Measuring the economic value of green assets: risk or opportunity

David A Greig, NZ Transport Agency
Increasingly Priceless Assets
Important issue

Transport Agency has a huge number of green assets: covering natural, cultural and public issues.

- Landscaped areas
- Stormwater management systems
- Stopping places and rest areas
- Bridging and viaducts
- Vegetation protection systems
- Buildings and heritage places (archaeological sites)

Asset management systems need to recognise these and plan for the development and operations.
Why is it important?

Green assets are a key aspect of the highway environment and context:

• Manage impacts (discharges)
• Visual features (of itself and wider)
• Often softer engineering (flexible, responsive)

Management is required regularly as they are susceptible to disruption, damages and changes:

• Condition awareness
• Need for upgrade
• Programming and funding

They cost money: So we need to value them correctly!
Risk is that we don’t fund green asset work correctly and lose functionality
Approaches to green asset management

- Conditions and functionality
- Achieving outcomes sought

Greater recognition of their value to the nation

- Reduce impacts on natural environment
- Support biodiversity
- Contributes to traveller experience
- Support economic growth
Places of destination
What do we know then?

Researched

- Value to nation and systems to use.
- Value of investment to support funding.

A natural environment and cultural asset management system for New Zealand’s state highway network: towards a practical concept and application. NZ Transport Agency research report 503. A WAY TO UNDERSTAND

Understanding the value of transport investment in historic and cultural heritage. NZ Transport Agency research report 601. A WAY TO MEASURE

Customer service delivery story for a specific state highway corridor (e.g. Wellington to Palmerston North), as measured against the One Network Road Classification performance framework. It is intended to describe the investment story for State highway.

30 corridor management plans considers a combination of:

- pressures on the system that are resulting in increased demand or a reduction in levels of service
- the current state of the system and how it is performing
- the Transport Agency response, i.e. what we are proposing to invest in to deliver customer levels of service along the corridor.

People, places, and environment

Natural environment

The journey is dominated by natural and rural landscapes with significant public conservation areas along the way, including a World Heritage Park and the largest Dark Sky Reserve in the world. Lakes, rivers and streams are located throughout the corridor and have numerous water catchment areas.

These features contribute to the stunning natural landscape on offer and the popularity of this journey, particularly to international tourists.

Noise, vibration, and air quality

Identified noise and vibration issues are limited to the Frankton and Cromwell section of the corridor. Urban development in areas that were previously rural has generated reverse sensitivity issues, particularly where heavy vehicles are braking to reduce speed from 100 km/h to 80 km/h. The surface material used on the state highway is contributing to noise where chip seal is often used to achieve cost saving measures.

Cultural landmarks, heritage, and built environment

Parks and reserves, journey views, and national walking trails are located throughout the journey and reflect the natural environment that the corridor is located in. Urban settlements provide opportunities for stopping places, although there are long distances between them. This is particularly so through the Lindis Pass section between Cromwell and Omarama. Twizel and Twizel are both undergoing urban development.
Investing in the Corridor

The Customer Levels of Service shapes our response to our investment in maintenance, renewals and improvements. The NZ Transport Agency must consider the impact we have on our customers, the environment, communities, iwi, and the NZ economy in everything we do.

Decisions must be evidence based, informed and transparent with investment targeted to the right treatment, in the right place, at the right time while considering a range of competing priorities for investment. This requires significant analysis of various alternatives and options and expertise in applying appropriate judgement in collaboration with our service delivery partners.

Right treatment, right place, right time

A range of factors have been considered to determine the best point at which to intervene with maintenance and/or renewal treatments and improvements along the corridor. Intervention works will be programmed to ensure:

- The right treatment,
- At the right place, and,
- At the right time.

Interventions will:

- Be based on minimising whole of life, whole of system costs and be underpinned by facts derived from enhanced asset information and modelling
- Define the most appropriate approach to asset maintenance, inspection and renewal, supported by reliability, availability, maintainability and safety specifications
- Use a risk-based approach to determining intervention requirements to specified levels of reliability
- Use resilience requirements to a specified range of weather conditions, considering climate change
- Define how sustainable development requirements are to be addressed

Summary investment

The proposed investment in the corridor is as follows:

Table 1 - Summary Corridor Investment ($000)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Expenditure Category</th>
<th>2018-2021</th>
<th>2021-2024</th>
<th>2024-2028</th>
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<tbody>
<tr>
<td>Access and Resilience</td>
<td>Maintenance and Operations</td>
<td>$12,319</td>
<td>$12,964</td>
<td>$19,432</td>
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<tr>
<td></td>
<td>Renewals</td>
<td>$18,316</td>
<td>$22,846</td>
<td>$32,974</td>
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<tr>
<td></td>
<td>Improvements</td>
<td>$16,817</td>
<td>$1,500</td>
<td>$0</td>
</tr>
<tr>
<td>Reliability and Efficiency</td>
<td>Maintenance and Operations</td>
<td>$4,320</td>
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<td></td>
<td>Improvements</td>
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<td>$46,900</td>
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<tr>
<td>Safety</td>
<td>Maintenance and Operations</td>
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<td>$9,675</td>
<td>$14,516</td>
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<td>Total</td>
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<td>$124,719</td>
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Figure 24 - Corridor Investment
## Summary investment

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Figure 24 - Corridor Investment

- People, Places and Environment: 4%
- Access and Resilience: 41%
- Safety: 20%
- Reliability and Efficiency: 35%

- Improvements: 44%
- Maintenance and Operations: 30%
- Renewals: 26%
Measuring the economic value of green assets; risk or opportunity

How do we know get to understand our assets?

What makes a good asset management system?

What is the best way of ascertaining the actual value and costs of assets?

Who should establish how green assets contribute to the nation?

What is the link between costs and value?
A cultural-economic synthesis

Culture & heritage frameworks

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<th>ICOMOS AU</th>
<th>English heritage</th>
<th>HNZPTA</th>
<th>NZ Transport Agency</th>
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<td>Spiritual experience and sense of place</td>
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<td>Context</td>
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</tbody>
</table>
Economist view of heritage value

Total Economic Value

Preferences and value articulation

Use
  - Direct use
  - Indirect use

Quasi-option

Option

Non-use

Consumptive
  - Use degrades heritage. Exceptional cases only
  - Tourism
  - Recreation
  - Traditional knowledge

Non-consumptive
  - Amenity
  - Aesthetic

Waiting for improved information when faced with a decision with irreversible effects

Maintaining the option of future use

Bequest
  - Existence
  - Sense of place
  - Cultural identity
Economic values derived from heritage

- Amenity
- Bequest
- Spiritual/cultural
- Commemorative
- Associative
- Recreation
- Historic education
- Tourism
- Functional
Mātauranga Māori–based assessment

Value–based: *whakapapa, kaitiakitanga, mauri, tapū, ...*

Holistic assessments

Separate process requires early partnering
Heritage Economic Benefit Tool

**STEP 1: Identify and document**
- Applying the first two columns of table 6.1, systematically identify the value/benefits for each heritage pace or area potentially affected by a project. Each heritage place or area can have multiple values/benefits, and the documentation should carefully explain the basis for each.

**STEP 2: Choose indicators**
- Select appropriate indicators from the third column in table 6.1, keeping in mind that each heritage value should be reflected by one or more indicators. However, avoid double-counting that may occur if the same indicator is used for more than one value/benefit.

**STEP 3: Quantify**
- Undertake analysis of heritage values/benefits using an appropriate quantification method. This should be done for each project alternative (or option). Individual heritage places or areas should be evaluated separately. Where a high-low or numeric scale is to be applied, ensure it is backed up by rich narrative descriptive material. Where a monetary value is being applied, ensure that the methodology is clearly described.

**STEP 4: Compare**
- Consider changes to the identified heritage values/benefits for all alternatives (or options) in terms of gains or losses of heritage value using the quantification methods applied in Step 3, and an appropriate scale. Ensure that the relevant information is included in the analysis of options and in the benefit and cost analysis of the preferred option. Mitigation, enhancement, or offset heritage values/benefits and costs should be integrated in a transparent way into this process.
## Methods to express heritage values & benefits

<table>
<thead>
<tr>
<th>Heritage value/benefit</th>
<th>Explanation</th>
<th>Potential indicator</th>
<th>Sources</th>
<th>Quantification Method</th>
<th>Appropriate Monetary Valuation Technique (where no technique is recommended, use rich narrative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amenity</td>
<td>The place/space/area is visually attractive and pleasant.</td>
<td>Visual qualities (including context); aspects of heritage place (fabric, material, structure); spatial characteristics</td>
<td>Community; expert</td>
<td>NECAMS; high-low; numeric scale; monetary unit</td>
<td>Hedonic pricing method</td>
</tr>
<tr>
<td>Spiritual/Cultural</td>
<td>Deeper experience of the place that transcends amenity associations and is distinct from commemorative associations</td>
<td>Presence or strength</td>
<td>Community; online and offline media</td>
<td>Present-absent; high-low</td>
<td>-</td>
</tr>
<tr>
<td>Bequest</td>
<td>The place is archaeologically or architecturally unique, or represents a historic technological development that is not found elsewhere, and needs to be preserved for future generations</td>
<td>Rarity; threat; integrity; presence or strength</td>
<td>Community; expert; online and offline media</td>
<td>High-low; numeric scale; monetary unit</td>
<td>Stated preference survey</td>
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<tr>
<td>Historic education</td>
<td>The place has the potential to be used for formal and informal educational purposes related to history, architecture, science, engineering, technology or design</td>
<td>Student visits; use of the place as an educational example; recognition in literature</td>
<td>Community; expert; online and offline media</td>
<td>High-low; numeric scale</td>
<td>-</td>
</tr>
</tbody>
</table>
Summary

We need to fully understand the nature and extent of our green assets so that we can manage them correctly in terms of functional needs and also take advantage of the opportunities they provide.

Our asset systems must capture their nature and extent to do this well so that there is sufficient resourcing available for this.

A key aspect of ensuring their functionality and gaining the resources needed is the understanding of economic values from a number of perspectives.

Developing an economic valuation system to support green asset management is in its early stages and the approach for heritage assets is proving useful.