

UNSW
THE UNIVERSITY OF NEW SOUTH WALES

Using surf cameras to predict future beach visitation

New South Wales Government

This project has been assisted by the New South Wales Government, through its Climate Action Grants Program


Outline

- Sea level rise and beaches
- Selecting adaptation options
- Sydney Beaches Valuation Project
- Need for visitor estimates
- How to estimate beach visitation
- Ongoing work

Climate change and the coast

18-59cm rise by 2099 (IPCC 2007)
.....Ice sheets, regional variation....91cm(+?)


- Inundation, shoreline recession, ecological impacts
- Higher temperatures



Source: Sydney Morning Herald

Sea level rise and beaches


- Inundation is a major focus of the media
- Interaction with existing vulnerabilities more important for many areas
- Before the houses get flooded, what happens if beaches disappear?



Eloura 13 July 2007 North Cronulla 13 July 2007

Adaptation options: Understanding tradeoffs

- Do nothing, retreat, adapt, protect
- What will different alternatives mean in environmental, social and economic terms?



'Line in the Sand' demonstration – Narrabeen 2005 (SMH)

Sydney Beaches Valuation Project

Determine the existing use and non-use values of selected ocean and estuarine beaches in Sydney

- Manly Ocean Beach
- Collaroy-Narrabeen
- Dangar Island and Brooklyn Baths

Using a range of methods, designed for transferability

Provide information to be used in the decisions about how to respond to climate change impacts

Sydney Beaches Valuation Project

- Partnership between the Sydney Coastal Councils Group and UNSW
- PhD project – valuation to be completed in 2009
- Range of methods:
 - Hedonic Pricing Method – property market impacts
 - Travel Cost Method – recreation value
 - Contingent Valuation (WTP) – cultural/social value
 - Choice Modelling – community preferences
 - Benefit Transfer – ecological values

Travel Cost Method



- Ask people where they came from, how they travelled, and how long they stay
- Travel costs and time costs gives a minimum estimate of value they expect to get from the trip



Contingent Valuation

- Present hypothetical future states
- Ask people how much they are WTP
- Captures non-use values



Source: Lives a Beach, Sydney Morning Herald July 19 2006

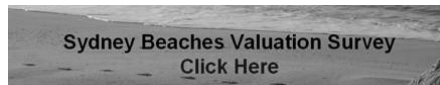
Survey administration



- Joint estimation: Travel costs and Contingent Valuation (WTP)
 - Designed to use handheld computer onsite and for internet surveys
 - Skip logic – conditional on previous responses: more efficient
- e.g. visitors who walked to the beach not asked about parking fees

Shameless plug

Online survey: CVM and TCM
Accessible from SCCG website:
<http://sydneycoastalcouncils.com.au>



How does beach visitation become important?

- Surveys give us an idea of the **average** travel costs and **average** willingness to pay to prevent erosion
- Total loss/gain is what is most relevant to policy decisions:
 - WTP/TC multiplied by relevant population

Need an estimate of beach visitation!

'Value' of visitation estimates

- Useful in economic valuation...
- Plan lifeguard services:
 - paid council services
 - shifts and rosters
- Emergency planning – tsunami response
- Plan public transport services

Estimating beach visitation

- Very challenging!
- Complex environments: many access points, variable in size
- Lifesaver estimates
- Aerial photographs
- Onsite photographs – fixed or observers
- Observations
- Proxy methods: parking or entrance fees

Lifesaver estimates

- Not always collected
- Less reliable at higher densities
- When beaches are crowded, lifesavers are busy



Bondi summer crowds: Tourism NSW

Photography

- Aerial photography allows for capturing the entire beach area
- Researchers taking photographs at ground level: people not always in same place
- Tradeoffs between the field-of-view and image clarity



Robotic surf camera at Manly Ocean Beach (Sony)

Proxy methods

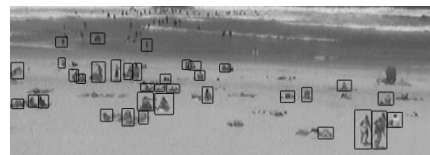
- Best in places with restricted access, e.g. NP
- Public transport ticket sales and numbers
- Parking fees and fines
- Vehicle counts

Difficult to separate out beach visits:

Multiple use tickets, multiple purpose trips
Parking permits and free parking areas
Many access points

CoastalCOMS

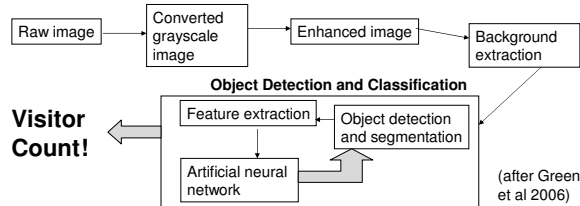
- Coastal Conditions Monitoring System
- Uses surf camera network of Coastalwatch
- Range of different modules: beach state, wave height, boat usage etc.



Identification of person objects in a beach location (Coastalwatch)

CoastalCOMS - beach usage

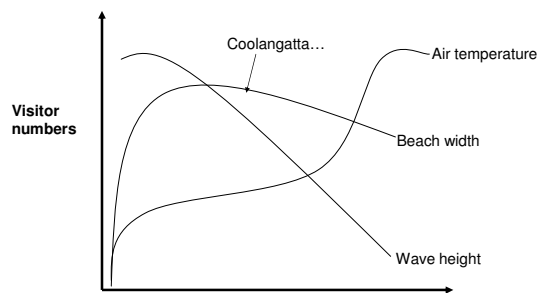
- System developed by Griffith University, GCCC and Coastalwatch
- Overcomes issues with low image quality
- Identifies person and non-person objects



Factors in visitation

- Beach width (tide as proxy)
- Congestion/density
- Wave height and orientation
- Wind speed and direction
- Time of day, and week
- Temperature
- Cloud cover and rainfall
- Surf reports?

Some expected relationships



Current work: Predicting the future

- Improving on the guesses:
 “It will be hotter, so more people will come.”
 OR
 “The beach will be smaller, no room for me”
- Use relationship between visitation and other variables to look at future visitation

$$V = \alpha + \beta_1 Temp + \beta_2 WaveHt + \beta_3 WindSpd$$
 e.g. if the number of days over 25 degrees goes up by 10%, what is the likely increase in beach visitation?

Theory under investigation...

- Predictions for SLR by 2050 are in the order of 30-50cms
- Average daily tidal range for Sydney is around 90cm
- Is it possible to use this to generate a model of future beach visitation, relative to beach width?

STAY TUNED!

Contact details



Dave Anning
 School of BEES
 University of New South Wales
 Sydney 2052
 Email: david.anning@student.unsw.edu.au



Benefit transfer

- Uses values from previous studies
- Two sites: study and policy
- Function or unit transfer



www.biodiversitygovernance.de/files/news.htm



www.chbr.noaa.gov/...rain/images/coral_01.jpg

- Asked
- Eg. Ca
- Can be
- Closer
- If there with tra

1
Question 1: Options A, B, and C.
Please choose the option you prefer most by clicking ONE box.

How much would I pay each year	Twenty-year effects	Number of kilometers of shoreline restored for fishing or swimming	People leaving country areas every year	I would choose
Option A	<div style="display: flex; justify-content: space-around;"> <div> <p>50</p> </div> <div> <p>4 million</p> </div> <div> <p>1 000</p> </div> <div> <p>15 000</p> </div> </div>			A <input type="checkbox"/>
Option B	<div style="display: flex; justify-content: space-around;"> <div> <p>70</p> </div> <div> <p>6 million</p> </div> <div> <p>6 000</p> </div> <div> <p>10 000</p> </div> </div>			B <input type="checkbox"/>
Option C	<div style="display: flex; justify-content: space-around;"> <div> <p>200</p> </div> <div> <p>8 million</p> </div> <div> <p>10 000</p> </div> <div> <p>10 000</p> </div> </div>			C <input type="checkbox"/>

combine

Figure A1 Example of a choice set used in the choice modelling questionnaire.