Natural capital, ecosystem services and the blue economy

12
Assessments

What is covered

Natural capital is the world's stocks of natural assets, including geology, soil, air, water and all living things. It encompasses the habitats and species that provide social, environmental and economic benefits to humans. Natural capital provides a common framework to bring together economic and social evidence and analysis for a particular subject or place ensuring that the value of the natural environment is given equal consideration. There is a need to balance the full costs of any human activity and this is why greater consideration is now being given to the ideas of natural capital and the blue economy.

The health of Scotland's seas is not only important for Scotland's wildlife and natural habitats, but also for the many benefits that people gain from the ocean, both locally and nationally. The viability of many marine and coastal businesses, from fishing to aquaculture and tourism, are inextricably tied to the condition of fish populations, the integrity of the sea bed and the conservation of species, habitats and physical processes. Less obvious in people's day-to-day lives are benefits such as the production of oxygen, the incorporation and storage of carbon by species and habitats, the absorption of large amounts of excess heat, the protection of shores that are vulnerable to coastal erosion, and the cycling of nutrients and waste. Furthermore, the contribution that a healthy sea makes to personal physical and mental well-being should not be underestimated.

The specific aspects of nature that provide benefits for people are called 'ecosystem services'. They are grouped into four categories:

- Provisioning.
- Supporting.
- Regulating.
- Cultural.

To continue receiving these benefits from Scotland's seas, the impacts of human activities must not exceed nature's capacity to provide them and lead to the decline of Scotland's natural assets. To salvage benefits that have waned, or to safeguard those that appear vulnerable, management of specific activities to ensure the recovery of the features that underpin those services will be necessary.

The realisation of both the rate of change and the magnitude (geographically the whole of Earth) of the impacts from the alterations in the climate resulting from an increase in the concentrations of greenhouse gases (primarily, carbon dioxide, methane, nitrous oxide and fluorinated hydrocarbons) in the atmosphere has forced humankind to consider solutions that work with nature. Whether this involves the restoration of habitats that provide coastal protection or undertaking actions to improve local biodiversity, nature-based solutions need to become mainstream.

This assessment explores ecosystem services with respect to a number of themes that are in line with the vision for Scotland's seas. The themes explored are:

- The physical and chemical marine environment and climate change.
- Productive seas.
- Clean and safe seas.
- Healthy and biologically diverse seas.
- Scotland's MPA network.
- Coasts and seas for human health.
- Social attitudes to the sea.

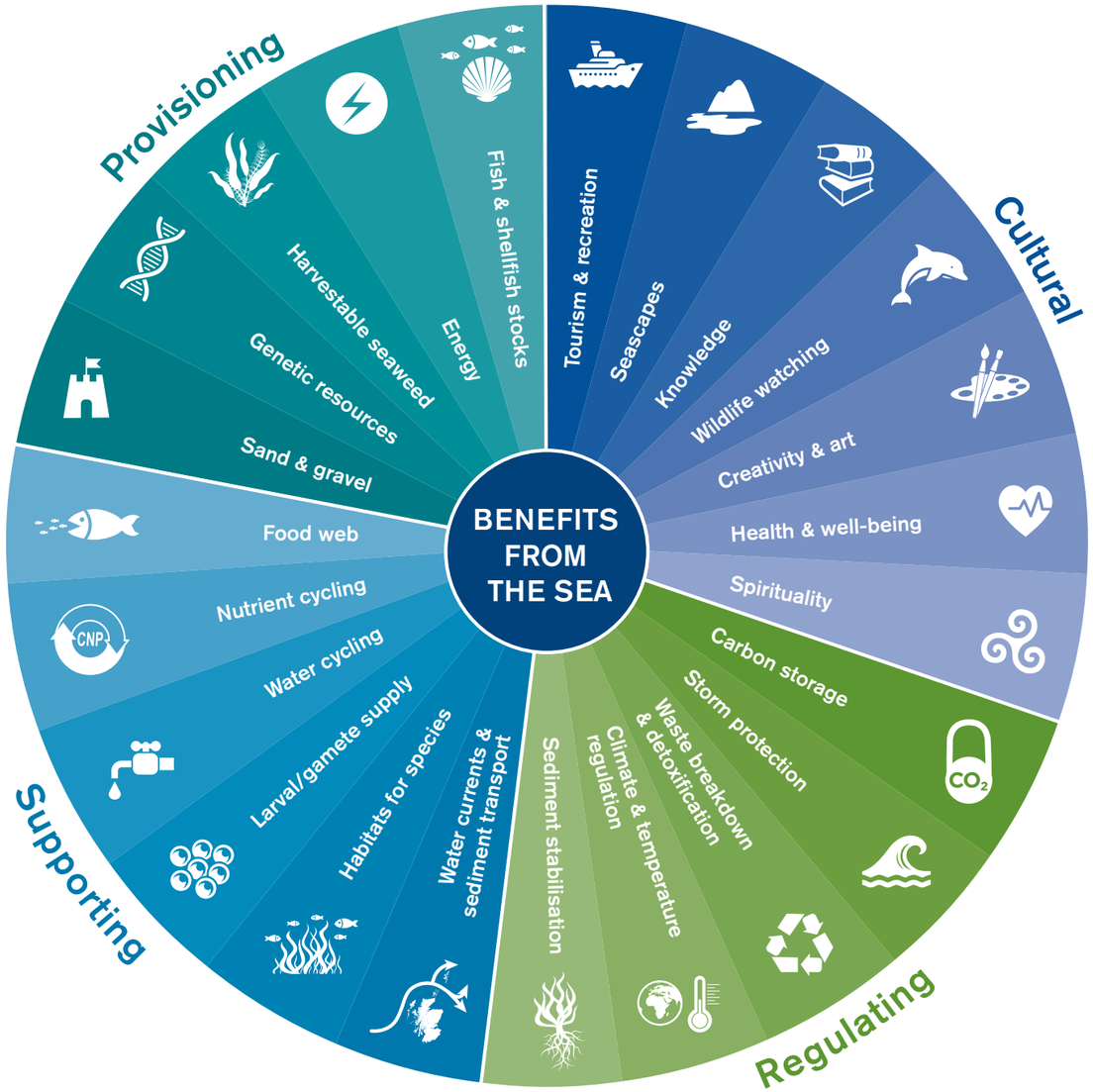
Natural capital and ecosystem services are fundamental concepts when it comes to managing human activities affecting Scotland's seas, although still viewed as relatively novel. They relate to both natural and social sciences, helping to strengthen links between science, policy and society.

The basis of the assessment

The details presented on natural capital, ecosystem services and the blue economy are based on published information with many examples also drawn from the other Topics presented in SMA2020, as well as from discussions around how natural capital, ecosystem services and the blue economy are being used by the Scottish Government and organisations such as NatureScot and SEPA.

There is a strong focus on the elements of the vision for Scotland's seas. In addition, understanding of the relationship between human health and the sea has been considered alongside the understanding of social attitudes towards the marine environment, based on a recent Scottish Government commissioned survey https://www.gov.scot/publications/scottish-social-attitudes-2019-attitudes-government-political-engagement/

Provisioning, supporting, regulating and cultural – examples of ecosystems services from Scotland's seas



Summary of key facts

Cultural	Health and Well Being Coastal Tourism Social Attitudes to the Sea	People who live near to or visit the coast and sea are more likely to be active and happy. In addition, people value the marine environment for leisure and recreation, providing a low-cost way to get outdoors, keep fit, look after mental health and entertain children. Visits to the beach and tourism are also good for the economy. The long-term trend from 2008 to 2017 showed marine tourism Gross Value Added increased by 28% and employment by 16%. Engagement with individuals and organisations greatly improves ocean literacy and facilitates action towards achieving the balance between exploitation and protection.
Regulating	Environmental Protection Coastal defence/protection	Seagrass meadows stabilise the sediment and help protect coastlines from erosion. Since 1970 the global ocean has taken up excess heat resulting from human activities that produce greenhouse gases in the climate system.
Supporting	Environmental Protection Coastal defence/protection	The Scottish Marine Protected Area (MPA) network, in 2018, covered approximately 22% of the seas around Scotland. Following designations in December 2020 this increased to 37%. The protected features of these MPAs, for example maerl beds and seagrass meadows, contribute to natural resources and ultimately benefit people. Scotland's beaches, kelp forests and salt marshes help protect £13 billion of coastal buildings and infrastructure. This compares to £5 billion protected by engineered sea walls.
Provisioning	Production of oxygen Sea Fisheries Freshwater Fisheries Marine Biotechnology	The ocean provides about half the oxygen required by the planet due to the photosynthesis that occurs in the phytoplankton. The ocean is critical to life on land. Humans have reaped benefits from the seas for thousands of years and continue to benefit in many ways from the sea, including the provision of fish and shellfish, providing a valuable source of protein and the essential n-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). New chemicals are being discovered, a common source being marine sponges. Some are anticancer agents. Others have anti-inflammatory properties or are analgesics. Several are in clinical use.

Direct contributors to the blue economy

Farmed Atlantic salmon showed a production value of £878 million in 2018, 97% of total marine aquaculture value. Mussels are the main shellfish species produced, accounting for 6,874 tonnes in 2018.

In 2017, ship building and processing provided 7,700 jobs out of a total of 84,500 jobs in the marine sector.

Ports are a key part of the maritime infrastructure, providing the transport infrastructure between land and sea. Ports are critical in the effective movement of cargo and people especially in the context of today's global economy and the ever-increasing demands of the customer. Between 2014 and 2018, ferry passenger numbers increased in Scotland by 6% to 10.3 million and vehicles carried by ferry increased by 12% to 3.5 million.

Oil and gas production in the Scottish sector has increased from 59.96 million tonnes of oil equivalent in 2014 to 77.22 million tonnes of oil equivalent in 2018 as a result of investment. However, the trend in production is in long-term decline.

Offshore wind and marine renewables are technologies that utilise wind, tide and wave motion to provide humans with sustainable and renewable electricity without the production of greenhouse gases, and could provide economic benefits for Scotland. Between 2014 and 2018 offshore wind capacity in Scotland increased by 216%.

Ecosystem services, the blue economy and climate change

The physical and chemical characteristics of the marine environment underpin the viability, distribution and functioning of species and habitats, and therefore the ecosystem services to which they contribute. As these characteristics change due to climate change, it is likely that habitats will be affected and species distributions will change. This will have consequences for the ecosystem services provided by the seas around Scotland and will impact the industries that are part of the blue economy.

Examples of benefits for people

Benefits for people from deep-sea habitats
- Food & nutrition.
- Clean water & sediments.
- Knowledge.
- Spiritual/cultural.
- Jobs & business.
- Climate and temperature regulation.
- Carbon storage.

Benefits to people from shellfish and other invertebrates
- Health & well-being.
- Knowledge.
- Clean water & sediments.
- Spiritual/cultural.
- Jobs & business.
- Tourism & recreation.
- Food & nutrition.

> "The benefits that we rely on from Scotland's seas are huge, from an economic perspective but also more broadly, for example we are increasingly recognising the contribution they make to our health and well-being."
>
> Katie Gillham, Head of Marine Ecosystems, NatureScot

Next Steps

The inclusion of the concepts highlighted in this section into marine planning requires a number of steps:
- Development of methods to make the concepts of the blue economy, ecosystem services, nature-based solutions and natural capital practicable by being able to take account of issues relating to scale, location, connectivity, and local knowledge, including cultural values.
- Improvement in the understanding of some aspects of marine ecosystems including the distribution of some habitats and species, resilience, function and processes, trends, and responses and thresholds relating to human activities and climate change.
- Development of tools that embed the concepts of ecosystem services, nature-based solutions and natural capital in decision making processes.
- Investment in the underpinning science so that the distribution of benefits across society, and how human activities can be managed to maximise these benefits over the long term, are fully understood. Without this, decisions may not effectively take account of the trade-offs between different options to support the planning and sustainable management that will be the basis of a refreshed National Marine Plan.
- Communicating about the concepts of ecosystem services, natural capital, nature-based solutions and the blue economy to make sure they are well understood, thereby readily included in processes and planning.