

Case Study Workshop: Using Beach Recreation Value Data

Mike Raybould & Dave Anning

Outline

- Principles of evaluation
- Cost-Benefit Evaluation
- Case 1: Woolli – Massive beach nourishment option
- Case 2: Woolli – Nourishment plus land swap option
- Case 3: Grunters Stair Improvement
- Case 4: Beach nourishment at Sunshine Coast
- Case 5: Dune revegetation and view improvements at Avalon beach

Roundtable/group discussion

- What is your earliest memory of the coast?
- What has changed the most since you were a child?
- What do you think your local beach will look like for your kids/grandkids?
- What would you most like to retain/improve for future generations?

Economic evaluation/appraisal

- Means of comparing projects or management options to determine preferred options
- Appraisal tools used to assist decision-makers
- Cost-benefit analysis (CBA) and multicriteria analysis (MCA) are the most commonly used

Cost-benefit analysis

- Dominant appraisal method in capital/infrastructure projects
- Compares costs and benefits of a single project over a defined timeframe
- Requires conversion of values to a common unit, current dollars
- Costs typically incurred upfront, benefits may exist over decades
- Discounting and the inherent assumptions becomes important

Decision criteria

Net Present Value – NPV

- Discounted benefits - discounted costs
- If the figure is above zero, the project looks favourable given the assumptions

Benefit-Cost Ratio – BCR

- Discounted benefits / discounted costs
- Higher ratios are better, anything over 1 is a positive project

Internal Rate of Return – IRR

- The discount rate at which benefits=costs
- If IRR is higher than the test discount rate, then the project is worthwhile

Scenarios modelled in BASTRA workshops

Case-study location	Scenario description	Summary of costs	Summary of benefits
Sunshine Coast	Improving access to an unspecified beach in the northern region – Mudjimba area	Car park and access stair construction	Increased visitation
Surf Coast	Surf Coast walk development	Boardwalk and car-park construction	Increased visitation
Clarence Valley	Wooli Village erosion and riverine flooding management plan	Construction of levee, raised access road, relocate South Village houses and water tower infrastructure, beach nourishment, purchase of new land for land swap	Increased security of North Village, maintain beach amenity
Augusta-Margaret River	Improving access to Grunters Beach through car-park development and construction of formalised access stairs to replace limestone path	Car park and access stair construction	Improved access and increase parking availability to key learner surf break

Case 1: Woolli – Massive beach nourishment option



Woolli Village Coastline Management Strategy Update and Options Review

301020-02273
3 August 2010



Source: former Dept. Natural Resources Estuary Inventory

Infrastructure & Environment
8-14 Telford Street
Newcastle East, NSW 2300, Australia
PO Box 668 NEWCASTLE NSW 2300
Telephone: +61 2 4907 5300
Facsimile: +61 2 4907 5338
www.worleyparsons.com
ABN 61 001279 812
© Copyright 2010 WorleyParsons



5.2 Management Options Considered in 1997

Table 5.2. updates capital and maintenance costs for management options considered in the 1997 *Coastline Management Plan*.

Table 5.2 Management Options Considered in 1997

Option	\$1997 Initial/ Capital Cost	\$2010 Initial/ Capital Cost	\$1997 Ave. Maintenance Cost /annum	\$2010 Ave. Maintenance Cost /annum
Seawall (full length)	12,520,000	17,700,000	196,100	277,200
Seawall (partial)	11,170,000	15,792,000	174,700	247,000
Groynes and Nourishment	13,080,000	18,492,000	308,100	435,600
Property relocation and Buy-back	3,600,000 to 7,500,000	5,090,000 to *10,603,000	–	–
Massive Beach Nourishment	12,980,000	18,351,000	667,600	943,800
Beach Scraping and Vegetation Regeneration	135,000	191,000	103,000	145,600

	A	B	C	D	E	F	G	H	I	J
1	Wooli Beach Massive Beach Nourishment Option: Benefit-Cost Modelling									
2										
3	Scenario 1: Masive Beach Nourishment (WorleyParsons, 2010, p.44)									Notes
4	Project costs:			Project benefits:						
5	Capital cost (\$)		\$18,351,000	Total regional beach visits: Local residents				1,801,728		
6	Annual Maintenance as % of capital		0.05	Total regional beach visits: Visitors				566,605		
7				Wooli beach visits: Local residents @ 5% of total				90,086		
8				Wooli beach visits: Visitors @ 2% of total				1,802		
9				Tourism growth p.a. (Real)				1.03		
10				Resident growth p.a.				1.03		
11				Resident value for a beach visit (CS values)				\$9.30	Fuel+Time (Fuel only = \$6.10)	
12				Tourist value for beach visit (market values)				\$26	Weighted avg.	
13				Resident recreation benefits p.a.				\$837,804		
14				Tourism recreation benefits p.a.				\$46,845		
15				Proportion of recreation benefits threatened (or protected)				0.50	Generous!	
16				Recreation benefits threatened (or protected) p.a. by proposal				\$442,324		
17				Other benefits (Property Protection etc..)						
18										
19	Project Costs (\$)			Project benefits (\$)				Net Cash Flow		
20	Year	Capital	Running cost p.a.	Total	Resident Recreation	Tourist Recreation	Other	Total	\$	
21	0	18,351,000	0	18,351,000	0	0	0	0		-18,351,000
22	1	0	943,241	943,241	418,902	23,422	0	442,324		-500,917
23	2	0	943,241	943,241	431,469	24,125	0	455,594		-487,647
24	3	0	943,241	943,241	444,413	24,849	0	469,262		-473,980
25	4	0	943,241	943,241	457,745	25,594	0	483,340		-459,902
26	5	0	943,241	943,241	471,478	26,362	0	497,840		-445,402
27	6	0	943,241	943,241	485,622	27,153	0	512,775		-430,466
28	7	0	943,241	943,241	500,191	27,968	0	528,158		-415,083
29	8	0	943,241	943,241	515,196	28,807	0	544,003		-399,238
30	9	0	943,241	943,241	530,652	29,671	0	560,323		-382,918
31	10	0	943,241	943,241	546,572	30,561	0	577,133		-366,109
32	11	0	943,241	943,241	562,969	31,478	0	594,447		-348,795
33	12	0	943,241	943,241	579,858	32,422	0	612,280		-330,961
34	13	0	943,241	943,241	597,254	33,395	0	630,649		-312,593
35	14	0	943,241	943,241	615,171	34,397	0	649,568		-293,673
36	15	0	943,241	943,241	633,626	35,429	0	669,055		-274,186
37	16	0	943,241	943,241	652,635	36,491	0	689,127		-254,115
38	17	0	943,241	943,241	672,214	37,586	0	709,801		-233,441
39	18	0	943,241	943,241	692,381	38,714	0	731,095		-212,147
40	19	0	943,241	943,241	713,152	39,875	0	753,027		-190,214
41	20	0	943,241	943,241	734,547	41,071	0	775,618		-167,623
42										
43	Net Present Value at 5%			-23,044,262						
44	Net Present Value at 8%			-22,193,393						
45	Net Present Value at 10%			-21,758,849						
46	Internal Rate of Return			#NUM!						

Case 2: Woolli – Beach nourishment plus land swap option



Woolli Village

Coastline Management Strategy Update and Options Review

301020-02273
3 August 2010



Source: former Dept. Natural Resources Estuary Inventory

Infrastructure & Environment
8-14 Telford Street
Newcastle East, NSW 2300, Australia
PO Box 668 NEWCASTLE NSW 2300
Telephone: +61 2 4907 5300
Facsimile: +61 2 4907 5338
www.worleyparsons.com
ABN 61 001 279 812

© Copyright 2010 WorleyParsons



Table 6.1 Assessment Matrix

Options Review	Current Cost	Cost \$Millions (current)
Levee/ Revetment + Beach Nourishment	levee/ revetment and road raising	0.9
	initial maintenance nourishment by dredging Woolli Woolli River (30,000 m ³)	0.3
	maintenance nourishment by moving sand from northern end of Woolli Beach to northern end of original Woolli Village (70,000 m ³ /3yrs)	1.1/3yrs
	new water tower	0.5
	subdivide and provide services to school site and Woolli sportsground (say 55 lots)	3.3
	relocate public assets and private dwellings sth of bowling club	2.0
	<i>(or property purchase at 29.1M)</i>	

Wooli Beach Nourishment Plus Land Swap Option (Worley Parsons, 2010): Benefit-Cost Modelling

Scenario: Levee / Revetment and Beach Nourishment

Notes

Project costs (Worley Parsons, 2010):		Project benefits:	
Capital		Total regional beach visits: Local residents	1,801,728
Levee/Revetment & Road Raising	\$900,000	Total regional beach visits: Visitors	643,260
Initial beach nourishment	\$300,000	Wooli beach visits: Local residents @ 5% of total	90,086
Subdivide school site and sportsground	\$3,300,000	Wooli beach visits: Visitors @ 2% of total	1,802
Relocate public and private assets	\$2,500,000	Tourism growth p.a. (Real)	1.03
Total Initial Capital Costs:	\$7,000,000	Resident growth p.a.	1.03
		Resident value for a beach visit (CS values)	\$9.30
		Tourist value for beach visit (market values)	\$26
Maintenance		Resident recreation benefits p.a.	\$837,804
Nourishment every 3 years	\$1,100,000	Tourism recreation benefits p.a.	\$46,845
Sub Total	\$1,100,000	Proportion of recreation benefits threatened (or protected)	0.50
		Recreation benefits threatened (or protected) p.a. by proposal	\$442,324
		Other benefits (Property Protection etc..)	

Fuel*Time (Fuel only = \$6.10)

Weighted average

Generous!

Project Costs (\$)

Project benefits (\$)

Net Cash Flow

Year	Capital	Running cost p.a.	Total	Resident Recreation	Tourist Recreation	Other	Total	\$
0	7,000,000		7,000,000	0	0	0	0	-7,000,000
1	0		0	418,902	23,422	0	442,324	442,324
2	0		0	431,469	24,125	0	455,594	455,594
3	0	1,100,000	1,100,000	444,413	24,849	0	469,262	-630,738
4	0		0	457,745	25,594	0	483,340	483,340
5	0		0	471,478	26,362	0	497,840	497,840
6	0	1,100,000	1,100,000	485,622	27,153	0	512,775	-587,225
7	0		0	500,191	27,968	0	528,158	528,158
8	0		0	515,196	28,807	0	544,003	544,003
9	0	1,100,000	1,100,000	530,652	29,671	0	560,323	-539,677
10	0		0	546,572	30,561	0	577,133	577,133
11	0		0	562,969	31,478	0	594,447	594,447
12	0	1,100,000	1,100,000	579,858	32,422	0	612,280	-487,720
13	0		0	597,254	33,395	0	630,649	630,649
14	0		0	615,171	34,397	0	649,568	649,568
15	0	1,100,000	1,100,000	633,626	35,429	0	669,055	-430,945
16	0		0	652,635	36,491	0	689,127	689,127
17	0		0	672,214	37,586	0	709,801	709,801
18	0	1,100,000	1,100,000	692,381	38,714	0	731,095	-368,905
19	0		0	713,152	39,875	0	753,027	753,027
20	0		0	734,547	41,071	0	775,618	775,618

Net Present Value at 5%	-3,688,652
Net Present Value at 8%	-4,544,868
Net Present Value at 10%	-5,103,048

Case 3: GrunTERS stair improvement

e.g. Proposal to build access stairs – as part of larger site plan
Estimate costs vs benefits for the project and calculate net present value (NPV).

Project Costs:

- Capital cost = \$101,965 plus 5% maintenance per year.
- 10 year life expectancy

Benefits (estimated):

- Project provides beach access to net additional 25 users per week (10 locals, 15 visitors).

Access Project Cost-Benefit results:

- NPV of project is positive (@ 7% discount rate)
- Internal Rate of Return (IRR) = 15.6%
- Sensitive to assumptions / estimates
 - Very conservative figures used
 - Estimate 650 visits
- Conduct sensitivity analysis – what if costs are 25% higher than estimated?
- Need to compare with other use of funds
- But looks like a worthwhile project!

Case 4: Sunshine Coast Beach Nourishment

- Alexandra Headland – Maroochydore heavily eroded
- Sand available in the mouth of the Maroochy River – close and cheap
- Council plans to carry out sand renourishment over two operations, dredging and placing 125,000m³ of sand in 2013 and 75,000m³ in 2015 at a cost of \$1.4M and \$1M respectively.
- Is it worthwhile? Need to know value of beach width at the location



Estimating gross resident beach recreation values for Sunshine Coast (using 84 visits per year avg.)

	Consumer Surplus Per Adult Per Visit	Annual Gross Consumer Surplus LGA
Fuel only model	\$3.26	\$69,657,911
Fuel only plus time @ 40% of hourly rate	\$9.24	\$197,149,901

From SLSA and Tourism Research Australia (TRA) data, approximately 15-20% of visits are to the Alex-Maroochydore stretch of coastline

Suggests an annual value from residents alone of at least **\$10.5 million**

Case 5: North Avalon Beach

- Regrade the foredune
- Restoring grassed recreation area covered by sand blowouts
- Change accessway to reduce blowouts
- Stabilise dunes
- Install viewing platform



North Avalon

- Project costs well defined - \$106,168
- Project benefits less so
- Some key knowledge gaps
 - How many people visit the beach
 - The value of these visits
 - How they'll be affected by the project
 - How long the project will last
 - What recreation-relevant changes will occur?

What will the project do?

- Improve beach reserve
- Increase visual access to the beach
 - Largely of benefit to surfers, beach users go regardless
- Possibly narrow the beach but make it appear more natural

Translating into economic terms

- Nordstrom (2001) surveyed high school students and found they preferred natural dune systems to artificial beaches
- BASTRA project identified ability to see the beach from the carpark as a component that influenced beach visitation

What is the minimum benefit needed?

- Avalon gets around 67000 visitors p.a. (SLSA)
- Using the Collaroy-Narrabeen estimates of the value of a beach day, these visits are worth approximately \$690k p.a.
- Assuming the works last 20 years, only need a 1.1% increase in benefit for the project to be economically viable
- Doesn't include expenditure, only non-market

Economic/management questions

- What do you see as the biggest challenge for your beach?
- Is economics useful in answering these questions?
- What economic questions would you like answered?
- If you've employed economics before, what was done well and what could be done better?

Mike Raybould: mraybould@bond.edu.au

Project info and survey:
www.mybeachmysay.com



Australian Government
**Fisheries Research and
Development Corporation**