

The Natural Capital Approach.

What is it, and how does it fit into decision-making for coastal and marine areas?

Why is the natural capital approach important?

The marine environment is fundamental to our economy and our wider health and well-being. Most obviously, it provides us with food, materials such as building sand and aggregates, the opportunity for the transit of ships and the installation of offshore wind farms, as well as leisure and recreation. Perhaps less apparent is the contribution made by, for example, coastal habitats such as saltmarshes and mussel beds in dampening erosion and absorbing pollution, and the essential role of the marine system in taking and locking up carbon dioxide and so regulating our climate. The natural capital approach is based on recognising this contribution of nature to human welfare, and hence improving the manner in which the natural environment is traded-off against other things that are important to society. The concept of value is central to the natural capital approach, as it seeks to better integrate environmental, social and economic information and thus to redress the historic trend of undervaluing and overexploiting marine ecosystems.

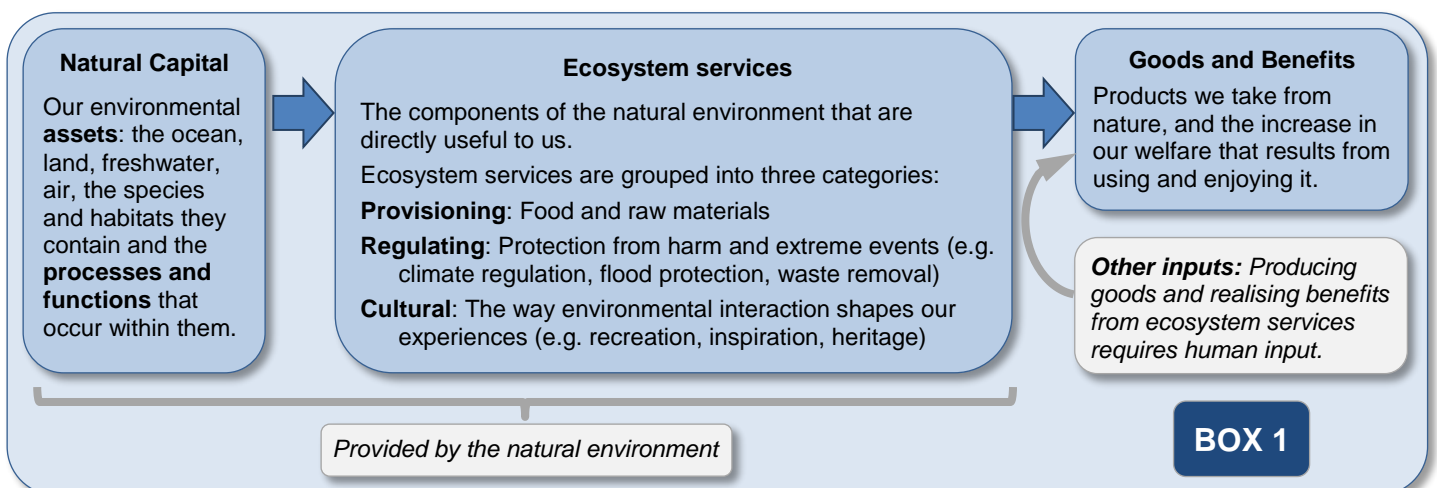


Terms like 'natural capital' are intended to convey that the environment is not separate from financial and other forms of capital. This thinking is becoming mainstream within national policy. The UK National Ecosystem Assessmentⁱ was amongst the first national-scale assessments of the contribution of nature to our welfare and economy. The Natural Environment White Paperⁱⁱ that followed pledged to “put the value of England’s natural capital at the heart of our economic thinking” and the 25 Year Environment Planⁱⁱⁱ published in 2018 reaffirmed the government’s position that the environment underpins well-being and prosperity and provides quantifiable economic benefits.

The natural capital approach has particular relevance to the marine environment: studies that attempt to compare the total value of global ecosystems repeatedly demonstrate the high relative value of marine and coastal environments compared to their terrestrial and freshwater counterparts^{iv,v}. However, application of the approach in marine systems presents several challenges, including significant evidence gaps. The scale of ecological processes does not match the jurisdictional borders that define our seas (such as the 12 nautical mile limit) bringing additional challenges for how the sea and its resources are managed. To add to this, methods and strategies for implementing the natural capital approach were originally developed for the land and so do not really take account of highly mobile species, the additional depth dimension, and the role of the water column, which are very important in the marine environment.

What is the natural capital approach?

The natural capital approach is a somewhat broad term, and there is no single, universal methodology through which it is applied. The core requirement is to measure the extent and status of natural capital and so provide the baseline against which the impacts of management and development options can be evaluated in the context of specific objectives for environmental exploitation, protection, and restoration (such as targets for sustainable yields or condition of protected areas). There are three key elements of the natural capital system: Natural capital and ecosystem services (both provided by nature), and goods and benefits, which are realised through human interactions with the environment and require, for example, skills, equipment, and the investment of time and/or money (Box1).

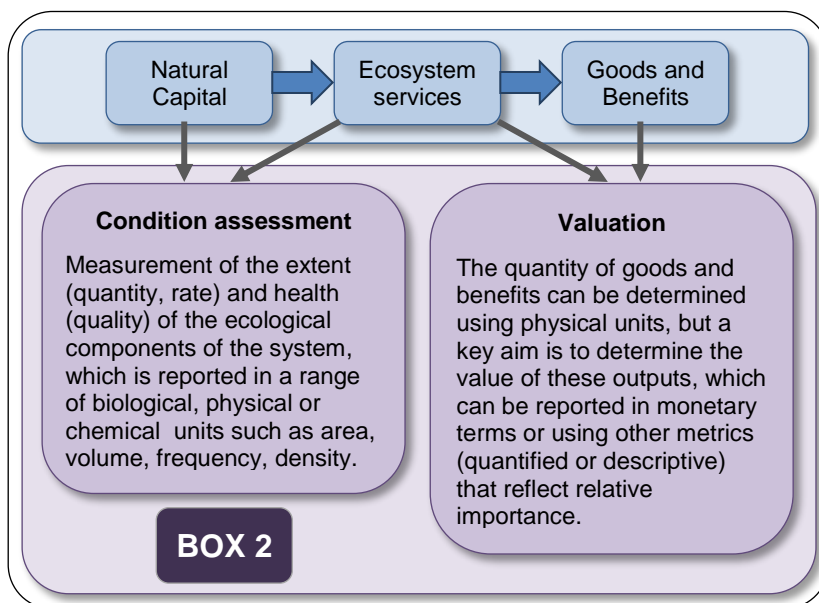


An essential component of the natural capital approach is that it does not just aim to maintain the flow of those ecosystem services and benefits that are most important to us now. Equal importance is given to ensuring that the underlying natural capital assets (species, habitats, and ecological processes) are not allowed to degrade, in order to ensure that we can continue to enjoy the full range of possible services and benefits into the future.

Measuring natural capital

Different elements of the natural capital system are measured in different ways. The status of natural capital assets is determined in ecological terms, through condition assessment, and the relative importance of goods and benefits using valuation. Both options are applicable to ecosystem services (Box 2).

One element of the natural capital approach is to try to determine value in monetary terms. Using money as a universal metric allows diverse services and benefits to be better compared with each other and with the wider economy using mechanisms such as cost benefit analysis. However, it is not always possible to monetise goods and services, and the natural capital approach allows for their relative importance to be highlighted in other ways. Decision support approaches such as multi-criteria analysis allow for information in diverse units to be systematically evaluated and compared.



The building blocks of natural capital assessment are habitats because they are distinct environmental ‘units’ which can be mapped spatially. It is sensible to distinguish coastal habitats, which are influenced to at least some degree by the ocean but are not permanently submerged, from fully marine (subtidal) habitats. This acknowledges how coastal habitats are part of both terrestrial and marine ecosystems and also, pragmatically, how coastal habitats are mapped and monitored within the same national-scale programmes as terrestrial habitats. If coastal habitats continue to be monitored as part of terrestrial programmes, it is important that the full extent (to the low tide mark) is recorded and that condition assessment takes account of their function as an integral part of the marine environment (the role of saltmarshes in providing a refuge for juvenile fish, for example).

The very broad habitat classes of ‘coastal’ and ‘marine’ need to be further separated into more refined units to ensure that assessment is not so high level that important changes and trends in quality and extent are missed. However, if there is too much subdivision of habitat classes, the resource required to gather the necessary data for a natural capital assessment will be too great. Certain habitats have a particularly significant role in providing ecosystem services and benefits, and so should be assessed separately. These include coastal plants, seagrass and kelp beds and reefs formed by dense aggregations of animals such as worms, mussels, oysters and cold water corals (Box 3).

Class	Zone	Examples of key land cover/seabed habitat types
Coastal	Coastal margin (<i>splash zone</i>)	Sand dunes, machair, shingle, sea cliffs
	Coastal (<i>between high and low tide</i>)	Intertidal rock, mudflats, saltmarsh, seagrass, worm reef, mussel beds
Marine	Shelf (<i>from low tide to about 200m deep</i>)	Subtidal rock, sediment, seagrass, kelp/other seaweed beds, oyster reefs
	Open Ocean (<i>below 200m depth</i>)	Deep sea rock, sediment, cold water corals

BOX 3

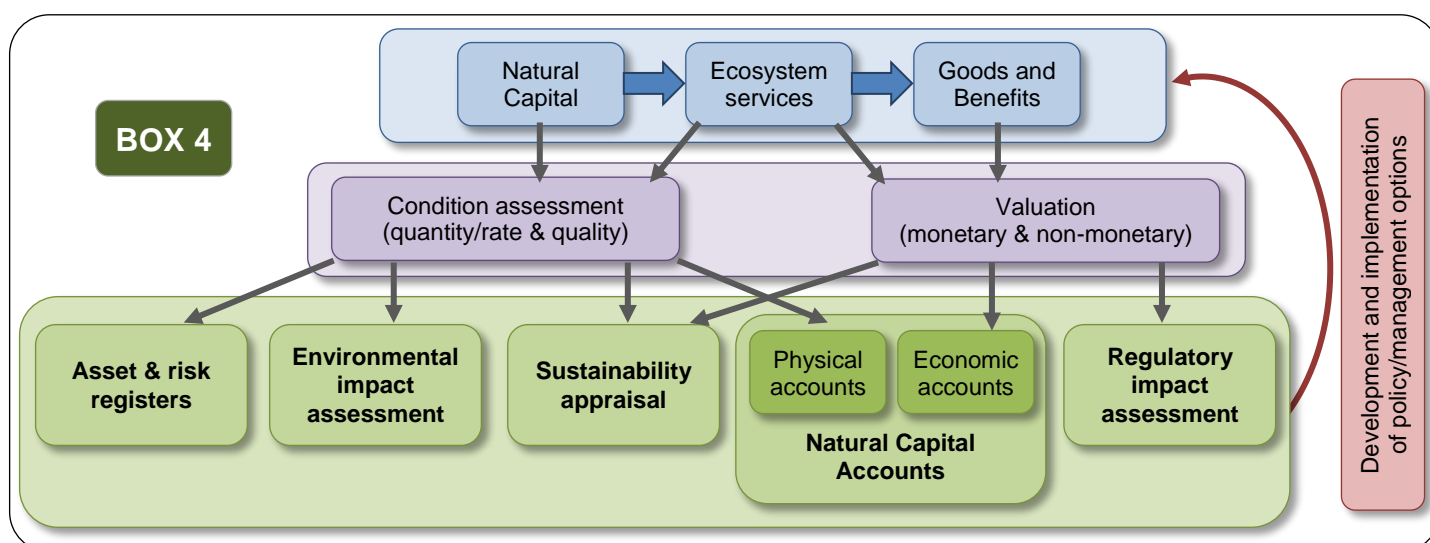
This approach to determining natural capital units evolved from terrestrial land cover mapping methods. In marine and coastal environments, it is also essential to include the water covering the seabed as a distinct type of habitat. The water column can be further divided according to salinity (in order to capture the unique features of, for example, lagoons and estuaries), and depth (relating to the penetration of light into, and the extent of mixing between, different depth layers, both of which are fundamental for primary productivity and hence for food webs).

Standard classifications and methods are important in the natural capital approach because consistency is required in order to monitor changes over time and to effectively compare different options. There are standard frameworks for the classification of both habitats and ecosystem services. Existing environmental monitoring programmes (such as those used to determine Good Environmental Status) use standard methods and so have the potential to support assessment of the extent and condition of natural capital assets. Building existing monitoring programmes into natural capital assessment also presents an opportunity for streamlined and cost-effective data collection.

Using the natural capital approach in decision-making

The natural capital approach offers a holistic process that can provide broad information in making the case for a policy intervention. Specific examples of where a natural capital approach could inform management and policy decisions for the marine and coastal environment include understanding and managing the trade-offs associated with different uses of the sea, such as the expansion of offshore wind. The natural capital approach would allow such large-scale infrastructure development to be assessed in terms of positive and negative interaction with other ecosystem services such as food provision and recreation and with the wider protection of marine species and habitats. This would help inform developers and decision makers about the best solutions in each case. Similarly, the approach would allow a holistic view of options for fisheries management to be taken. This would take into account the food provision and economic return of the sector while also considering the costs to other natural capital assets and ecosystem services affected by different fishing strategies. The natural capital approach can also be used to monitor 'net gain' (where a development leaves biodiversity in a better state than before), for example in assessing the potential for 'green' (managed realignment and saltmarsh creation) versus 'grey' (manmade engineering) solutions to address problems of coastal flooding and erosion. Natural capital assessment may also highlight other opportunities from development, such as benefits for fisheries or nature conservation offered by the development of offshore renewables.

There are several different mechanisms for organising and evaluating condition assessments and/or valuations of natural capital, goods and services in order to support the decision-making process (Box 4).



An asset register is a key foundation of the evidence base, and is an inventory of natural capital assets in an area, which records their type, extent and quality. A risk register systematically documents the threats to natural capital, services and benefits, including the likelihood of changes and the potential scale of their impact. A particular focus of the approach has been the development of natural capital accounts, as a means of monitoring the change in natural capital over time within a framework that is comparable to economic accounts, providing a broader measure of progress. There are two types of accounts: physical accounts consider the extent and quality of natural capital, and quantities of ecosystem services, while economic accounts consider monetary values.

Importantly, the natural capital approach also has relevance to a number of established appraisal techniques including environmental impact assessment (both for strategic environmental assessment at the programme scale and in consenting and licensing decisions for specific developments), sustainability appraisal, and regulatory impact assessment. Monetary valuation has a particular role when cost benefit analysis is used to assess options and trade-offs, although other types of value and ecological information are also important within appraisal.

Taking the natural capital approach forward

The natural capital approach is relatively new, particularly in terms of its application to marine areas, and so more work is needed to allow the conceptual frameworks to be put into practice. In particular, methods need to be developed to take account of the relative shortage of ecological data for the marine environment compared to land, which may include a greater reliance on modelled data. A focus on the monetary valuation aspects of the natural capital approach may also be less appropriate for marine areas in the absence of a sufficient number of robust monetary values. A significant unresolved challenge (which is also relevant on land) is supplementing the land cover approach with mechanisms to take account of mobile species and the interconnected nature of spatially separate components of the wider environment.

ⁱ UK NEA (2011) *The UK National Ecosystem Assessment: Technical Report*. Cambridge: UNEP-WCMC.

ⁱⁱ HM Government (2011) *The Natural Choice: securing the value of nature*.

ⁱⁱⁱ HM Government (2018) *A Green Future: Our 25 Year Plan to Improve the Environment*.

^{iv} Costanza, R. et al. (1997) The value of the world's ecosystem services and natural capital. *Nature*, 387(6630), 253-260

^v de Groot, R. et al. (2012) Global estimates of the value of ecosystems and their services in monetary units. *Ecosystem Services*, 1(1), 50-61.