

Cost-benefit analysis (CBA) in Coastal Management: Are we Getting it Right?

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Show of hands

- some experience with coastal CBA studies in NSW?
- lots of experience with CBA studies in NSW?
- just want to sleep or read emails on phone?

Some definitions

- Cost Benefit Analysis (CBA)
- tool to assist in deciding what option to do, and when to do it
- eg coastal development at risk – is the best option to leave it at risk (do nothing), retreat, build seawall, undertake beach nourishment?
- in CBA monetise and sum benefits and costs, as discounted present values
- Benefit Cost Ratio (BCR)
- if $BCR > 1$, project is probably viable (benefits outweigh costs)
- if $BCR < 1$, project probably should not be considered (costs outweigh benefits)
- CBA does not consider who should pay
- distributional analysis to attribute costs & benefits to parties impacted

NSW framework for coastal CBA studies



Guidelines for using cost-benefit analysis to assess coastal management options



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Coastal CBA's in NSW

- various coastal CBA studies have been and are being undertaken in NSW
- most projects related to seawalls
 - build it or not?
 - if it is built, when should it be built?
 - distribution analysis to decide who should pay

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NSW studies

- CBA of options to protect Old Bar from coastal erosion (2014)
- CBA of Coastal Management Options for Lake Cathie (2015)
- Coastal Hazard Management Study - Byron Bay Embayment (2016)
- Collaroy-Narrabeen Beach coastal protection works benefit distribution analysis (2016)
- Wamberal Beach Management Options: Cost Benefit and Distributional Analysis (2017)
- Campbells Beach cost benefit and distribution analysis for protection works (2019)
- Warilla Beach CBA of options for coastal management (now)

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The Allure of Coastal CBA's

- an objective, rational, quantitative method for comparison of coastal management options
- public and private funds being spent wisely

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The Reality of Coastal CBA's in NSW

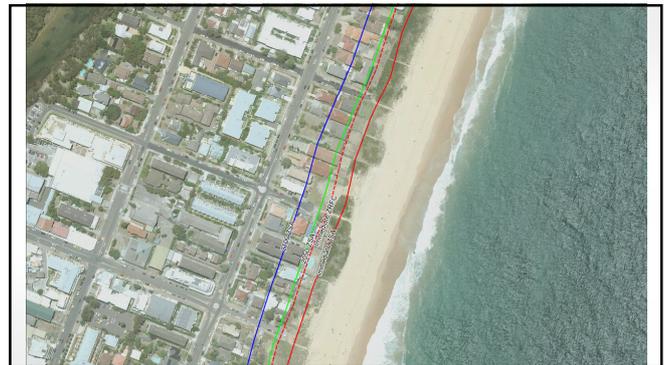
- producing questionable and contradictory outcomes
 - unrealistic coastal engineering and economics assumptions
 - incorrect probabilistic modelling
 - bias - thinking answer will be X before the study is undertaken
 - lack of ethics - don't bite the hand that feeds you
 - guidance document is not robust
- perception that CBA is an unreliable tool that is overemphasised, can give any answer that is wanted, and that is diverting funds away from and delaying useful coastal management actions

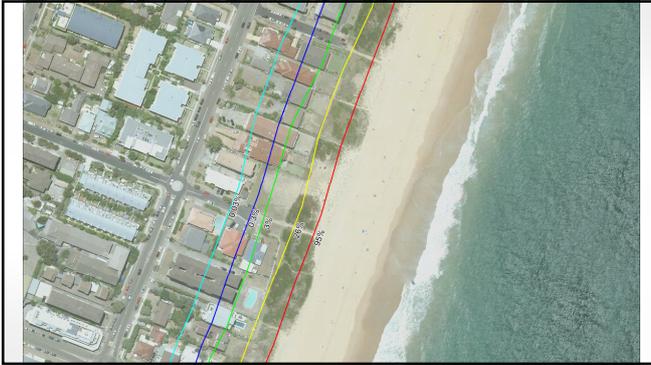
How to Win Friends and Influence People

- don't criticise, condemn or complain
- I now have no friends and no influence
- an ethical issue - engineers care about the truth and are obligated to "be discerning and do what you think is right"
- we should want CBA in coastal management studies done right - and want the right decisions being made
- so how do we get it right?

7 ways to get it right

1. correctly defined probabilistic coastal hazard lines





1 - Correctly defined probabilistic hazard lines

- quantitative not subjective
- careful selection of input probability distributions (not conservative for mean!)
- Monte Carlo
- annual probabilities (or interpolated to be) - CBA requires a stream of benefits and costs in each year over a defined planning period
- common error – using cumulative probabilities or only assessing in last year of planning period

7 ways to get it right

1. correctly defined probabilistic coastal hazard lines
2. close collaboration between the coastal engineer and economist

2 - Close collaboration

- coastal engineer needs to test assumptions of economist and vice versa
- economist needs to ensure probabilistic hazard information provided is constructed in a statistically correct manner that fits the CBA framework
- cross-review

7 ways to get it right

1. correctly defined probabilistic coastal hazard lines
2. close collaboration between the coastal engineer and economist
3. testing of assumptions

3 – Testing of assumptions



By Dave Morven on en.wikipedia

3 – Testing of assumptions

- design flaw - Pinto could burst into flames in a rear-impact collision
- Ford decided not to issue a recall
- Ford's CBA (financial analysis) estimated that based on the number of cars in use and the probable accident rate, deaths due to the design flaw would cost it about \$49.5 million in wrongful death lawsuits
- a recall would cost \$137.5 million
- the company failed to consider the costs of negative publicity, which forced a recall and reduced Ford sales
- what else did they fail to consider?

BUSINESS THE ECONOMY CLIMATE POLICY

OPINION

Only the stupid think the cost of climate change is simple

Ross Gittins
Economies Editor

May 4, 2019 – 12:00am

You know an election campaign has run off the rails when the pollies start hurling the results of [economic modelling at each other](#). Voters find it incomprehensible and cover their ears, and the only people who think it proves something are the pollies themselves and the journalists silly enough to imagine their incessant demands to "show us your modelling" will expose the truth.

The more you know about modelling, the less it impresses you. There's a place for economic modelling, but it's in a seminar room, being pulled apart by experts, not in the argy-bargy of politicians seeking election, vested interests seeking more bucks, and jourmos who think their customers will just love a bit more meaningless conflict.

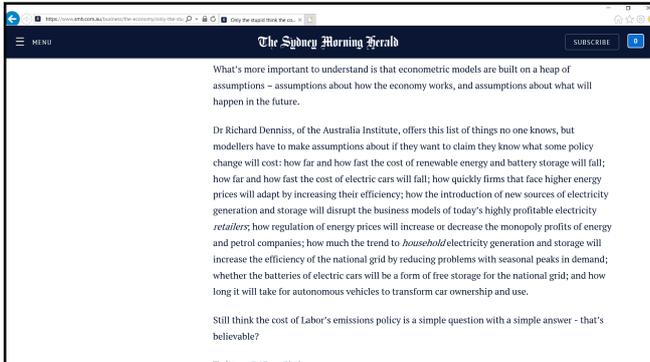
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TRUMP IMPACTMENT
Army officer who heard

WAR OF WORDS - CASTING THE FIRST STONE



3 – Testing of assumptions

- Give me a one-handed economist. All my economists say, 'on the one hand...on the other' (US President Harry Truman)
- there needs to be careful assessment (and sensitivity testing) of assumptions for a coastal CBA study to be reliable
- planned retreat vs protection works (seawalls)
 - Belongil BCR 0.4 vs 1.4
 - Wamberal BCR 5.0 vs 0.7
 - if Wamberal correct, no beach in Australia will have seawalls justified by CBA
 - "good"?
 - can't use flawed CBA to justify that philosophical position or bias

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3 – Testing of assumptions

- questionable assumptions for Wamberal study:
 - loss of beach amenity for seawalls overstated relative to status quo
 - loss of beach amenity for seawalls overstated for low footprint options
 - loss of beach width due to long term recession not assessed in rigorous probabilistic manner (and again overstated)
 - planned retreat had no costs except for relocation of dwellings (despite there being no place to relocate dwellings to, no certainty that there would be time to move it if there was room, and no certainty that a relocatable dwelling would have been constructed in the first place)
 - any loss in land value of beachfront properties fully transferred as gain to next row of houses landward

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3 – Testing of assumptions

- options assessed must also be realistic and implementable, eg planned retreat
- existing use rights
- no point assessing option that actually can't be done
- BCR > 1 doesn't make unimplementable option somehow realistic and viable
- square wheels
- Warilla beware

7 ways to get it right

1. correctly defined probabilistic coastal hazard lines
2. close collaboration between the coastal engineer and economist
3. testing of assumptions
4. framing the CBA so as to avoid bias and pre-judging the answer

4 – Framing CBA to avoid bias & pre-judging

- hope or expectation from interest groups of a particular answer
- "There are two approaches you can take to modelling results. One, believe all results that fit with your prejudices and ignore all those that don't. Two, be sceptical of them all and don't accept any results where you haven't been told which assumptions are the main drivers of those results".
- risk of no scrutiny of results when answer is as desired

7 ways to get it right

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4. framing the CBA so as to avoid bias and pre-judging the answer
5. recognise the limitations of CBA

5 – Recognise the limitations of CBA

- cannot make value judgements
- cannot assess what options are acceptable to community
- gives answer – but not the only answer
- but...can provide strong guidance to decision making, assuming robust assumptions and methodologies are adopted

7 ways to get it right

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5. recognise the limitations of CBA
6. **not overdoing CBA**

6 – Not overdoing CBA

- not every decision needs CBA
- NSW Treasury \$10M, but \$1M in coastal management
- there are not unlimited resources for studies – do less studies better

7 ways to get it right

1. correctly defined probabilistic coastal hazard lines
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4. framing the CBA so as to avoid bias and pre-judging the answer
5. recognise the limitations of CBA
6. not overdoing CBA
7. **revise the Guidelines and change the culture of arrogance**

7 – Revise the Guidelines

- scale of the analysis is the local council area, so inclusion of costs and benefits is dependent on whether asset owners are located within the LGA
- "It is our view that benefits accrue to whomever they accrue, wherever they may be...In the case of coastal households, properties still pay council rates, local labour for housing maintenance, utilities, and the like and should be included wherever they accrue. A non-local property owner could sell the property to a local owner the day after the analysis and therefore change the way costs and benefits are accounted for. In any case, the data required to differentiate a local property owner to a non-local property owner is generally not available. In our view, the absentee owner concept is not supported by economic theory nor by available data... restricting the scope of the CBA is likely to result in perverse outcomes."

Conclusions

- NSW experience shows there are many pitfalls in coastal CBA studies
- to be done right, robust assumptions and methodologies must be adopted
- get it right
 1. correctly define the probabilistic coastal hazard lines
 2. have the coastal engineer and economist closely collaborate
 3. test assumptions
 4. frame the CBA so as to avoid bias and pre-judging the answer
 5. recognise the limitations of CBA
 6. don't overdo CBA
 7. Revise the Guidelines and change the culture of arrogance

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Questions?

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