economics
public policy
markets
strategy

MARSDEN JACOB ASSOCIATES

Talks Live

Economics of coastal zone management

30 March 2023

Talks Live

The **Marsden Jacob Talks Live** webinar series brings people together to discuss pressing issues across environment, energy, water, waste and recycling, agriculture and earth resources and other sectors in Australia and internationally.

These free webinars are open to everyone. We aim to share best practices and bring you the latest research and thinking. Our focus in these events is on encouraging open, positive and collaborative discussion.

We encourage you to share your questions, opinions, experience and interests. We also welcome your thoughts on future topics for our webinar series.

Each live event includes a presentation hosted by Marsden Jacob experts, followed by an open Q&A session.

Marsden Jacob Associates acknowledges the Traditional Custodians of the lands and waters across Australia where we conduct our business. We also pay our respects to their Ancestors and Elders past and present, and leaders emerging.
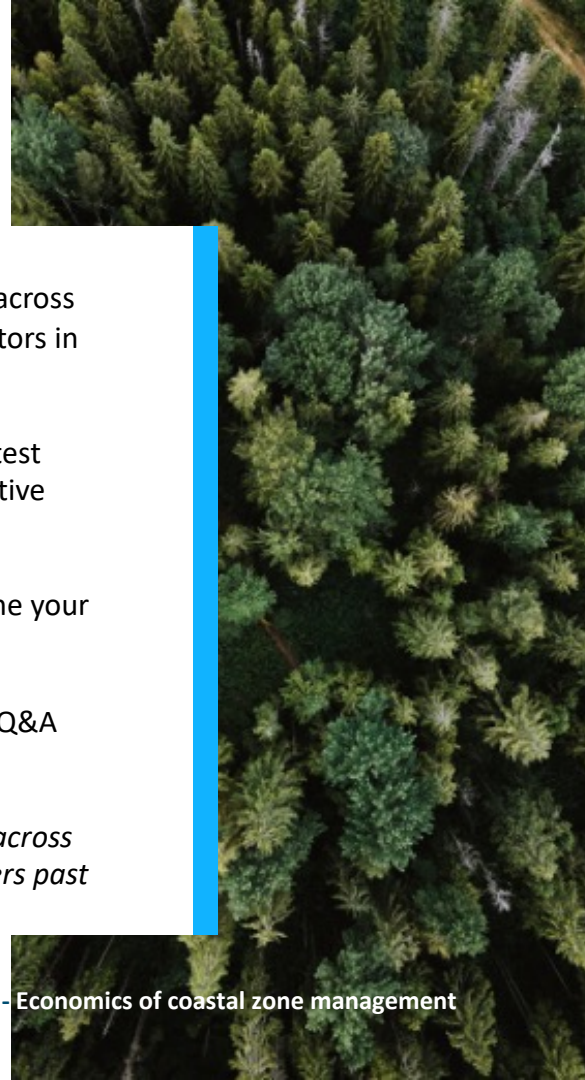
Who are we?

Philippa Short
Principal

MEc (W.Aust.), GDip Comp Policy (Oxf.Brookes), BSc (Natural Resource Management) (Hons) (W.Aust.), BEc (W.Aust.)

- A unique combination of scientific and economic knowledge and extensive experience across a range of sectors, including environment and climate change, natural resources and waste.
- Experience includes regulatory and institutional reform (including RIS development); economic research, cost-benefit analysis and business case development; and environmental sustainability policy advice. Also skilled in structural policy, including microeconomic and financial analysis.

Rod Carr
Director

MEnvSt (Macq.), BEc (Syd.)

- Experienced and highly qualified environmental and resource economist. Worked extensively with public/private sector clients across water, environment, natural resource management and transport.
- Skilled in economic analysis, strategy and policy development; program and project development, management, monitoring and evaluation; business case development and review; market-based instruments; and institutional reform – in particular, water reform and National Competition Policy reviews.

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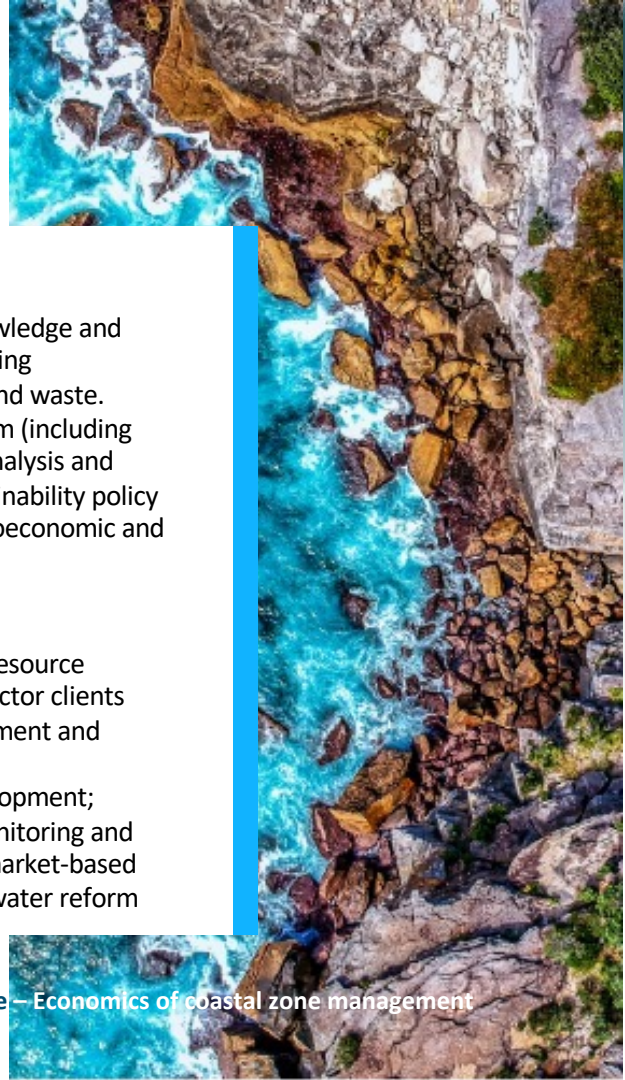
Why this topic? And why now?

1. **The effects of climate change means that timely, smart action-taking is critical for both private and public sectors**
    As sea levels continue to rise, the impact of storms on coastal areas and the threat to environmental and build assets along our coastlines is increasing.

2. **The economics of coastal zone management is deeply complex**
    This is a complex and wide-ranging local, state and national issue. No two coastal zones are the same. When it comes to analysing options, choosing the approach that will achieve the best outcomes for your community requires analysis that balances social, economic and environmental risks and benefits.

Why are we here?

Nine News - Jul 17, 2020

Why us?

Our market-leading approach integrates probabilistic hazard modelling and economic models to inform benefit distribution analysis, using economics to inform option selection and development of funding models for coastal zone management. We have:

- Been instrumental in developing a 'best practice' approach to assessing the costs of coastal hazards on built assets, land values and amenity by applying the outputs of probabilistic hazard modelling – a modelling framework that's been peer reviewed by State Government economics units.

- Developed guidelines for decision-making on coastal adaptation for local councils in eastern states. Our guidelines adopt a similar staged approach to decision-making as the WA CHRMAP guidelines.

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What we'll cover

During this webinar, we will:

- **Set out the frameworks and analytical approaches** that we have developed to grapple with this extremely complex policy challenge.

- **Share some of our deep and applied expertise** in the integration of scientifically based probabilities into economic analysis.

Context

Coastal zone threats from storm events are a national issue.

Beach erosion – Wamberal Beach (NSW)

Storm surge – Cairns (QLD)

Beach erosion – City of Stirling (WA)
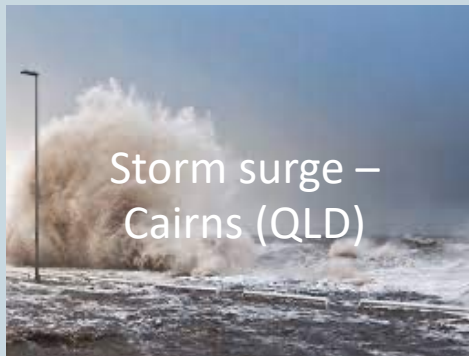
Key steps within risk treatment identification

Step 1
- Identify the full range of risk treatment options (may be 10 management areas x 10 treatment options).

Step 2
- Use multi-criteria analysis to identify the most important areas and highest-ranking treatment options (e.g. 3 management areas x 3 treatment options).

Step 3
- Use cost-benefit analysis to identify the preferred option for addressing short, medium and long-term risk and whether the preferred treatment will deliver a net benefit.

Step 4
- Develop adaptation pathways (identify triggers for implementation of the risk treatment options and decision-points over time).

What is cost-benefit analysis?

Cost-benefit analysis is:

- A form of economic appraisal that can be used to estimate changes to the economic wellbeing of local and wider communities.

- Used to estimate and compare the costs and benefits of implementing a proposed project or management activity with the costs and benefits of a 'base case', which represents a continuation of current conditions under which the proposed project/ policy is not implemented.

In the analysis we model:
- Base Case = Business as Usual
- Option Cases = Protect (e.g. revetment) vs. Retreat

Note: Marsden Jacob undertakes cost-benefit analysis in accordance with the Government guidelines for cost-benefit analysis of coastal management options.

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Example benefits and costs

Cost-benefit analysis considers each short-listed option against the Base Case.

Benefits	Costs
• Value of private property (residential and commercial) protected by the treatment. • Value of public infrastructure protected by the treatment (e.g. roads and utility services). • Value of natural assets protected by the treatment (e.g. beaches, estuaries).	• Construction of the new treatment. • Operating and maintenance cost associated with the treatment. • Possible contribution to damage to or loss of values of coastal areas (e.g. loss of beach may be exacerbated by a sea wall).

Total economic value – for valuing coastal adaptation

Client related event

← Sea level rise
Storm surge
Coastal recession
Rising water table

Market costs (tangible)

Direct market

- Loss of land.
- Damage to infrastructure.
- Increased maintenance costs for private assets.
- Increased maintenance costs for public assets (e.g. roads, beaches).
- Costs of clean up (e.g. after storm surge, flooding).

Indirect market

- Property valuation impacts of climate change or adaptation policy (e.g. vulnerability warning on properties).
- Production impacts on businesses affected by climate change adaptation policy (e.g. local businesses affected by beach loss or closure).
- Disruption to services and/or increased cost of service provision (e.g. water, power, waste collection).
- Legal costs.

Non-market costs (intangible)

Direct market

- Death or injury.
- Loss of environment assets (beaches and foreshores, wetlands).
- Loss of cultural assets (e.g. middens).
- Loss of personal memorabilia.

Indirect market

- Stress and health impacts following extreme climate events.
- Health impacts associated with loss of recreational opportunities (e.g. beaches, public open space).
- Social disruption (e.g. closure of schools, hospitals etc.).

Seawall and hazard lines

Source: Marsden Jacob Associates

PURPLE LINES - PROPOSED ROAD SEGMENTS

BLUE POLYGON
APPROX EXTENT OF WALL

RED LINES - PROPOSED PARCEL EXTENTS

2068 Forecast

— 50% Exceedance Level
— 1% Exceedance Level
— ZSA 2050 (SMEC, 2010)
- - - ZRFC 2050 (SMEC, 2010)

0   75   150   300
                     m

Source: NSW Office of Environment & Heritage

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What do CBA results look like?

The cost-benefit analysis (CBA) assesses the incremental costs and benefits of each option relative to the base case.

Costs and benefits are assessed over an agreed timeframe (e.g. 10 to 50 years), with future costs and benefits discounted to reflect 'time preference value' of money.

(5% discount rate, $'000)	Option 1	Option 2a	Option 2b	Option 3
Total PV cost	5,000	9,000	15,000	0
Total PV avoided cost/benefits	12,000	12,000	12,000	-2,500
Total net present value	7,000	3,000	-3,000	-2,500
Total PV avoided cost/benefits	2.4	1.33	0.8	NA

PV – Present value

Escalating probabilities

Why is this complex?

15

Escalating probabilities

Why is this complex?

Escalating probabilities

Why is this complex?

Escalating probabilities

Why is this complex?

Escalating probabilities

Why is this complex?

Example CBA continued

Considerable **care** and **attention** needs to be exercised when assessing the economic costs and benefits.

Among the issues to consider:

- **Probabilities are not constant** (climate change impacts).

- **Properties are redeveloped** with new foundation considerations.

- **Beach amenity is a dynamic consideration**.

- **Edge effects**.

Who are the beneficiaries?

Government – utilities such as roads, water, electricity.

Business and industry – cafés, restaurants etc.

Private land holders – private property that is saved.

Local community – local users of beaches, parks, estuaries etc.

Broader community – wider users of green assets including non-uses such as altruism.

Provided proposed treatment enhances rather detracts from the value of these assets

Why is this analysis important?

- Coastal zones are already being impacted by climatic events and climate change is only going to make this worse.

- Benefit distribution analysis (BDA) – forms the basis for the funding proposal for the identified areas.

- Not spending unnecessarily on solutions that may not produce the best long-term outcome.

- Important to ensure that all stakeholders are identified including the impacts and benefits.

- Will become more important as understanding of the science and impacts of climate change evolves.

- Not just protecting current infrastructure and assets but ensuring good planning for the future environment.

Problems we have witnessed

Errors in the probabilistic modelling

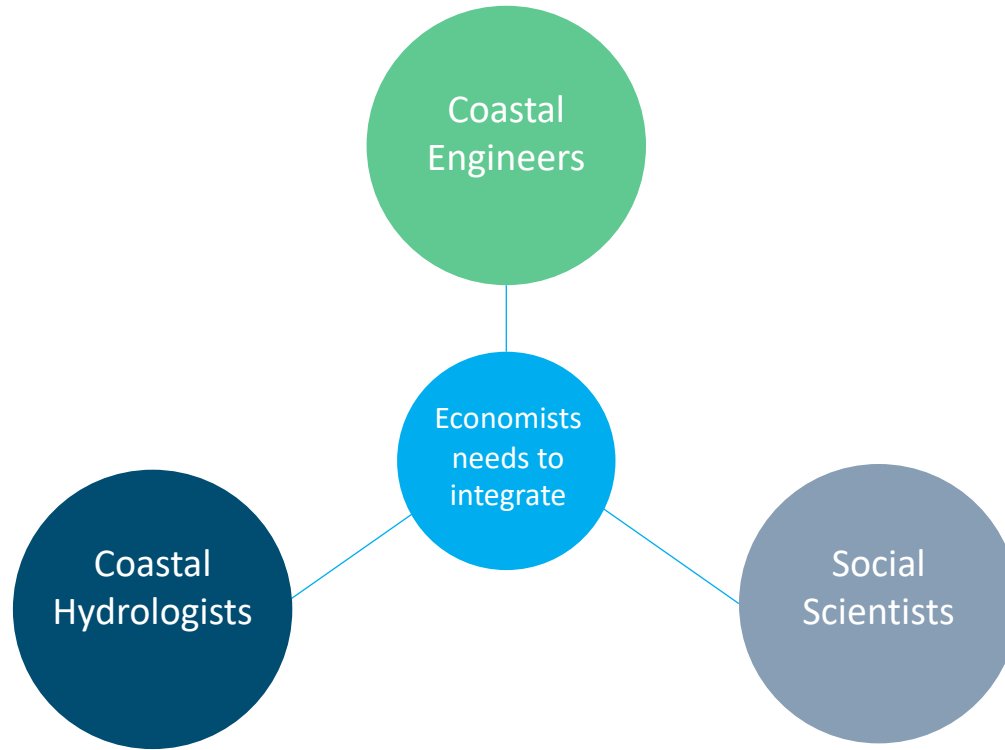Errors in cost valuation

Errors in benefit valuation

Inclusion of wealth transfers in the economics

Errors in the scope and scale of the analysis

Sources of meaningless results

You need a multi-disciplinary team

Coastal Engineers

Economists needs to integrate

Coastal Hydrologists

Social Scientists
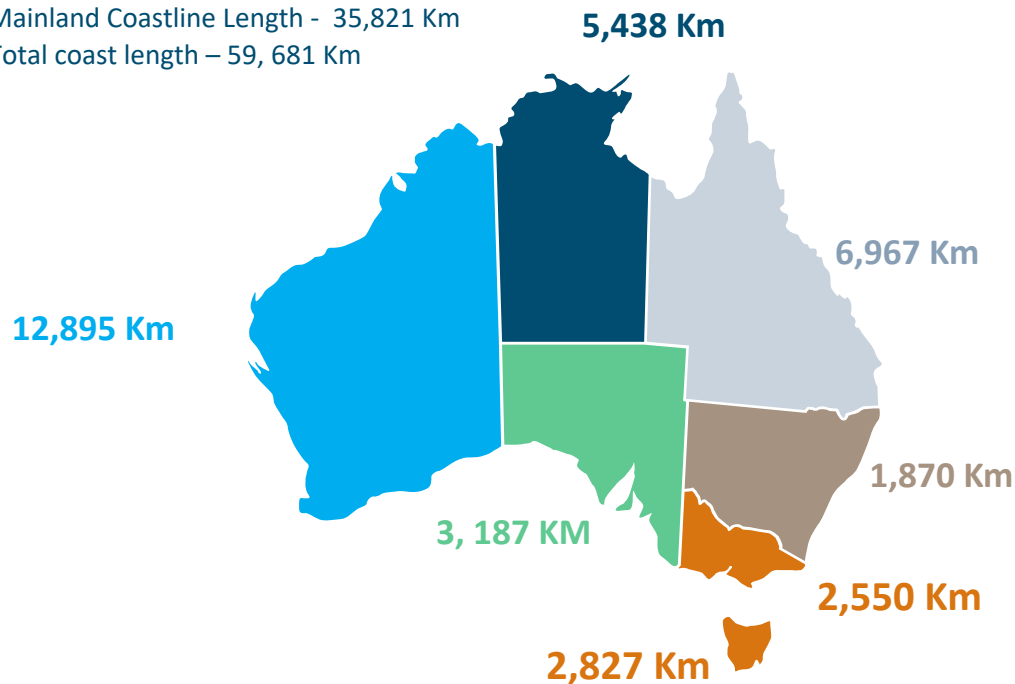
Clients that require assistance with this issue

Mainland Coastline Length - 35,821 Km
Total coast length – 59, 681 Km

5,438 Km

6,967 Km

12,895 Km

3, 187 KM

1,870 Km

2,550 Km

2,827 Km

Governments

Engineering firms

Property owners and developers

Insurance organisations

Geoscience Australia - https://www.ga.gov.au

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The Team

We have a highly experienced team in coastal management across the country that can assist
www.marsdenjacob.com.au/people

Rodney Carr
Director

Philippa Short
Principal

Alexander Marsden
Associate Director

Nadja Arnold
Principal

Peter McKenzie
Associate Director

David Rogers
Principal

Q&A and thank you

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Thank you

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1. Valuing natural capital

2. Simplifying water markets

3. Constructing nature-positive RISs

4. European energy crisis: lessons for Australia

5. The real cost of carbon

6. Economics of coastal zone management

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