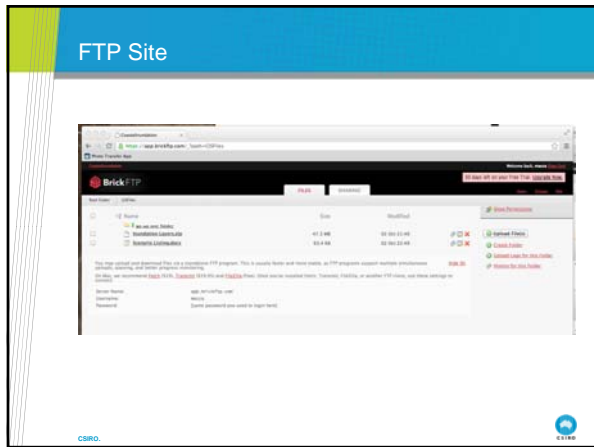
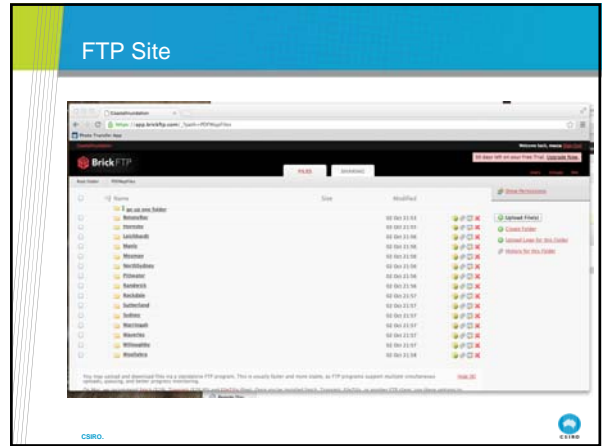
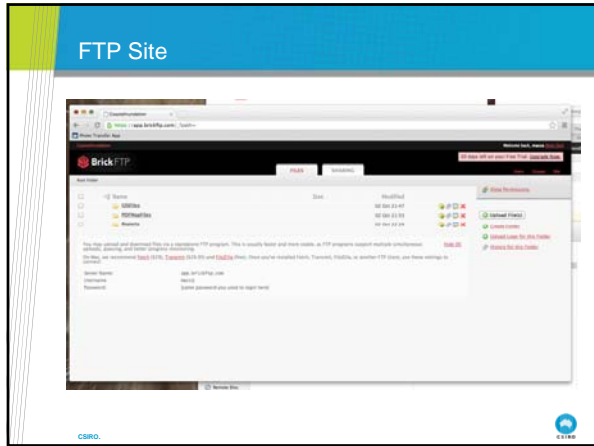
*Two layers have been provided extracted per event: an inundation layer and an inundation including the maximum vertical.

Scenario	Area of land inundated (m ²)		
	Not Including LiDAR Uncertainty	Including Uncertainty	Difference
1 in 1	28322267	35728256	20.73%
1 in 100	32205477	39439263	18.34%
1 in 1 +34cm	37331383	45168841	17.35%
1 in 100+34cm	42335292	50799820	16.66%
1 in 1+84 cm	50167760	59425454	15.58%
1 in 100+84cm	57884441	66648295	13.15%

What Has Been Provided

File name conventions
An A2 Size Map Per Council (.PDF)

- 1yr.shp - 1 in 1 year event.
- 1yrLU.shp - 1 in 1 year event with 30cm LiDAR Uncertainty.
- 1yr40.shp - 1 in 1 year event with 40 cm Sea Level Rise.
- 1yr40LU.shp - 1 in 1 year event with 40cm Sea Level Rise and 30cm LiDAR Uncertainty.
- 1yr90.shp - 1 in 1 year event with 90cm Sea Level Rise.
- 1yr90LU.shp - 1 in 1 year event. with 90cm Sea Level Rise and 30cm LiDAR Uncertainty.
- 100yr.shp - 1 in 100 year event.
- 100yrLU.shp - 1 in 100 year event with 30cm LiDAR Uncertainty.
- 100yr40.shp - 1 in 100 year event with 40 cm Sea Level Rise.
- 100yr40LU.shp - 1 in 100 year event with 40cm Sea Level Rise and 30cm LiDAR Uncertainty.
- 100yr90.shp - 1 in 100 year event with 90cm Sea Level Rise.
- 100yr90LU.shp - 1 in 100 year event with 90cm Sea Level Rise and 30cm LiDAR Uncertainty.



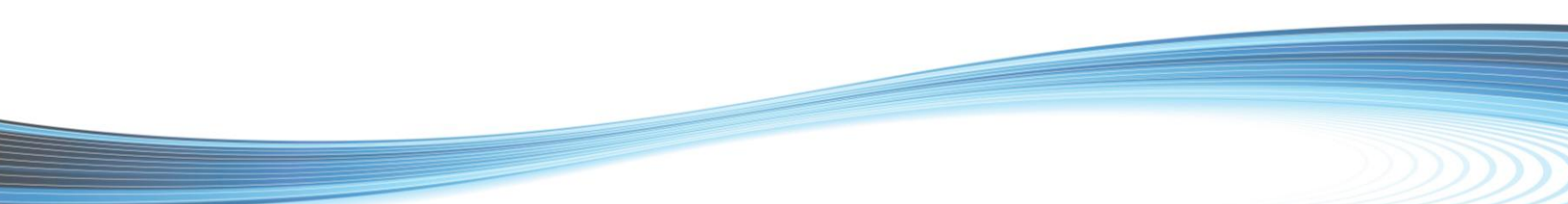
AUDIT OF SEA LEVEL RISE, COASTAL EROSION AND INUNDATION LEGISLATION AND POLICY


Ms Rachel Walmsley

Policy and Law Reform Director | NSW EDO

Rachel Walmsley is the Policy and Law Reform Director at the EDO NSW. She has written law reform submissions and discussion papers across a range of environmental issues, including responding to significant reforms that are proposed for planning and environmental laws in NSW and nationally. Rachel has a Masters in Environmental Science and Law from University of Sydney; a Graduate Diploma in Legal Practice; a Bachelor of Laws with Honours in international environmental law; and a Bachelor of Arts from ANU. Rachel is Co-consulting Editor of the Australian Environment Review, and has lectured on environmental law at UNSW. Rachel is also a member of a number of government & non-government advisory committees on natural resource and environment issues.



Authored 2 great reports for the SCCG:

- 2008, Coastal Councils Planning for Climate Change: An assessment of Australian and NSW legislation and government policy provisions in relation to climate change relevant to regional and metropolitan NSW coastal councils.
 - 2011, Audit of Sea Level Rise, Coastal Erosion and Inundation Legislation and Policy.
- 





Audit of sea level rise, coastal erosion and inundation legislation and policy

SCCG Presentation March 4 2010
4 October 2012



About EDO NSW

- A community legal centre specialising in public interest environmental law.
- Mission: To empower the community to protect the environment through law.
- Primary Functions:
 - Legal Advice and Representation;
 - Scientific Assessment and Advice;
 - **Policy and Law Reform**; and
 - Community Programs such as Legal Education





Task for the SCCG

- Conduct a comparative assessment of Australian State and Territory planning and coastal legislation and policies that address:
 - ‘Sea Level Rise’;
 - ‘Storm Surge’;
 - ‘Coastal erosion’; and
 - ‘Coastal Inundation’.

Jurisdiction	“sea level rise”	“coastal erosion”	“coastal inundation”	“storm surge”	“coast”
Western Australia					
Legislation	No results.	No results.	No results.	No results.	17
Regulations	No results.	No results.	No results.	No results.	44
Tasmania					
Legislation	No results.	No results.	No results.	No results.	21
Regulations	No results.	No results.	No results.	No results.	No results at time of writing
Northern Territory					
Legislation	No results.	No results.	No results.	No results.	9
Regulations	No results.	No results.	No results.	No results.	13
South Australia					
Legislation	No results.	No results.	No results.	No results.	79
Regulations	No results.	Development Regulations 2008, Schedule 2, 3 & 8 (not relevant).	No results.	No results.	97
Victoria					
Legislation	No results.	No results.	No results.	No results.	27
Regulations	No results.	No results.	No results.	No results.	13
Queensland					
Legislation	No results.	No results.	No results.	No results.	266
Regulations	No results.	No results.	No results.	No results.	13
New South Wales					
Legislation	No results.	No results.	No results.	No results.	139
Regulations	21 Various LEPs and SPPs.	18 Various LEPs and SPPs.	Newcastle LEP 2003 SEPP (Infrastructure) 2003	No results.	489




Audit Findings – Western Australia

- Limited reference to search terms.
 - When they did appear it was not primarily in relation to the coastal zone.
- Indication that terms would be addressed in the State Planning Policy, intended to be released at the end of 2010.

Update?

- Review of State Coastal Planning Policy (SPP2.6)




Audit Findings - Tasmania

- Transition period:
 - State Coastal Policy under review
 - *Tasmanian Framework for Action on Climate Change* under review
 - Policy statements on adaptation to be released over next 12 months
- Case Studies - City of Clarence

Update?

- Draft of the State Coastal Policy was rejected & a new 'Coastal Planning & Management Framework' is being developed
- Developing a Coastal Hazards Planning Directive, this may/will include SLR benchmarks
- Policy statements on adaptation have just been released for comment
- Tasmanian Coastal Adaptation Pathways project progressed



Audit Findings – Northern Territory

- Very limited references to search terms
- NT Planning Scheme provided classification of Primary and Secondary Storm Surge Areas

Update?

- Here are still no SLR benchmarks in place



Audit Findings – South Australia

- Search terms appear primarily in subordinate instruments
- Multiple documents pertaining to same subject matter

Update?

- Active Coast Protection Board – refer to SLR in their handbook
- Local Council variation



Audit Findings - Victoria

- Transition with changes expected from meeting of Coastal Climate Change Advisory Committee in December 2010
 - how to better utilise land-use planning and development controls
 - Focus on developing a strong governance structure to address project issues

Update?

- State Planning Policy Framework (SPPF) refers to climate change and SLR; decision-makers must consider SPPFs when making decisions but are not bound by them.



13.01 Climate change impacts 13.01-1 Coastal inundation and erosion

• Objective

To plan for and manage the potential coastal impacts of climate change.

• Strategies

In planning for possible sea level rise, an increase of 0.2 metres over current 1 in 100 year flood levels by 2040 may be used for new development in close proximity to existing development (urban infill).

Plan for possible sea level rise of 0.8 metres by 2100, and allow for the combined effects of tides, storm surges, coastal processes and local conditions such as topography and geology when assessing risks and coastal impacts associated with climate change.

Consider the risks associated with climate change in planning and management decision making processes.

For new greenfield development outside of town boundaries, plan for not less than 0.8 metre sea level rise by 2100.

Ensure that land subject to coastal hazards are identified and appropriately managed to ensure that future development is not at risk.

Ensure that development or protective works seeking to respond to coastal hazard risks avoids detrimental impacts on coastal processes.

Avoid development in identified coastal hazard areas susceptible to inundation (both river and coastal), erosion, landslip/landslide, acid sulfate soils, bushfire and geotechnical risk.



Audit Findings - Queensland

- Transition period
- Reviewing *Draft Queensland Coastal Plan* (final to released March)
- Indication that the four current *Regional Management Plans* will be abolished
- Controversial land management principles, eg: Injurious Affection

Update?

- QLD Coastal Plan released late 2011, commenced February 2012 containing requirement for local government to develop Coastal Hazard Adaptation strategies that consider 0.8m SLR by 2100, and 1in 100 year storm events
- Regional plans still in place
- Significant potential implications of new QLD government



Audit Findings – New South Wales

- Focussed mainly on the new instruments
- Overall
 - Large amounts of documentation
 - Detail in subordinate instruments as opposed to primary legislation
 - Appears to be ad-hoc and unstructured system that requires overarching guidance

Update?

- New coastal management 'reforms' – eg. To make it easier for landowners to build temporary protection structures; "remove the compulsory application of SLR benchmarks"; focus s149 certificates on "current known hazards"
- Broader planning reforms?



Audit Findings – International Jurisdictions

- New Zealand
- United Kingdom
- South Africa
- California



Key Recommendations (NSW)

1. Address ad-hoc framework
2. Need for detail to appear in primary legislation as opposed to subordinate instruments
3. Improving enforcement and compliance systems
4. More adequately dealing with existing inappropriate development
5. Providing certainty to those managing the uncertain



6. Lines in the Sand – preventing inappropriate development from occurring
7. Development of a federal framework
8. The need for a paradigm shift in NSW
9. Hierarchy of adaptation approaches
10. Improving communication



INCORPORATING COASTAL INUNDATION AND SEA LEVEL RISE INTO LOCAL AND REGIONAL PLANNING RESPONSES

Dr Matt Inman


Program Leader Urban Systems | CSIRO

Matthew is a research scientist with CSIRO's Urban Systems Program and his key areas of research include integrated urban water management as well as options to improve the resilience of cities to climate change impacts. For this project, Matthew led Stages One and Two from 2011 onwards and coordinated the wider CSIRO team.



Outline

- Rationale for Project
- Key steps in the Project
- Recommendations
- Project Outputs



Rationale for the Project

- Assess existing planning strategies within Australia and Internationally used to address and communicate sea level rise and flooding impacts
- Identify gaps in information, knowledge, capacity or external barriers preventing councils from integrating sea level rise and flooding adaptation actions and considerations into local EP instruments and associated policies
- Explore different strategies to guide local and state government with the integration of climate change adaptation into local EP instruments and policies

Key Steps in the Project

- Environmental Defender's Office Report
- Principles to guide a co-ordinated planning response
- Workshop Discussion and Findings
- Final Report

EDO Report

- How are Australian jurisdictions responding to climate change through legislation and policy?
- Where are there good examples from overseas?
- Recommendations for law reform in NSW




Audit of Sea Level Rise, Coastal Erosion and Inundation: Legislation and Policy
Report prepared by the Environmental Defender's Office of NSW for the Sydney Coastal Councils Group
December 2010
Revised May 2011

Principles

- Protecting environmental and community values
- Translating climate science for management
- Timing of action: anticipatory or reactive responses
- Increase policy convergence and minimise mal-adaptation
- Allocating costs, benefits and responsibilities

Workshop

- Pre-workshop survey
- Planning responses / measures identified
 - Flood modelling and mapping
 - Investigation areas
 - Zoning and triggers for re-zoning
 - Land tenure-based responses
 - Strategic land purchase
 - Development Assessment, criteria and conditions in coastal risk areas



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Final Report


- Integrates several elements of the Project
- Provides context for the SCCG Region
- Reviews the Workshop and outcomes from those discussions
- Recommendations for future areas of activity



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Thank you!

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9

SUPPORTING LOCAL GOVERNMENT TO COMMUNICATE COASTAL INUNDATION

Ms Anne Leitch

Communication Specialist, Climate Adaptation | CSIRO

Anne is a Communications Specialist working with CSIRO's Climate Adaptation Flagship where she develops and implements communication plans that promote activities and outcomes from the science. Anne also contributed directly to the project as a Team Member. For this Project, Anne led Stage Three - 'Toolkit for Communicating Sea Level Rise'.



Mapping & responding to coastal inundation

Stage 3: Supporting local government to communicate about sea level rise

Anne Leitch | Presenter title
4 October 2012

CLIMATE ADAPTATION FLAGSHIP

SYDNEY COASTAL COUNCILS GROUP

CSIRO

Review thinking and practice around communicating sea level rise and develop resources to support council communication

- Literature review of risk communication and sea level rise communication
- Review existing local and international strategies for addressing coastal inundation and other natural hazards
- Consult with member councils to identify gaps in information, knowledge and capacity as well as internal and external barriers for message transfers
- Develop resource kit for councils to increase their capacity to communicate about sea level rise.

Presentation title | Presenter name | Page 2

Local government managing sea level rise

1. LG play a key role in managing adaptation to climate change
2. LG already manage natural hazards
3. LG already communicate and engage with their community over a variety of issues
4. Sea level rise is a difficult issue for local government to manage

Presentation title | Presenter name | Page 3

SLR – a ‘post normal’ problem

‘Facts are uncertain, values in dispute, stakes high and decisions urgent’
Brings values, resources and rights into conflict - mobilises a wide range of political & stakeholder interests
Challenges a traditional approach of a defined ‘scientific’ methodology leading to a clear solution
Challenges how we think & make decisions with uncertainties



Presentation title | Presenter name | Page 4

Approach of stage 3

- Build on existing processes &/or strengths of councils
 - History of managing natural hazard
 - Trust / relationship with community more broadly/other issues
 - Consider different types of risk & uncertainties
 - How do people think about risk and uncertainty?
 - Need to broaden & deepen community engagement to build trust and include different types of knowledge
- Differentiate types of stakeholders
- E.g. existing property owners, prospective residents etc
- Use a variety of ways to engage – tailored & targeted to stakeholders

Presentation title | Presenter name | Page 5

Risk communication framework

1. Crisis communication – e.g. Disaster planning for extreme events
2. Care communication – e.g. Land use planning
3. Consensus planning – e.g. Coastal futures



Presentation title | Presenter name | Page 6

	Crisis communication	Care communication	Consensus communication
Direction of communication	One way	Dominantly one way Local knowledge about barriers and enablers	Multi-directional
Types of knowledge	High expert knowledge Low community knowledge	Moderate expert knowledge including technical and authority knowledge Moderate community knowledge including historical knowledge of previous events, socially relevant experience	A range of knowledge used Local expert knowledge High community knowledge
Types of messages	Information about harm mitigation, procedures, possible additional harm	Information about avoiding future risk, preparedness, planning	Sharing information about values and aspirations
Examples of council activities	Disaster response planning at the community scale	Land use planning Disaster preparation planning at individual and group scale Integrated coastal management	Integrated coastal management
Examples on the coast	Expert understanding of the nature, scale, likely impact of the hazard e.g. storm events, tsunami, increasing extreme events	Response/ responsibility of community to prepare for natural hazards (e.g. household evacuation plan)	Community engagement to ascertain community values and aspirations for the future including tradeoffs

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IAP2

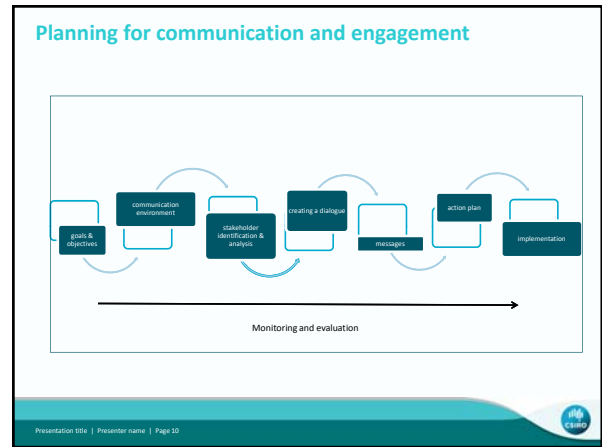
Inform	Consult	Involve	Collaborate	Empower
Public participation goal To provide balanced and objective information to assist understanding of topic, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work with the public throughout the process to ensure that concerns & aspirations are consistently understood & considered	To partner with the public in each aspect of the decision including development of alternatives and identification of preferred solution.	To place final decision making in the hands of the public
Promise to the public We will keep you informed	We will keep you informed, listen and acknowledge concerns and aspirations, and provide feedback on how input influenced the decision	We will work with you to ensure that your concerns & aspirations are directly reflected in the alternatives developed & provide feedback on how input influenced the decision.	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice & recommendations into the decisions to the maximum extent	We will implement what you decide
Techniques to consider (see also Table 5 for case study)	Public comment Surveys Stakeholder meeting Shopfront Phone hotline Briefings Feedback forms Social media	Workshop Deliberate polling Social media Advisory groups Discussion forums	Advisory Committees Deliberative Dialogue	(Empowerment depends on how this information is incorporated – i.e. how much power is handed to community) Summits Deliberative Democracy Deliberative forums Citizen's panels Citizen juries

Presentation title | Presenter name | Page 8

Resources for sea level rise

Simple explanations of sea level rise
Plenty of quality links to useful websites
Case studies – local & international

Presentation title | Presenter name | Page 9



Tactic	Deliver	Who	Measured by
• Council makes hazard maps available with supporting information	• Letter to existing property owners setting them know rationale how/where maps can be viewed	• Community engagement & planners	• Stakeholder feedback
• Meetings by locality – aim for "small groups in safe environment"	• Invitation by areas – most affected, moderately affected, least affected	• Community engagement & planners	• Stakeholder feedback
• Local knowledge project	• Project to canvas local knowledge: historical, events, solutions, photos	• Community engagement	• Number of responses • Staff can use new knowledge
• Fact sheet for existing property owners	• Posted out & available on website	• Community engagement & planners	• Pre-test with focus group
• FAQ: Impacts of sea level rise on a Site	• Available on website	• Community engagement & planners	• Pre-test with focus group

Communication goals
Existing property owners are aware of their rights and responsibilities for their property as well as council's rights and responsibilities
Council's position is defensible – legally and morally but also in the eyes of the broader community
Stakeholder concerns: Key messages
Will the value of my property be affected? Council is acting responsibly and legally
Will I be able to develop my property? Council has investigated this using the best available scientific knowledge
Why is council doing this? Residents have local knowledge to contribute also
How is council doing this? Do they have the right to do this? Council wants to work in partnership with residents to ensure best outcome for all
Will the beach be affected? Decisions made now affect the sustainability of our coasts in the future
Why can we do what we have done in the past? We need to act now to protect our coast
What alternatives has council investigated?
Can I have a say?

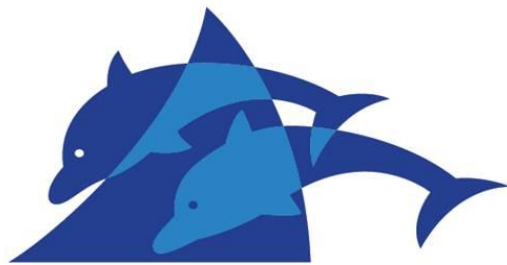
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Questions?

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