

An Approach to
**Integrated Assessment of
Complex Problems - Gippsland Lakes**

**Anna Roberts*, David Pannell,
Graeme Doole and Olga Vigiak**

**Department of Primary Industries, Rutherglen Victoria*



Background

- Work on integrated assessment of complex management and policy problems
- Inter-disciplinary
 - ◆ Biological science
 - ◆ Physical science
 - ◆ Economics
 - ◆ Social science
 - ◆ Policy

What we've done

- **Developed approaches that**
 - ◆ **Focus on decision making for management and policy**
 - ◆ **Are very strong on engagement (managers, experts, community, policy)**
 - ◆ **Draw together the current science**
 - ◆ **Employ expert and/or community judgements to fill gaps**
 - ◆ **Are fully transparent and easily interrogated**
 - ◆ **Theoretically rigorous**

Gippsland Lakes

- Important national asset
 - ◆ Recreational, economic, environmental values
- Catchment has multiple uses
 - ◆ Dairy, beef, sheep
 - ◆ Tourism, forests and urban
- Multiple stakeholders
 - ◆ 40% nutrient reduction target
 - ◆ No economic input!
 - ◆ As for many ecological targets



Engagement strategy

- Participatory - work with the willing
- Active and adaptive partnership - feedback
- Have clear framework to use (INFFER www.inffer.org)
- Understand and develop the 'rules' of the game
- Work with trusted champions - find if necessary
- Collate, evaluate and modify previous information
- Meetings to actively engage and use local knowledge to augment data and information
- External peer review for credibility

Analysis strategy (technical)

- Identify desired outcomes
- Identify potential management actions
 - ◆ When, where, how much, how often
- Relationships between actions and outcomes
 - ◆ Review existing data, publications, reports
 - ◆ Preliminary relationships quantified
 - ◆ Gaps identified
 - ◆ Expert workshop(s) review preliminary relationships and provide judgements to fill gaps
- Identify and quantify technical risks

Analysis strategy (socio-political)

- Identify policy instruments/delivery mechanisms
 - ◆ Direct works, regulation, extension, payments, R&D
- Relationships between mechanisms and actions (behaviour change)
 - ◆ Direct works – no problem
 - ◆ Behaviour change – more difficult
 - ◆ Review data, reports, publications
 - ◆ Workshop(s) with experts on behaviour change
- Identify and quantify socio-political risks

Analysis strategy (economic)

- Estimate private costs of desired behaviour change
 - ◆ Feeds into consideration of likely levels of behaviour change and into cost of policy instruments
- Estimate costs of direct actions and implementing policy instruments
 - ◆ Determines required budget

Analysis strategy (integration)

- Integration - developed a spreadsheet tool to enable interrogation of impacts on outcome(s)
- Optimal delivery mechanisms for scenarios
 - ◆ Simulated annealing, genetic algorithms

Microsoft Excel - Gippsland Lakes P tool v27_MS_280410.xls [Shared]

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H1

Gippsland Lakes P Tool: Land use interactive testing							Results	
Land Use	Current area (ha)	Modified area (ha)	Without BMPs		With BMPs			
			TP load (tP/yr)	TP load (%)	TP load (tP/yr)	TP load (%)		
Native vegetation	546,580	546,580	22	7%	0	0%	TP Reduction	
Forest - production	859,450	859,450	35	11%	35	12%	by land-use change (tP/yr)	0.0
Forest- plantation	53,720	53,720	2	1%	0	0%	by BMPs (tP/yr)	13.0
Irrigated Dairy	45,890	45,890	65	20%	54	19%	total (tP/yr)	13.0
Dryland Dairy	27,920	27,920	15	5%	15	5%	total (%)	4%
Dryland Beef/Sheep	347,160	347,160	39	12%	38	13%	Cost	
High rainfall mixed dairy beef	82,570	82,570	27	8%	26	9%	of land-use change	
Horticulture/Cropping	18,300	18,300	26	8%	26	9%	of BMPs	\$0
Other (urban, mining water, residential)	75,610	75,610	18	5%	18	6%	of administration	\$0
Streambank	3,460	3,460	79	24%	79	27%	total	\$0
Total	2,060,660	2,060,660	329	100%	291	100%	Total (up front + ongoing)	\$0
							Index of cost effectiveness	0.00

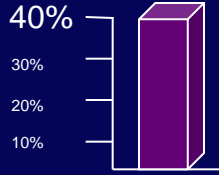
18 About this sheet: This is where you can experiment with different areas of each landuse to see
 19 what impacts can be made on P exports. Change the land area values in Column C to investigate
 20 potential impacts.
 21
 22 Note: The cost of land-use change is based on estimates of annual profit per ha.
 23 In calculating total costs, it is compounded over 20 years, using a discount rate of 5%.

Colour scheme
 Headings
 Management options you can alter
 Numbers not to alter
 TP results
 Cost results

Scenarios analysed

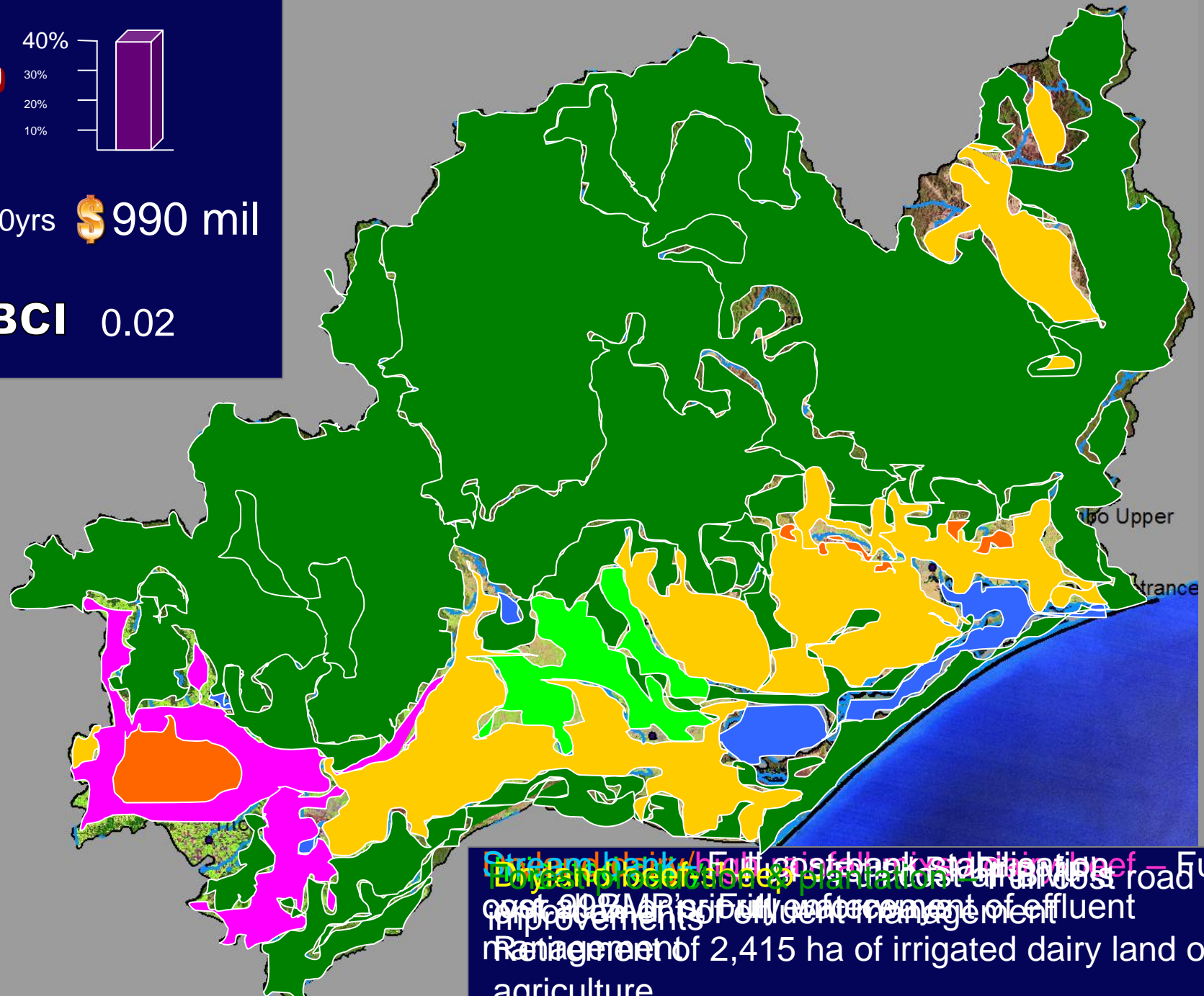
- 40, 30, 20 and 10% P least cost
- \$2, 5 and 10 million/year/5 years + on-going maintenance costs
- As above but no on-going costs
- Current incentives - 3 scenarios
- Effluent enforcement
- Streambanks only - 50% and 20% effective
- Higher lakes value

P



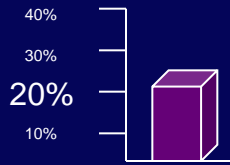
PV 20yrs \$ 990 mil

BCI 0.02



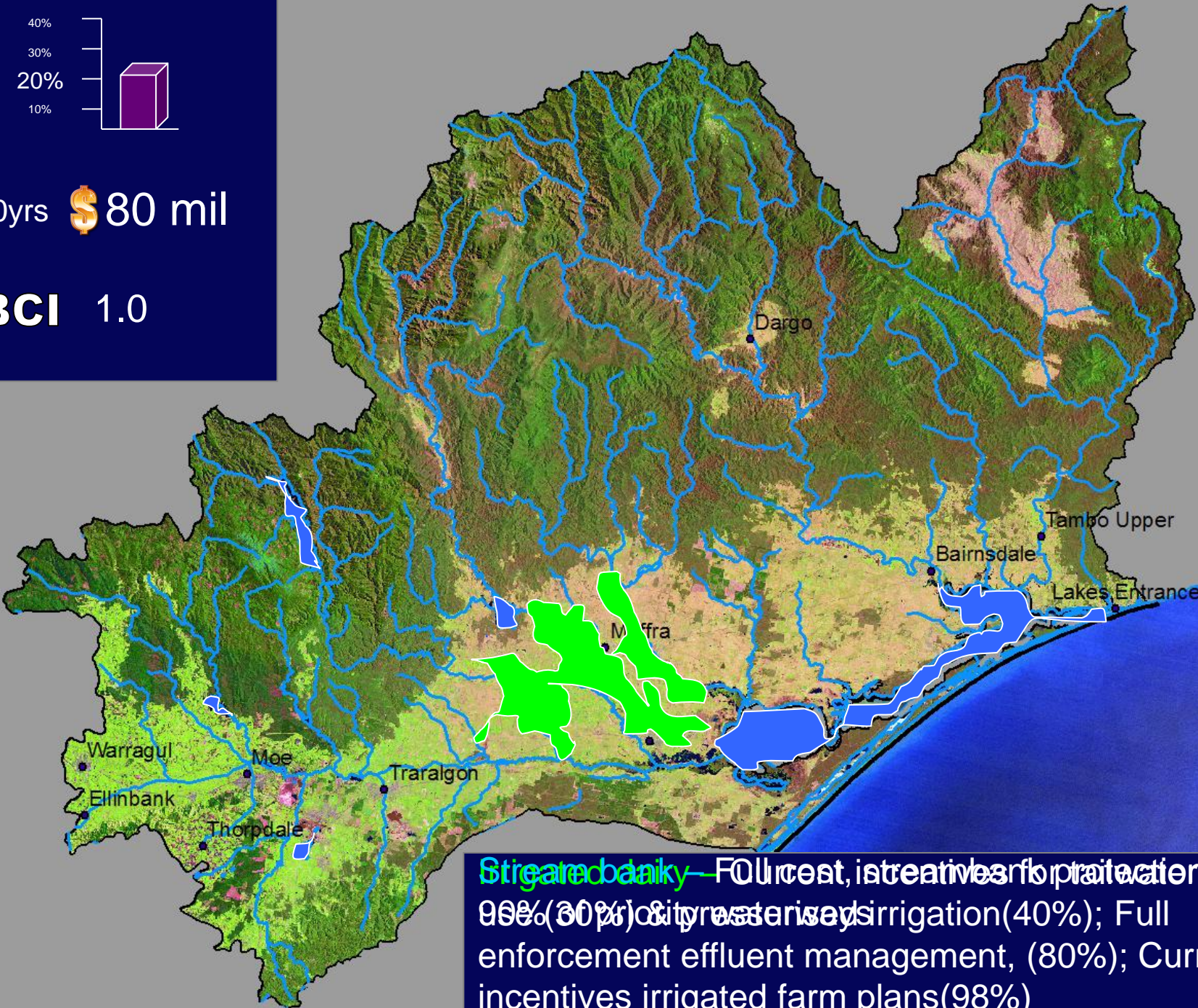
Stream bank/Full cost of bank stabilization - Full
 Dry fallow beef slopes plantation and best road
 cost of 20% APR is Full enforcement of effluent
 improvements Full enforcement of effluent
 management of 2,415 ha of irrigated dairy land out of
 agriculture

P



PV 20yrs \$ 80 mil

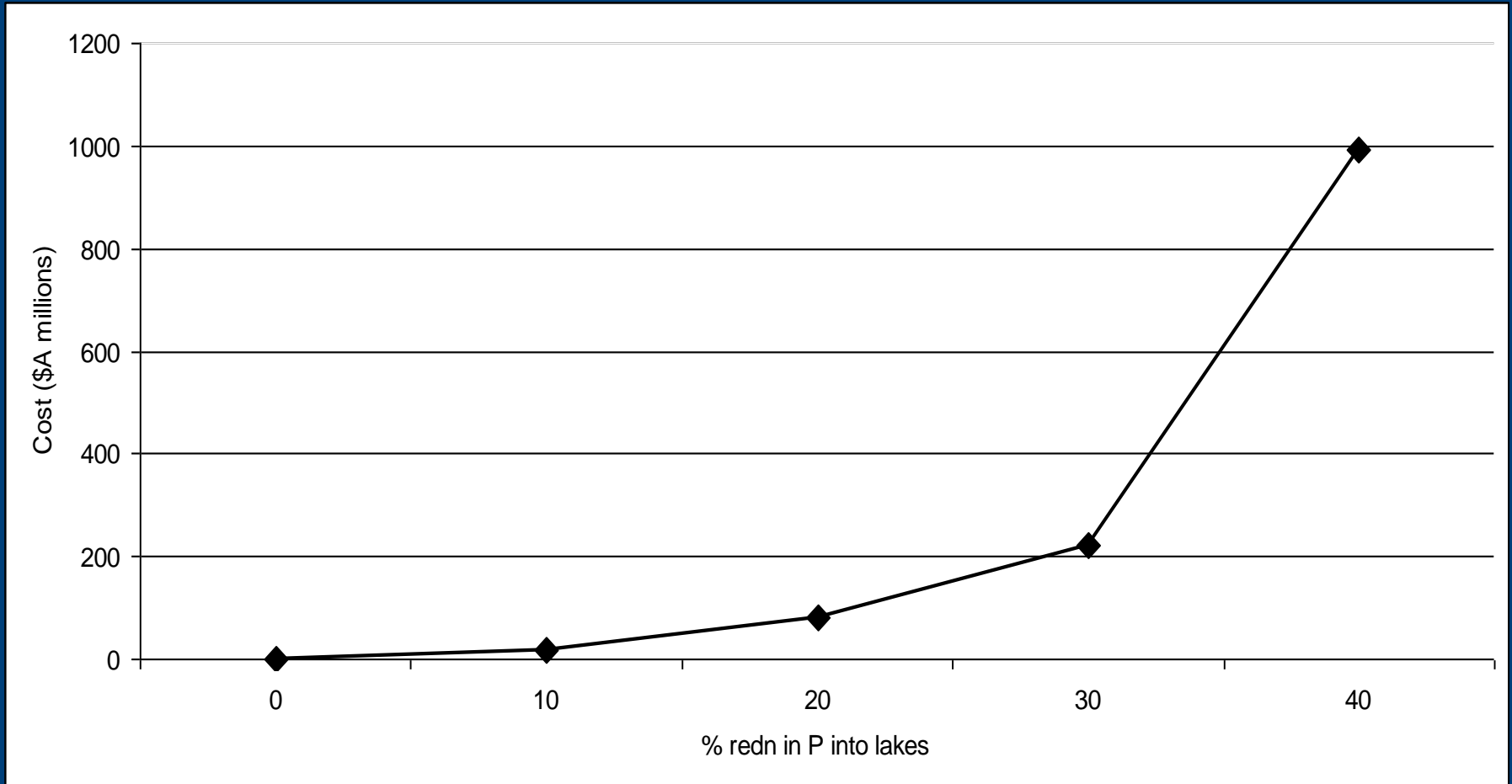
BCI 1.0



Streambank – Full cost, is a critical area for protection on 99% (30%) of city water supply & irrigation (40%); Full enforcement effluent management, (80%); Current incentives irrigated farm plans (98%)

Scenarios	% P target	Upfront \$ million	Maintenance \$ million	BCI
40% Least cost	40	584	38	0.02
30% Least cost	30	117	10	0.3
20% Least cost	20	54	2.5	1.0
10% Least cost	10	10	0.6	2.6
\$5m/yr for 5yrs with ongoing funding	18	25	8	0.6
\$5m/yr for 5yrs no ongoing funding	7	25	0	1.7
Irrigated dairy incentives	9	14	1	1.7
Effluent	6	5	1	2.8

Gippsland Lakes: costs of meeting targets



Conclusions

- Relationships and trust were crucial
- Economic mindset absent from stakeholders
- Need to understand and adapt information
 - ◆ Present in several forms – visual, graph, numbers
- Avoid direct conflict/confrontation
 - ◆ Adapt strategy/messages to be at least partly within existing knowledge/comfort zones
 - ◆ Let go of purist positions whilst avoiding prostitution