

## Introduction

### What is Benefit Distribution Analysis

These factsheets provide context and guidance for undertaking a benefit distribution analysis (BDA) for coastal adaptation investments. BDA is recommended to be undertaken as part of the WA Coastal Hazard Risk Management and Adaptation Planning (CHRMAP) process to identify funding models for adaptation investments. BDA shows:

- who benefits from an adaptation investment
- how much they benefit
- when they benefit and for how long.

BDA is used so that the beneficiary pays principle (BPP) can be applied. BPP is a form of cost recovery with the basic principle that those who benefit from adaptation actions should pay for them.

### CHRMAP requirements for consideration and use of BPP

The CHRMAP guidelines in clause 6.3 Funding Implementation require consideration and use of the beneficiary pays principle. Where private parties benefit from coastal protection works, the costs associated with the design, construction and maintenance of coastal protection works should be paid for by those private parties, proportional to the benefit received, in line with the BPP. The analysis should also include any costs associated with the provision of existing and future public access to, and use of, the coast where new protection works are likely to interfere with existing and future public access and use (State Coastal Planning Policy Guidelines).

### Contents

The remainder of these factsheets cover:

- Setting the scope and objectives when undertaking BDA
- Identifying the base case, accounting for the future and discounting
- Understanding outcomes, benefits, and beneficiaries
- Common issues and challenges in identifying and valuing outcomes and benefits
- Identifying information and data
- Quantifying non-market values
- Principles for funding adaptation measures
- Checklist for planning and managing BDA
- Checklist for reporting BDA findings

The purpose of the factsheets is to provide insight and guidance on some of the challenges, and key terminology and concepts, to enable land managers to procure and manage consultants engaged to deliver BDA.



## Setting the scope and objectives

Before starting a benefit distribution analysis (BDA) it is important to set out a clear objective and scope for the process. A clear scope reduces risk of misinterpretation, scope creep and inefficiency. Some important elements of a clear scope are set out here, as well as other issues to consider when planning to undertake a BDA.

### Elements of a clear scope



**Objective:** What is the purpose and objective of the BDA? How will it be used to inform decision-making?



**Location:** What is the focus area for the BDA? Is only one location included or are there multiple locations to be assessed?



**Hazards:** What are the key hazards for these areas? Do all hazards need to be assessed or are some more important for funding decisions?



**Adaptation action:** What adaptation actions should be considered and at what level of detail?



**Partners and stakeholders:** Which stakeholders need to be engaged, when, and for what purpose?

### Other issues to consider



**Stage of planning:** If BDA is being undertaken before adaptation actions are clear, it may be appropriate to undertake a high-level BDA focused on understanding potential funding risks.



**Remit:** locations should be within your organisation's remit to manage, and adaptation actions considered should be within your organisation's remit to implement.



**Community values:** the focus location should have value to the community, and partners and stakeholders should be chosen to support understanding of community values throughout the process.



**Information and knowledge base:** BDA can be more complex and detailed when more detailed information is available to support it.



**Budget and capacity:** Budget and capacity to support a BDA will need to align with the desired scope and complexity.

## Identifying the base case, accounting for the future and discounting

### Identifying the base case

Establishing a clear 'base case' scenario is critical for economic analysis. This scenario serves as a benchmark against which other investment options can be assessed. The base case should not necessarily be a 'do nothing' scenario. The base case should include any investments or priorities already committed to. It should not include any proposed new investments. The key consideration for analysis is the difference between the base case scenario and the adaptation scenario, as depicted in Chart 1.

### Accounting for the future

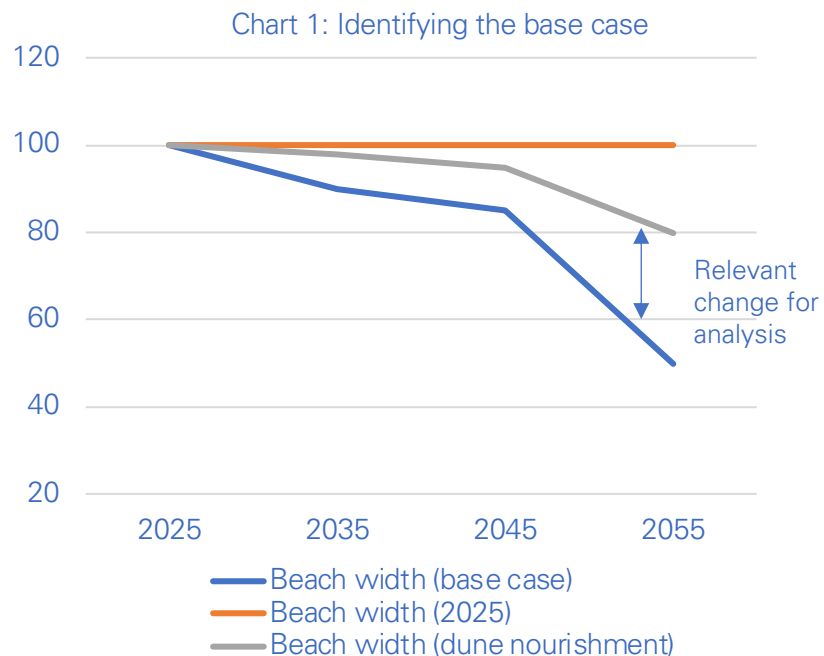
When conducting BDA, it's necessary to consider long-term benefits and costs as far out as 2050, 2070, or even 2100. This means considering potential changes that may occur during this time, such as new residential, commercial, or industrial developments, changes in population, and alterations to infrastructure like roads and railways. While uncertainties around these future outcomes may exist, it's essential to identify them and consider, as a best estimate, their affect on the analysis.

### Discounting costs and benefits over time

Discounting is used to account for the time value of money and compare costs and benefits at different points in time. Discounting recognises that a dollar received today is generally more valuable than the same dollar received in the future due to factors like inflation, opportunity costs, and risk.

Discounting also accounts for intergenerational equity effects by giving appropriate weight to the well-being of future generations. Since future costs and benefits are discounted, the analysis gives greater weight to the well-being of present generations while considering the effect on future generations in a consistent and transparent manner.

Standard guidance in most Australian jurisdictions is to use a 7 per cent discount rate however the rate can be varied depending on the circumstance and should be tested through sensitivity analysis.



## Understanding outcomes, benefits, and beneficiaries

Identifying the causal links between outcomes (e.g. the expected consequences of coastal hazards with and without adaptation measures), the benefits of adaptation measures, and the beneficiaries of those measures is integral to any benefit distribution analysis. Some examples of outcomes, benefits and beneficiaries for coastal erosion are provided here. Any one BDA may include multiple outcomes, benefits and beneficiaries.



### Example 1

**Effects of coastal erosion (outcomes):**

Coastal erosion damages or destroys public assets or requires assets to be relocated.

**Benefits of protection from coastal erosion:**

Public asset protection avoids costs of damage and costs of relocation.

**Beneficiaries:** All local council ratepayers (avoided loss of asset value to the council).



### Example 2

**Effects of coastal erosion (outcomes):**

Coastal erosion damages or destroys private property, making it unsafe for continued use, and reducing the value of the property to zero.

**Benefits of protection from coastal erosion:**

Private property protection avoids costs of property damage that would otherwise have been incurred.

**Beneficiaries:** Private property owners directly affected by coastal erosion.



### Example 3

**Effects of coastal erosion (outcomes):**

Increasing coastal erosion affects the width and profile of the beach, reducing the number and value of visits made.

**Benefits of protection from coastal erosion:**

Recreational use benefits from continued use of, and access to the beach.

**Beneficiaries:** Recreational beach users from the local area and tourists or visitors to the beach from outside the local area.



### Example 4

**Effects of coastal erosion (outcomes):**

Increasing coastal erosion affects the visual amenity, environmental outcomes, and existence values of the beach and reserves, reducing the non-use value to residents.

**Benefits of protection from coastal erosion:**

Beach and reserve non-use values (e.g. environmental values).

**Beneficiaries:** Private property owners adjacent to the beach and reserve and other local residents near the beach and reserve.



### Example 5

**Effects of coastal erosion (outcomes):**

Coastal erosion damages or destroys a park, as well as park amenities such as picnic tables and play equipment, reducing the value to local residents

**Benefits of protection from coastal erosion:**

Park amenity benefits.

**Beneficiaries:** Local residents near the park.



## Common issues and challenges in identifying and valuing outcomes and benefits

### Double counting

Benefits can be doubled counted accidentally in economic analysis. This is usually because they are already captured in the value of other benefits.

**Example:** Including an estimated value of benefits from improved visual amenity of a beach and a separate estimated value for increased house prices in a local area from protection of the beach. These values both include amenity benefits and therefore only one should be included.



### Attribution of benefits

Analysis should clearly outline how a proposed adaptation option affects coastal hazards. The benefits should not be included in the analysis if a causal relationship cannot be demonstrated or assumed with confidence. It is also important to consider which costs and benefits would have occurred in the absence of the investment.

**Example:** An area will be affected by flooding due to sea level rise in the future. Several properties are protected from flooding by an existing levee. The proposed adaptation option is to raise the level of the road to act as a barrier for coastal flooding. There should be no benefits included for the properties already protected by the levee, as their circumstances will not change.

### Owners of assets are not always the beneficiaries

In benefit distribution analysis, it is important to accurately identify the beneficiaries of adaptation measures. In some instances, the asset owner may not be the only, or the main, beneficiary of protection.

**Example:** Assets such as roads or play areas may be owned and maintained by the local council, however, the costs of the assets are paid for by ratepayers, and the benefits from these assets accrue to the people using the assets, not the council.

### Negative outcomes or disbenefits

It may be that adaptation options will not just benefit the wider community but also impose costs. It is important to understand the trade-offs between different options when undertaking benefit distribution analysis. These outcomes should be identified and included in the analysis where they are expected to occur. However, a cost-benefit analysis approach should be used to identify the preferred options accounting for these trade-offs.

**Example:** Construction of a seawall to protect private properties has resulted in a loss of beach width, versus what would have otherwise occurred with no seawall in place. There will be a loss of value for recreational beach users as a result.



## Identifying information and data

Identifying appropriate data and information for BDA can be challenging. Some common data needed for a coastal BDA are identified below. If this data is not available when undertaking a BDA it will limit the accuracy of the BDA. However, simplifying assumptions can be made about some data to allow for a BDA to be undertaken. If this is the case these assumptions should be transparently communicated. If possible better data can be collected over time to increase the accuracy of and confidence in the BDA.

### Beach, park and recreational use data

- Number of beach visitors, local and from other areas
- Number of people using parks or recreational facilities
- Changes in use resulting from flooding or erosion

### Environmental and heritage data

- Location of environmental assets and heritage assets
- Any studies on values or use
- Expected risks resulting from coastal hazard

### Hazard information

- Coastal and estuarine erosion and inundation mapping
- Timing and risk profile
- Extent or effects
- Frequency

### Adaptation measures

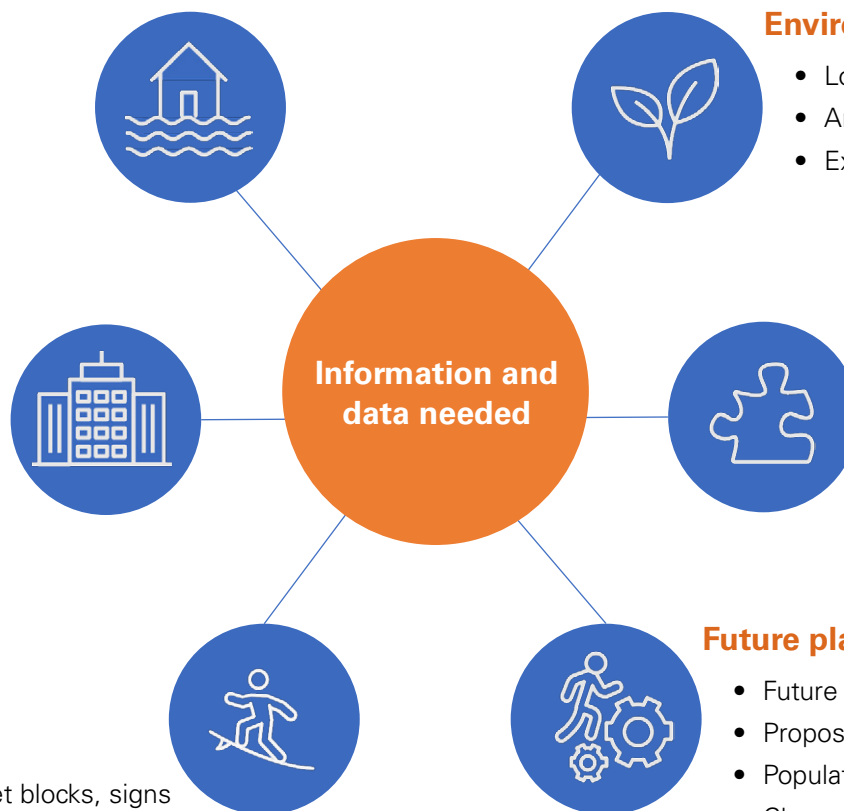
- Effect of proposed adaptation measures, e.g. beach width or access, frequency or risk of erosion or flood events
- Costs of proposed adaptation measures

### Built Asset location and value

- Building locations
- Road network, state and local
- Other built assets e.g. car parks, toilet blocks, signs
- Financial value, maintenance costs

### Future planning information

- Future growth, new building developments
- Proposed planning controls
- Population growth rates
- Changes in infrastructure, access or use



## Quantifying non-market values

Many of the costs and benefits that need to be included in a benefit distribution analysis may be hard to value. Benefits such as recreational use of a beach or environmental benefits from healthy wetlands are not captured in standard market values. Undertaking a BDA therefore requires non-market valuation methods to be used to enable these important benefits to be included alongside other benefits such as property protection. Non-market valuation includes two broad categories; use and non-use values. Both use and non-use values are likely to be included in a BDA for coastal or estuarine adaptation.

### Use values

Use values refer to the direct or indirect benefits that individuals receive by using or consuming a resource. This includes:

- **Direct Use Values:** benefits derived from directly using or consuming a resource, such as fishing in a lake, or enjoying recreational activities in a park.
- **Indirect Use Values:** benefits obtained from the indirect use of a resource. For example, wetlands providing flood control, or ecosystems supporting biodiversity.

### Non-use values

Non-use values represent the value individuals place on a resource even if they do not use or directly benefit from it, for example:

- **Option Value:** the value people place on preserving a resource for potential future use or for future generations benefit.
- **Existence Value:** the value people attach to the existence of a resource, whether they plan to use it or not.

These use and non-use values can be estimated using a range of different methods that estimate willingness to pay for environmental or social outcomes. It is most likely that for BDAs being undertaken for coastal and estuarine adaptation benefit transfer methods will be used.

### Benefit transfer methods

Benefit transfer methods are a way to estimate the economic value of environmental goods or services in a specific location by borrowing information from existing studies of other locations. This is done when conducting a new study might be expensive or time-consuming. Benefit transfer methods consider factors such as site-specific characteristics, differences in population, and socio-economic conditions between the original study and the target location. While it

provides a useful tool for approximating values, it is important to consider the limitations and uncertainties involved in transferring values and the need for local validation when using benefit transfer methods.

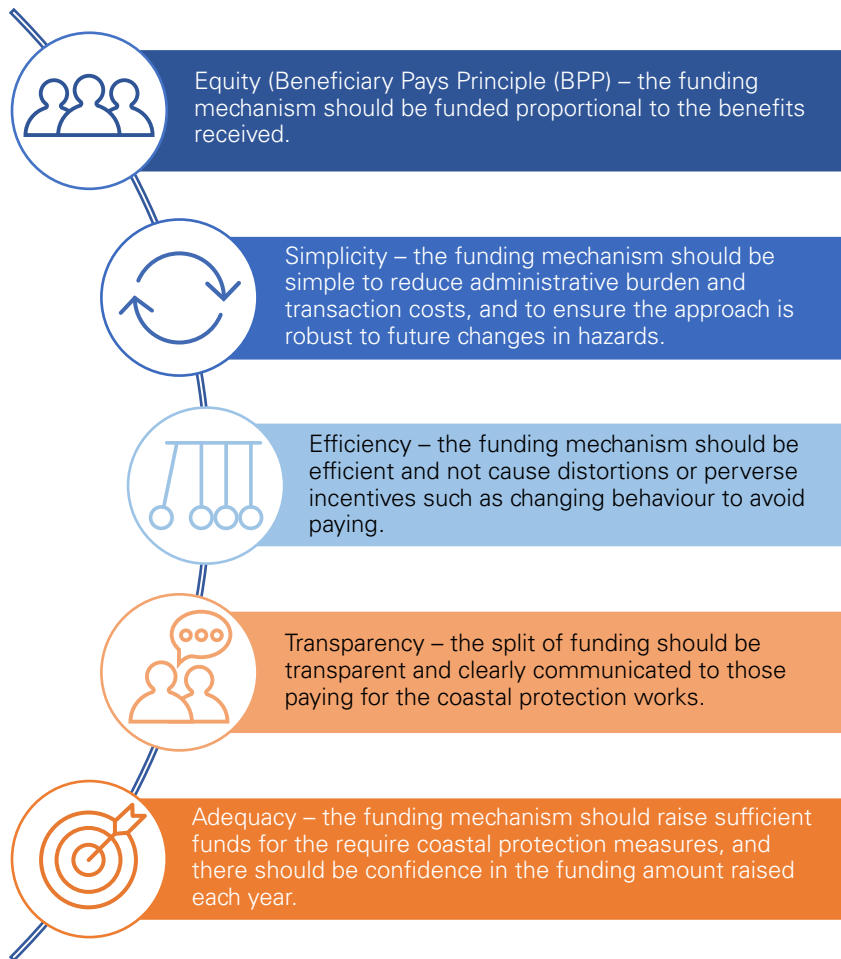
Other methods that might be mentioned in a BDA include:

- **Travel cost:** direct estimates of the cost of a individuals' travel to visit environmental or recreational sites used as a proxy for value.
- **Stated preference:** survey-based methods used to understand people's preferences and willingness to pay environmental resources or outcome.
- **Hedonic pricing:** statistical methods to estimate the effect of environmental or social goods and services on related prices such as house prices.

Further guidance on non-market valuation methods can be found in Appendix 5 of CHRMAP Guidelines (July 2019).

## Principles for funding adaptation measures

When using the findings from a BDA to develop proposed funding models for adaptation measures the following principles should be considered:



Further guidance can be found in 4.5 of the SPP2.6 Guidelines (Nov 2020); CHRMAP Guidelines (July 2019); and WA Coastal Zone Strategy (Aug 2017).

### Example A

The costs of a sea wall to protect private property are funded through a flat rate applied to all ratepayers

<input checked="" type="checkbox"/>	Equity	This approach does not meet the intent of the beneficiary pays principle as all residents pay the same regardless of the benefits they receive from the sea wall.
<input checked="" type="checkbox"/>	Simplicity	This approach is simple with low admin burden.
<input checked="" type="checkbox"/>	Efficiency	This approach is efficient and doesn't introduce perverse incentives.
<input checked="" type="checkbox"/>	Transparency	The split of funding is transparent and easily communicated.
<input checked="" type="checkbox"/>	Adequacy	The rates can be set to deliver consistent levels of funding.

### Example B

The costs of beach nourishment for a popular beach are funded by charging for parking at the beach

<input checked="" type="checkbox"/>	Equity	This approach meets the BPP as those using the beach are paying for protection measures.
<input checked="" type="checkbox"/>	Simplicity	This approach is not simple and may incur additional costs for example installing parking meters.
<input checked="" type="checkbox"/>	Efficiency	This approach is less efficient and may lead to perverse incentives such as using other beaches or parking away from the beach.
<input checked="" type="checkbox"/>	Transparency	The split of funding is transparent and easily communicated.
<input checked="" type="checkbox"/>	Adequacy	The amount of funding recovered may be inconsistent or hard to predict year to year.



## Checklist for planning and managing BDA

The table provides a checklist of actions, considerations, and timing for planning and managing a BDA. This includes considerations for managing consultants.

Planning and managing BDA	Checklist	Timing
Confirm BDA objectives and scope.	<p>Has a clear scope been defined including: objectives, location, hazards, adaptation actions, project outputs, partners, and stakeholders?</p> <p>Is the scope feasible and appropriate given the remit, information and knowledge base, current stage of planning, community values, and resources?</p>	This should be undertaken prior to engaging a consultant.
Identify and define the base case and adaptation options.	<p>Do you have a clear understanding of the base case?</p> <ul style="list-style-type: none"> <li>• What investment in coastal protection has occurred to date.</li> <li>• What investments are already funded or in planning stages.</li> </ul> <p>Have you identified the adaptation options to be included in the assessment?</p> <ul style="list-style-type: none"> <li>• Are the options clearly defined?</li> <li>• Have costs and engineering designs been completed?</li> </ul> <p>If not, the analysis will be less detailed and will need to be refined once the options are further developed</p>	The base case and adaptation options can be developed together with the consultant, but understanding the base case and adaptation options before starting the project will help set up for success.
Identify outcomes, benefits and beneficiaries.	<p>Are all key outcomes, benefits and beneficiaries being considered?</p> <p>Is there a causal link between all outcomes, benefits and beneficiaries?</p>	The consultant should work closely with you to help identify the outcomes, benefits and beneficiaries however they will need your local knowledge and understanding to do this effectively.
Identify information and data availability.	<p>Have you identified relevant information and data, which may include:</p> <ul style="list-style-type: none"> <li>• previous risk assessments</li> <li>• spatial data for hazards and assets</li> <li>• information on proposed adaptation options</li> <li>• financial and cost data for council-owned assets.</li> </ul>	Identify what information you have prior to engaging with the consultant, they can then help you to address gaps or provide guidance on the level of analysis that can be undertaken given data constraints.

## Checklist for reporting BDA findings

The table provides a checklist of actions and considerations for reporting findings of the BDA. These are usually actions that will be delivered by consultants hired to undertake a BDA, but should be validated before the project is complete to ensure effective reporting and communication.

Reporting considerations	Checklist
Documenting methods and data used	<ul style="list-style-type: none"> <li>• Have the values used to estimate benefits been clearly documented, and the methods explained?</li> <li>• Have any assumptions or data limitations been outlined?</li> <li>• Has the discount rate been documented?</li> </ul>
Sensitivity analysis	<ul style="list-style-type: none"> <li>• Have all key assumptions been sensitivity tested?</li> <li>• Did the sensitivity analysis change the findings of the BDA?</li> <li>• If an assumption is material (makes a big difference to the results) and uncertain (could be a wide range of different values) then this should be documented and addressed through future analysis</li> </ul>
Communicating findings	<ul style="list-style-type: none"> <li>• Does the content and structure of the final report align with the intended audience and purpose?</li> <li>• Is the report clear, concise and easily understood by a non-technical audience?</li> <li>• Does it include an executive summary for decision-makers?</li> <li>• Does it include technical appendices with detailed information about methodology and assumptions?</li> </ul>