

ASSESSING THE VALUE OF THE COAST TO VICTORIA

Context

This paper is based on '*Assessing the Value of Coastal Resources in Victoria, 2013*' a study that was commissioned by the Victorian Coastal Council (VCC) and prepared by WorleyParsons. The purpose of the study was to identify, characterise and quantify the commercial and non-commercial values of the natural resources of the Victorian coast.

The results of the study are intended to assist policy development and decision making that takes into account the value of ecosystem services and the interdependency of economic benefits with the health of coastal ecosystems. The study builds on previous work commissioned by the VCC (URS, 2007) and is a first attempt at a high level assessment to estimate a dollar value of ecosystems services provided by the Victorian coast.

The study was used to inform the Draft Victorian Coastal Strategy 2013 (VCC, 2013). Both *Assessing the Value of Coastal Resources in Victoria, 2013* and the *Draft Victorian Coastal Strategy, 2013* are available from the VCC website (www.vcc.vic.gov.au).

Introduction

The Victorian coastline is made up of many different ecosystems including, beaches, terrestrial vegetation, estuaries, wetlands, seagrass, mudflats and rocky reefs. These ecosystems provide services that support commercial and non-commercial uses of the coast and generate wide-ranging benefits to Victorians.

Commercial uses linked to coastal ecosystem services include shipping, petroleum extraction, commercial fishing and tourism. These have direct and indirect (or flow-on) benefits to local, regional and national economies.

Non-commercial uses of coastal ecosystem services include storm and flood protection, erosion buffers and nutrient cycling, which provide significant benefit to the community but are largely invisible. Non-commercial and many commercial uses, such as tourism and fisheries, depend on healthy and ecologically functioning coastal ecosystems.

It has been suggested that given the unique characteristics of the coast, resulting from its location at the interface of the sea, land, air and catchments, coastal ecosystems can produce cumulative benefits more significant and unique than services provided by any single ecosystem (Barbier *et al.*, 2011).

Ecosystem services

The concept of 'ecosystem services' can be useful in making the non-market (non-commercial) benefits derived from nature more explicit (Eadie & Hoisington, 2011). Ecosystems are characterised by the interactions between different species, including humans. 'Ecosystem services' are produced when these interactions transform natural

assets (such as soil, plants, animals, air and water) into things that we value (Eadie & Hoisington, 2011). The Millennium Ecosystem Assessment (2005) grouped ecosystem services into four broad categories (Fig. 1).

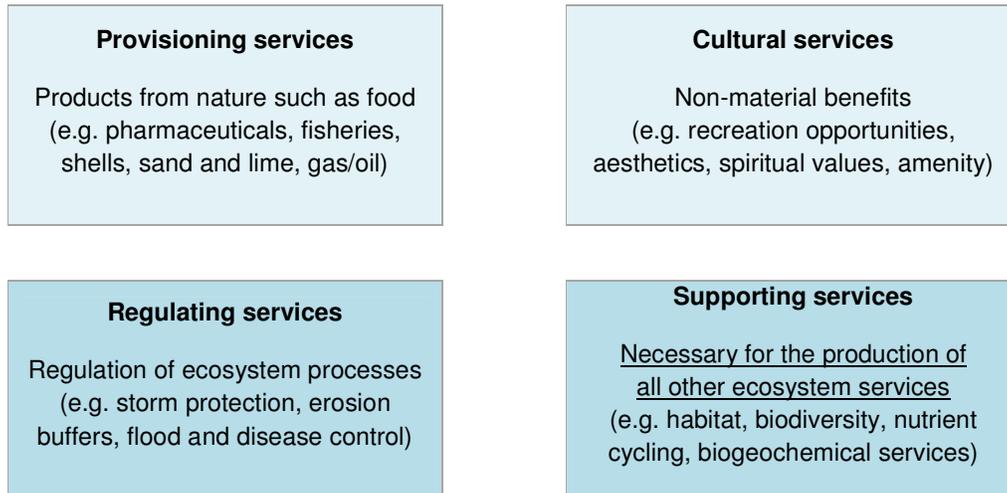


Figure 1. Broad categories of ecosystem services (adapted from the Millennium Ecosystem Assessment, 2005).

Provisioning and cultural services are dependent upon regulating services and therefore supporting services. This has important implications for decision-making about use and management of ecosystem services, in particular when there are competing demands.

Commercial and non-commercial services are interconnected

The interconnection between commercial and non-commercial services is important and can be illustrated by considering fisheries and ports as an example. Fisheries provide an estimated \$68 million value to the Victorian economy (WorleyParsons, 2013). In order to run such industries efficiently and competitively, coastal infrastructure is required, such as jetties, ports, navigational aids and the like.

Provision of coastal infrastructure may affect coastal ecosystems (e.g. seagrass meadows, estuaries, mangroves) and the ecosystem services they provide. If these ecosystems provide services such as fish breeding grounds or natural storm protection barriers, then their value (and the cost of losing them) is a critical component of maintaining a sustainable fishing industry *and* protecting the investment in coastal infrastructure associated with ports.

In this example, commercial and non-commercial uses are interdependent (both fisheries and ports benefit from the ecosystem services provided by coastal ecosystems) rather than competing elements for coastal planning. Decision making frameworks need to encompass such interdependent interactions, and allow for the full evaluation of trade-offs that are sometimes inherent in the use of ecosystem services.

At present, non-commercial services are given limited, if any, consideration in planning, management and decision making on the coast. Consideration of both non-commercial

and commercial services is important in order to ensure sustainable use of the coast (WorleyParsons, 2013).

One barrier to evaluating trade-offs is the lack of a common currency for comparing value. For instance, how does a decision maker compare the benefit from a strip of mangrove forest with those of a new recreational boating facility? Economic valuation is one way to attempt to address this barrier.

Valuing ecosystem services

Estimating the economic value of ecosystem services is becoming increasingly important in environmental and land-use planning and decision-making. This is particularly evident with complex issues which cover multiple geographic scales, socio-political levels and business practices (Defra, 2007).

While valuation is not the complete answer, it can be used as a tool to 'recalibrate the faulty economic compass' that has led to decisions that detrimental to the well-being of both current and future generations (TEEB, 2010). The hidden nature of biodiversity values can result in our natural capital, which provides the foundation for our economy, being inefficiently used or even destroyed.

Valuation of provisioning services and some cultural services is relatively straightforward. The economic value of services which are traded in the marketplace can be measured as their market value. However, the economic value of these activities can extend beyond the simple market value, with indirect or flow-on effects. For example, valuing of a port would need to consider associated ancillary activities such as transport and distribution networks, along with effects on the local economy.

Regulating and supporting services are much harder to value in economic terms. Economic valuation attempts to elicit community preferences for changes in the state (or health) of the environment in monetary terms. This is complex and often requires considerable research and data collection to provide a reliable estimate.

While it is difficult and appropriate care is required to manage judgement, uncertainty and bias, valuation can provide a sound basis for policy setting and decision-making. Those services which are not quantified are more readily taken for granted, undervalued and overlooked. Services that are quantified may be the only ones considered. Decision-makers need to be able to show both benefits and costs associated with changes in ecosystem services and make trade-offs explicit.

Eadie & Hoisington (2011) suggest that the true value of ecosystem services is likely to rise over time. As critical ecosystems decline or are lost altogether as a result of increased pressure and changes to ecosystem function, society is likely to recognise that these ecosystems (and their health) are in fact invaluable (Eadie & Hoisington, 2011).

Methodology

Although research has been done on the economic value of ecosystem services globally (Costanza *et al.* 1997, Nunes, 2001, Spurgeon, 1999), there has been little peer-reviewed work in Victoria to estimate the explicit economic value of ecosystem services.

Estimating the value of commercial ecosystem services

WorleyParsons (2013) used published economic studies of commercial activities to provide an indication of the relative scale and magnitude of the economic value of provisioning services to Victoria.

Estimating the value of non-commercial ecosystem services

Establishing the non-commercial (non-market) value of natural assets and services is a complex problem which often requires considerable research and data collection to provide a reliable estimate (WorleyParsons, 2013). Economic valuation attempts to elicit public preferences for changes in the state of the environment in monetary terms. The main types of economic valuation methods available for estimating public preferences for changes in ecosystem services are revealed preferences, stated preference and value transfer.

To ascribe a combined value for the regulating and supporting services provided by a number of coastal habitat types, WorleyParsons applied a value transfer method to published data from Victoria and elsewhere. This method provides a means of demonstrating the approximate non-commercial ecosystem service value that needs to be considered, utilising available data. The value of cultural services was considered as recreation value for the coast as a whole, independent of habitat type.

There are a number of limitations to this approach and these will not be covered here but are discussed in the report '*Assessing the value of coastal resources in Victoria, 2013*'.

Findings

Value of commercial services

It was estimated that the combined value of coastal commercial activities, arising from provisioning ecosystem services, in Victoria is around \$9.9 billion per annum (Table 1). Of the industries examined, petroleum, tourism and commercial ports are the largest, each contributing more than \$3 billion annually to the economy. The tourism industry is by far the largest contributor to employment, with an estimated 23,000 jobs created directly.

Victoria's commercial fisheries occur within state waters (to 3 nautical miles), or in some cases beyond and in bays, inlets and estuaries. The most valuable wild-caught fishery sectors are abalone (\$24 million) and rock lobster (15.8 million). Aquaculture production provides a further \$11.8 million (WorleyParsons, 2013).

The petroleum sector encompasses the exploration, appraisal, development, construction and production of natural gas and petroleum liquid resources (DPI 2012). While much of the production occurs beyond the 3 nautical mile limit of state waters, the product is brought onshore in Victoria for refining, storage and distribution.

Industry	Economic contribution (\$ millions)	Employment (# jobs)	
		Direct	Indirect
Commercial ports	3,017	15,883	n/a
Petroleum	3,600	1,280	n/a
Wind power	31	300	900
Tourism	3,154	23,010	16,770
Fisheries	68	646	1,054
TOTAL	9,870	41,000	20,000

Table 1. Commercial activities – economic contribution of coastal industries.

Value of non-commercial services

WorleyParsons 2013 estimated that the value of Victoria's non-commercial uses is at least as large as the value of commercial coastal uses. The total value of Victoria's non-commercial uses, including regulating services (e.g. storm protection, flood and disease control) supporting services (e.g. habitat, biodiversity) and cultural service (e.g. recreation, spiritual) is \$8.4 billion per year (WorleyParsons, 2013) (Table 2). This is a conservative estimate and it is likely that the true value of all ecosystem services associated with the Victorian coast would be much larger.

The cultural service of coastal recreation is highly valued at \$2.4 billion per annum. This represents the willingness of people to pay for coastal recreation opportunities over and above what they actually spend on tourism.

Estuaries/Rivers are a valuable habitat type at \$2.5 billion per annum. Seagrass habitats are also highly valued at around 1.8 billion per annum (WorleyParsons, 2013). Studies indicates that seagrass, mangroves and saltmarsh are large sinks for carbon, estimating that they sequester as much as 50 times the amount of carbon per hectare compared to tropical forest (Pidgeon, 2009).

Habitat type	Area (ha)	Unit value (\$/ha/yr)	Total value (m\$/yr)	Share (%)
Coastal recreation (beaches)			2,385	28.2
Forest	252,627	1,518	383	4.5
Grassland/heathland	65,844	363	24	0.3
Wetlands/marshes	48,422	4,265	207	2.4
Estuaries/rivers	71,264	35,768	2,549	30.2
Mangrove	71,264	38,750	320	3.8
Seagrass	61,961	29,771	1,845	21.9
Other marine	806,141	904	729	8.6
TOTAL			8,441	100

Table 2. Ecosystem service value calculation.

Total value of the Victorian coast

The total value of commercial and non-commercial services for the Victorian coast is estimated to be \$18.3 billion per year. It should be noted that the non-commercial

valuation considered only a subset of the ecosystem services provided by the Victorian coast.

Maintaining ecosystem services

The coastline of Victoria has seen loss of seagrass, mangrove and other important habitats over preceding decades, as well as changes in the water quality and plant and animal populations of coastal estuaries and wetlands (WorleyParsons 2013). Many of the threats are inadvertent results of human use of ecosystem services, and this use may be in parts of the catchment distant from where the effects are felt.

In Victoria between 2001 and 2011 the annual growth rate of Victoria's coastal areas was 1.33 per cent, and approximately four out of five Victorians visit the coast every year (IPSOS, 2012). With increasing population on and near the coast, and increasing numbers of people benefiting from commercial and non-commercial services associated with the coast, there is increasing pressure on coastal ecosystems. Changes due to the impacts of climate change will further compromise the ability of these ecosystems to provide commercial and non-commercial services.

Coastal planning, management and decision making should be mutually protective of both commercial opportunity and coastal ecosystems because the two are essentially interdependent - if coastal ecosystems are diminished, then economic opportunity is diminished. In order to do this it is important to understand, as outlined in Figure 2, the:

- features of an ecosystem which provide commercial and non-commercial services
- threats to these features; and
- priority management actions which will maintain or enhance these features, or enable them to adapt.

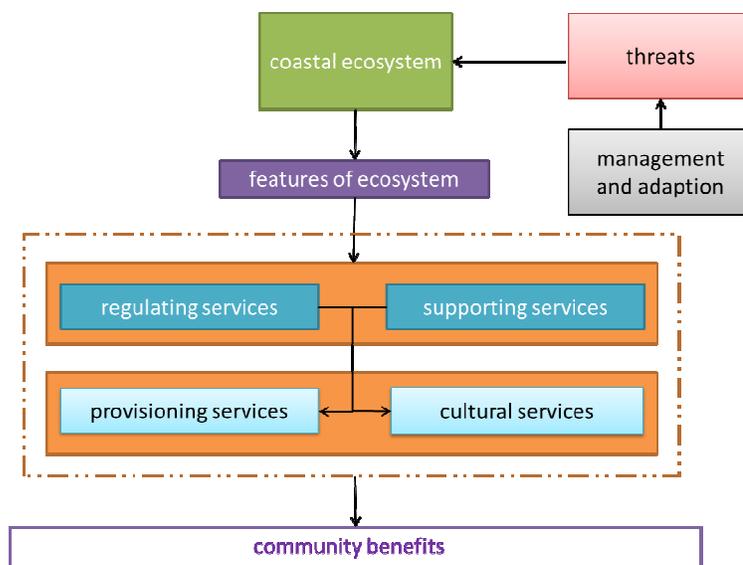


Figure 2. Linkages between coastal ecosystems, ecosystem services and flow-on community benefits.

Draft Victorian Coastal Strategy 2013

The study '*Assessing the Value of Coastal Resources in Victoria, 2013*' is a first attempt at a high level assessment to estimate a dollar value of ecosystems services provided by the Victorian coast. The findings of the study have been used to inform a number of sections, policies and actions within the *Draft Victorian Coastal Strategy, 2013*.

Better understanding the value of natural coastal resources is one of six key issues that cut across different coastal interests and require specific attention. To address this issue one of the desired outcomes of the draft Strategy is 'improved methods for valuing ecosystem services are used to allow the balance between competing coastal and marine values to be negotiated transparently and systematically'.

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