bushfire&natural HAZARDSCRC

ECONOMICS OF NATURAL HAZARDS:
HELPING DECISION-MAKING WHEN DATA IS MISSING

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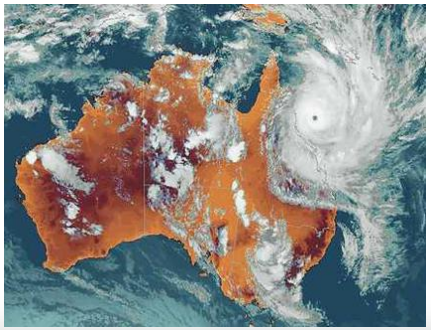
THE UNIVERSITY OF WESTERN AUSTRALIA

ECONOMICS OF NATURAL HAZARDS

Objective of mitigation: protect the values affected by natural hazards

a) Limited budgets and competing investments
b) Need to justify investments



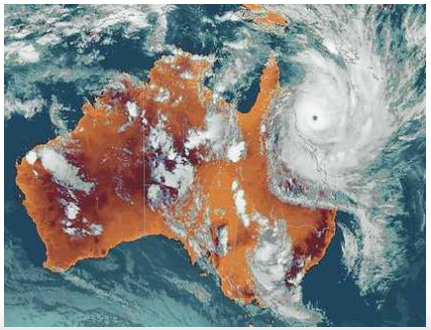



ECONOMICS OF NATURAL HAZARDS

How do we determine which management options offer the best value for money?

a) Compare investments between different locations and different hazards
b) Prioritise by benefits gained per dollar invested






EFFECTIVE PRIORITISATION

1) Need to weigh up all of the economic, environmental and social outcomes:

   a) What would happen if we didn't mitigate?
   b) How are the outcomes changed if we do?

2) Integrated economic assessments

   a) Benefit-cost analyses
   b) See the trade-offs between the different, sometimes competing, outcomes

3) Environmental and social outcomes (intangible values) need to be fully integrated into BCA (in $)

ECONOMICS OF NATURAL HAZARDS

2 parts to the project

Intangible values (non-market values)

Integrated Economic Analysis

ECONOMICS OF NATURAL HAZARDS

Intangible values
(non-market values)

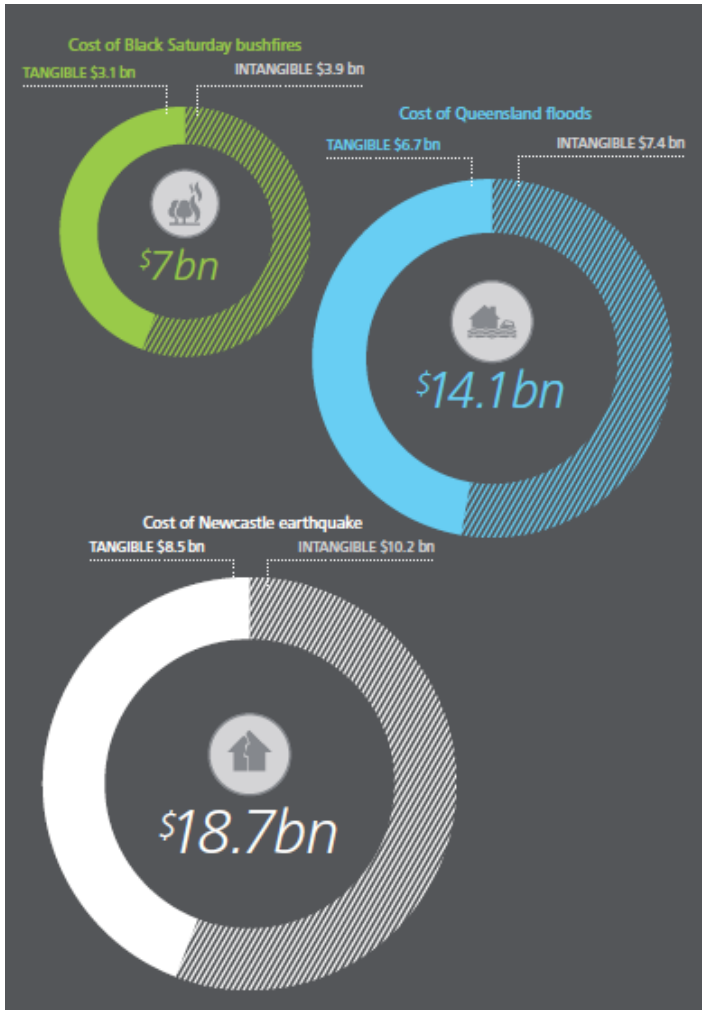
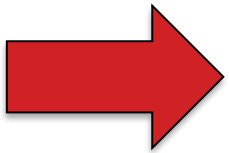


Image: Deloitte Access Economics 2016 “The economic cost of the social impact of natural disasters”

ECONOMICS OF NATURAL HAZARDS

Intangible values (non-market values)



Integrated Economic Analysis

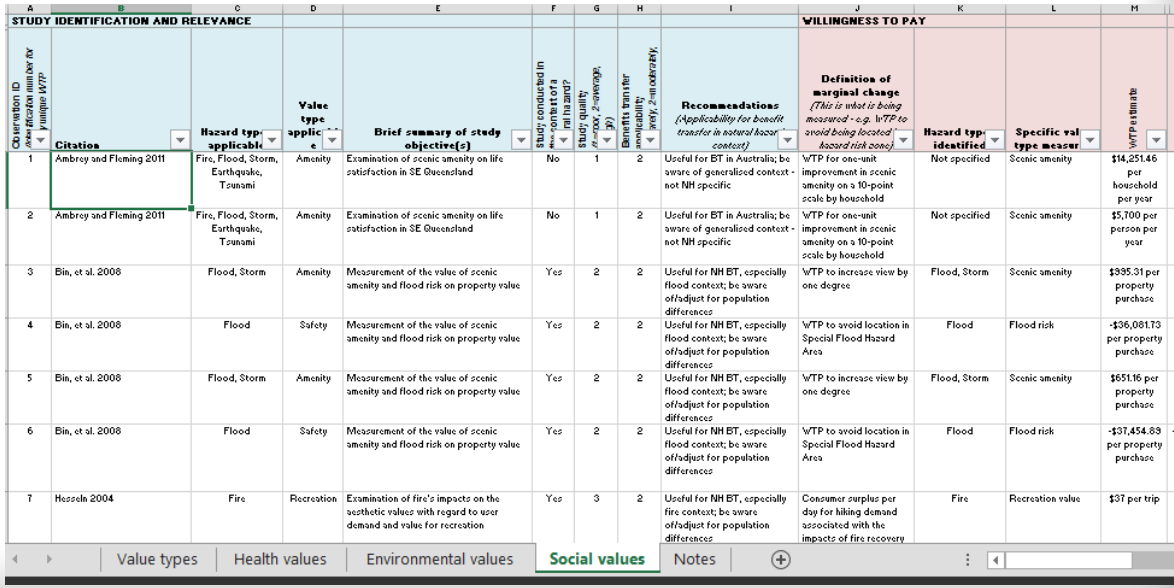
Flood mitigation in Brown Hill Creek and Keswick catchments in Adelaide

Prescribed burning in the Mount Lofty Ranges (Adelaide Hills)

ECONOMICS OF NATURAL HAZARDS

Intangible values (non-market values)

A database of existing intangible values relevant to natural hazards that can be used to include intangibles in benefit-cost analyses



	B	C	D	E	F	G	H	I	J	K	L	M
	STUDY IDENTIFICATION AND RELEVANCE								WILLINGNESS TO PAY			
Observation ID (Key identification number for unique WTP value)	Citation	Hazard type applicable	Value type applicable	Brief summary of study objective(s)	Study conducted in context of a natural hazard?	Study quality (1=poor, 2=average, 3=good)	Benefit transfer applicability (1=poor, 2=moderately, 3=good)	Recommendations (Applicability for benefit transfer in natural hazard context)	Definition of marginal change (This is what is being measured - e.g. WTP to avoid being located in hazard risk zone)	Hazard type identified	Specific value type measured	WTP estimate
1	Ambrey and Fleming 2011	Fire, Flood, Storm, Earthquake, Tsunami	Amenity	Examination of scenic amenity on life satisfaction in SE Queensland	No	1	2	Useful for BT in Australia; be aware of generalised context - not NH specific	WTP for one-unit improvement in scenic amenity on a 10-point scale by household	Not specified	Scenic amenity	$14,251.46 per household per year
2	Ambrey and Fleming 2011	Fire, Flood, Storm, Earthquake, Tsunami	Amenity	Examination of scenic amenity on life satisfaction in SE Queensland	No	1	2	Useful for BT in Australia; be aware of generalised context - not NH specific	WTP for one-unit improvement in scenic amenity on a 10-point scale by household	Not specified	Scenic amenity	$5,700 per person per year
3	Bin, et al. 2008	Flood, Storm	Amenity	Measurement of the value of scenic amenity and flood risk on property value	Yes	2	2	Useful for NH BT, especially flood context; be aware of/adjust for population differences	WTP to increase view by one degree	Flood, Storm	Scenic amenity	$395.31 per property purchase
4	Bin, et al. 2008	Flood	Safety	Measurement of the value of scenic amenity and flood risk on property value	Yes	2	2	Useful for NH BT, especially flood context; be aware of/adjust for population differences	WTP to avoid location in Special Flood Hazard Area	Flood	Flood risk	-$36,081.73 per property purchase
5	Bin, et al. 2008	Flood, Storm	Amenity	Measurement of the value of scenic amenity and flood risk on property value	Yes	2	2	Useful for NH BT, especially flood context; be aware of/adjust for population differences	WTP to increase view by one degree	Flood, Storm	Scenic amenity	$651.16 per property purchase
6	Bin, et al. 2008	Flood	Safety	Measurement of the value of scenic amenity and flood risk on property value	Yes	2	2	Useful for NH BT, especially flood context; be aware of/adjust for population differences	WTP to avoid location in Special Flood Hazard Area	Flood	Flood risk	-$37,454.89 per property purchase
7	Hesseln 2004	Fire	Recreation	Examination of fire's impacts on the aesthetic values with regard to user demand and value for recreation	Yes	3	2	Useful for NH BT, especially fire context; be aware of/adjust for population differences	Consumer surplus per day for hiking demand associated with the impacts of fire recovery	Fire	Recreation value	$37 per trip

Value types | Health values | Environmental values | Social values | Notes

NON-MARKET VALUES AFFECTED BY NATURAL HAZARDS

Health values	Environmental values	Social values
• Physical health • Mental health	• Ecosystems • Water quality	• Recreation • Amenity • Safety • Cultural heritage • Social disruption • Memorabilia • Animal welfare

A VALUE TOOL FOR NATURAL HAZARDS

1) Accessible database of $ estimates for non-market values

2) Guidelines on conducting simple benefit transfers

3) Easier to account for *all* costs and benefits that affect bushfire mitigation decisions

4) Next steps:

   a) Distribution to end-users
   b) Online presence, website housing the Value Tool
   c) Non-market valuation study to fill some of the research gaps

ECONOMICS OF NATURAL HAZARDS

Comprehensive economic assessments

a) Require **time**
b) A lot of **information**

Integrated Economic Analysis

ECONOMICS OF NATURAL HAZARDS

Comprehensive economic assessments

a) Require **time**
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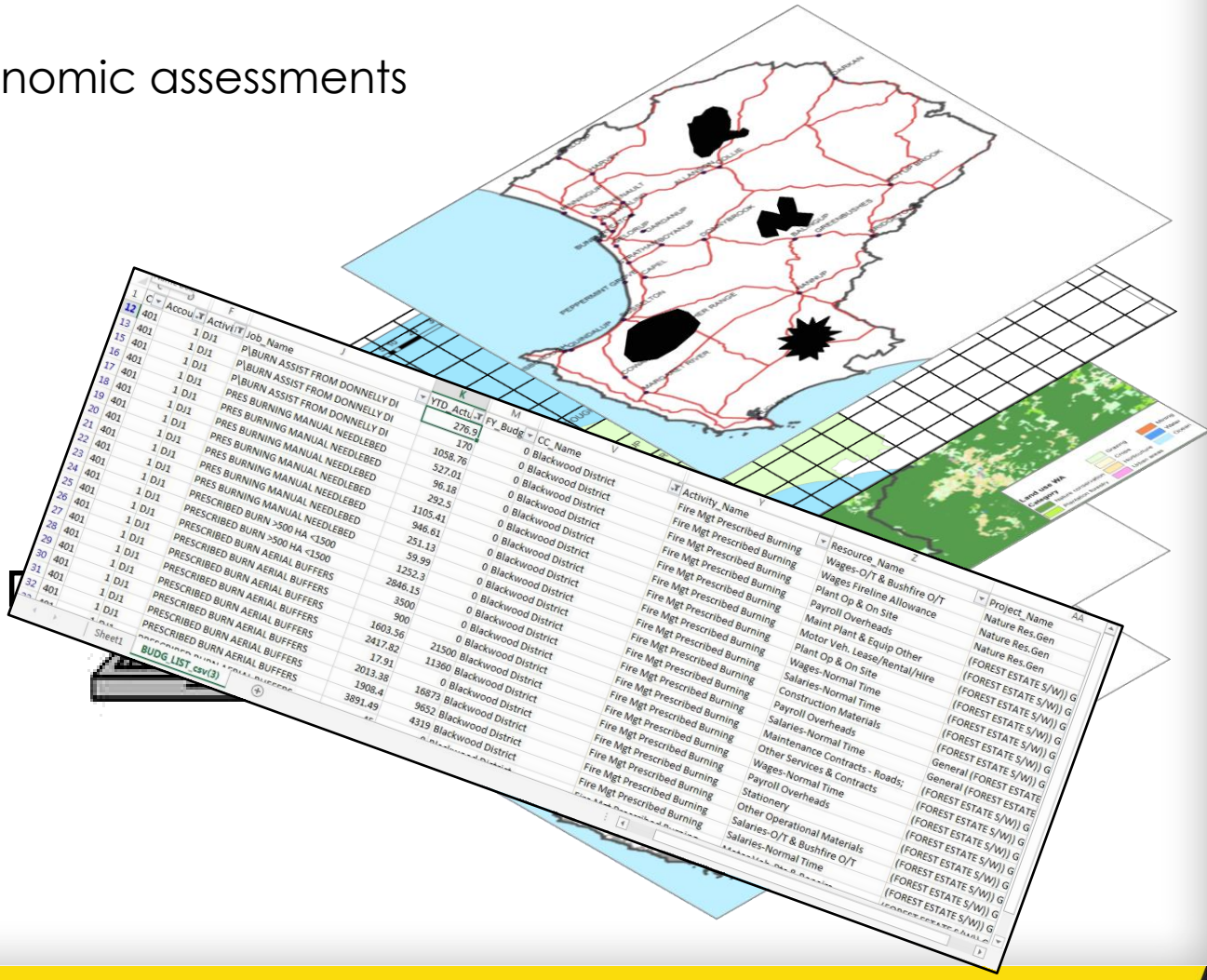
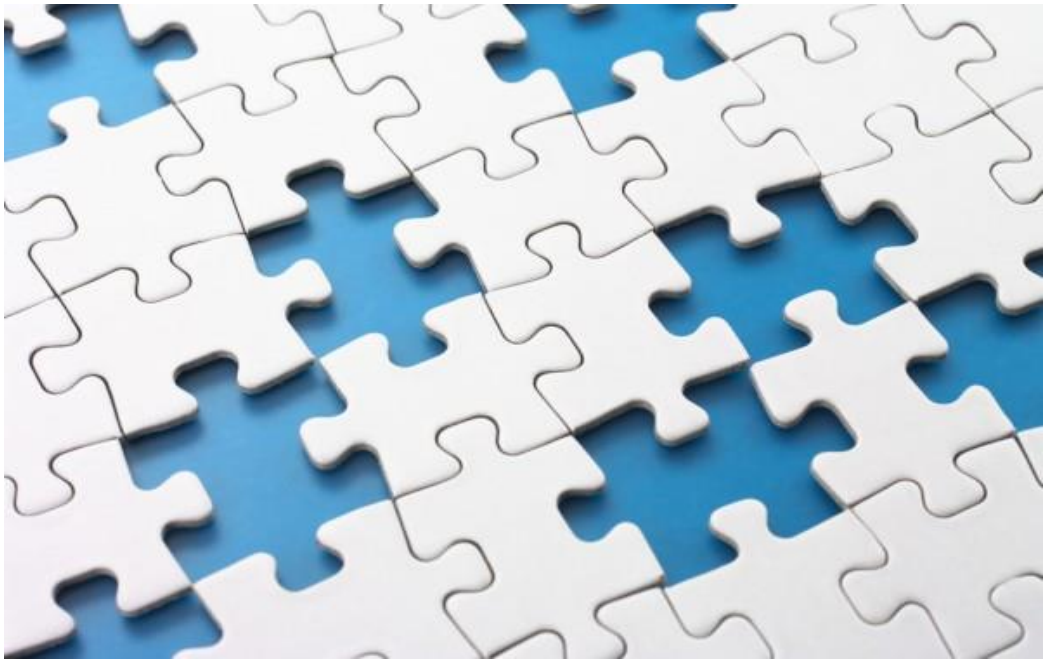


INPUTS

1) Prescribed burning strategy
2) Number wildfires
3) Ignition probability
4) Time of the year
5) Weather conditions
6) Suppression proxy

EFFECTIVE PRIORITISATION

But what if we **don't have** a lot of **time** or all the **data** required?



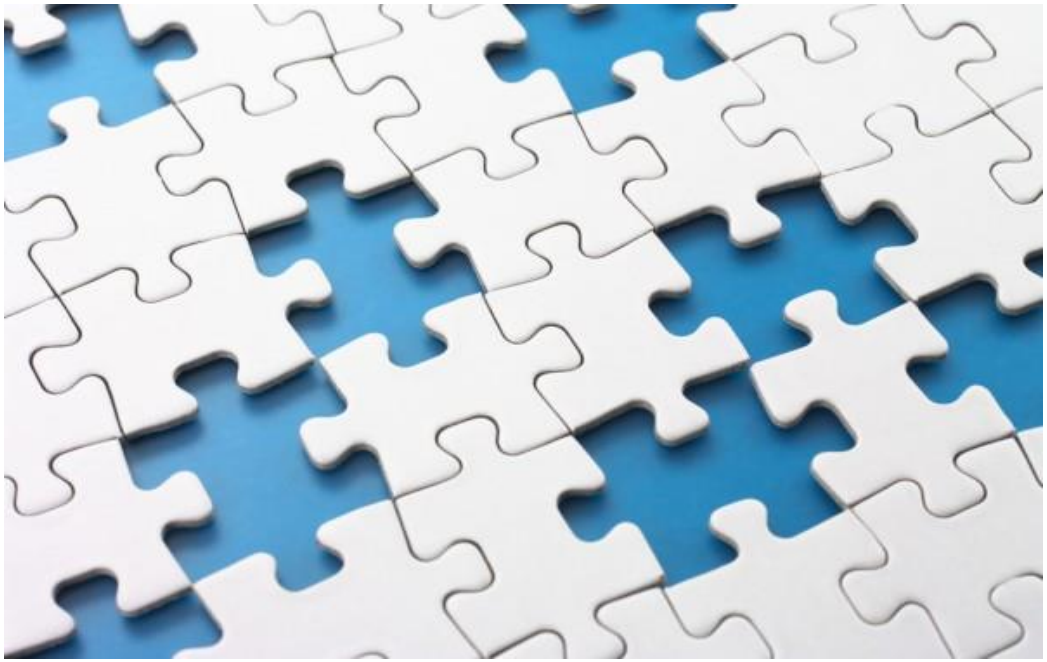
GIVE A BREAK TO YOUR BRAIN ☺

With pictures from the land of ice:

Antarctica

EFFECTIVE PRIORITISATION

But what if we **don't have** a lot of **time** or all the **data** required?



EFFECTIVE PRIORITISATION

1) Economics can help in such cases

2) Uncertain information is better than no information

3) Better to include information with uncertainty than to ignore it completely

Pannell, D.J. and Gibson, F.L. 2016. Environmental cost of using poor decision metrics to prioritize environmental projects. Conservation Biology, 30(2): 382-391.

a) Investigated variables used in decision metrics for environmental project prioritisation
b) Environmental outcomes were better with uncertain information compared to incomplete information

EFFECTIVE PRIORITISATION

1) Development of a **quick economic analysis** tool

2) Provide natural hazard managers with a **quick** and **rough** overview of value for money

   a) Intended to be helpful as a guide to decision making

   b) Use available information, existing risk analyses

   c) Prioritise mitigation strategies

   d) Identify which project options are most worth developing business cases for

EFFECTIVE PRIORITISATION

1) Development of a **quick economic analysis** tool

2) Provide natural hazard managers with a **quick** and **rough** overview of value for money

   e) Insights into what information is more important to collect

   f) What is needed to improve decisions and confidence in them

   g) Prioritise collection of additional information

EFFECTIVE PRIORITISATION

1) Development of a **quick economic analysis** tool

2) Provide natural hazard managers with a **quick** and **rough** overview of value for money

   h) Help clarifying the counterfactual (business as usual or another baseline)

   i) Help managers develop their economics thinking

EFFECTIVE PRIORITISATION

3) Include intangible (non-market) values

a) Determine their importance for different decisions
b) Guide future research on non-market values in natural hazards context

4) Have a tool that allows for the analysis to be conducted in weeks rather than months or years

5) Enough for Treasury?

a) Will depend on the type of decision studied
b) Usually a full BCA is required

NEXT STEPS

1) Case studies for the quick economic tool

2) First release of the Value Tool for Natural Hazards database and guidelines

3) Original non-market value study – earthquake mitigation in York, WA

Session: Economics of natural hazards
2:50pm
Blackwattle & Melaleuca

MEET THE TEAM

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THANK YOU!

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