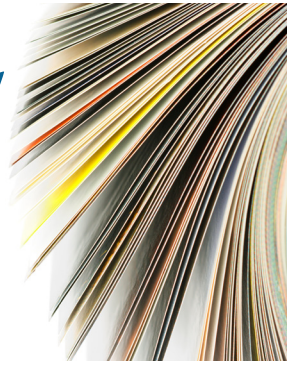


Terminology

Natural Capital, Ecosystem Services
and more



- Natural Capital
- Ecosystem
- Ecosystem Services
- Abiotic Resources
- Ecosystem Assets
- Green Economy
- Biodiversity
- Ecosystem Approach
- Green Infrastructure

Introduction

The dependency of human societies on nature and its functions is multi-faceted, which has given rise to a variety of terms in order to explain the interactions between the environment and people. There is recognition that the natural environment is important. However, as society has become more developed it has become more disconnected from nature and the understanding of our ultimate dependence on it has declined. Linking our dependence on nature to the economic functioning of society has also proved to be difficult, resulting in increased environmental degradation. As the depletion

of nature accelerates there is growing concern that we are damaging the 'valuable nature' on which humans rely. To reverse this trend the linkages and dependencies society has on nature have become the subject of increasing study. This increased focus has driven the development of numerous terms and concepts to explain how and why nature is critical to human society. However the similarity of these terms often gives rise to confusion. Exactly what the terminology means, and how all these concepts relate to each other, is the focus of this document.

Nature and Natural Capital

Nature encompasses all living things and the non-living elements of the environment in an interconnected whole. It is an overarching term that includes all the physical world. As such a holistic concept it is hard to use for decision making.

The concept of natural capital emerged in the 1970s. 'Capital' is a stock that has the capacity to give rise to flows of goods and/or services. Natural capital consists of the proportion of nature that could yield benefits

in human terms. The parts of an ecosystem which collectively make up natural capital are considered stocks. If the stock is degraded the goods and services which the ecosystem provides will also decrease. The economic risks associated with environmental degradation, and the economic potential of natural capital, are becoming recognised. There are increasing attempts to integrate natural capital into accounting systems in order to track the depletion of these potentially valuable reserves.

Natural capital is made up of two components; abiotic resources (natural resources) and ecosystem assets

Natural Capital: natural assets in their role of providing natural resource inputs and environmental services for economic production. Natural capital includes land, minerals and fossil fuels, solar energy, water, living organisms, and the services provided by the interactions of all these elements in ecological systems.

United Nations Environment Programme (UNEP) 2012

Abiotic (Non-Living) Resources (Natural Resources)

The "natural resources" (including energy resources) such as iron ore, crude oil and wind energy, which are regarded as non living." They are therefore the non-living natural assets that are valuable to humans.
e.g.

- Fossil Fuels
- Minerals
- Aggregates
- Deep ocean stores of carbon
- Solar Energy

Ecosystem Assets

The "spatial areas containing a combination of biotic (living) and abiotic (non-living) components that function together".
e.g.

- Soil
- Forest
- Fishstocks
- Genetic variation (within/ between species)
- Species of plants and animals

NATURE

NATURAL CAPITAL



Natural capital in the context of ecosystems and the interactions which occur. Natural capital is made up of ecosystems. Ecosystems are dynamic and include the living communities which interact with the abiotic (non-living) environment.

Ecosystems & Ecosystem Services

Natural capital is effectively the stock of ecosystems. Within ecosystems, organisms interact with their environment and with each other through ecosystem processes. For example all organisms reproduce and consume food; some also migrate transferring energy through the landscape. These are some of the many examples of processes which support the effective functioning of the ecosystem.

Ecosystem: a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a *functional unit*

(Convention on Biological Diversity 1992)

The word 'functional' within the definition of ecosystem is key. Ecosystems rely on ecosystem processes for their healthy functioning. Processes, such as nutrient cycling, are required for an ecosystem to function properly. The process of nutrient cycling leads to ecosystem functions such

as water filtration and plant growth. These functions are essential for the ecosystem to maintain itself and to regenerate. Some of these ecosystem functions yield benefits to people, such as food derived from plant growth or clean drinking water from the filtration function. The important part of this is where these elements link to human well-being.

Ecosystem Services: the benefits people obtain from ecosystems.

(Convention on Biological Diversity 1992)

Ecosystem services yield ecosystem goods or benefits. Ecosystem goods are the tangible products obtained from ecosystems (wood, fruit, fish, fodder). Ecosystem services are the work that the ecosystem does which humans benefit from (water filtration, soil creation, coastal protection). So through ecosystem goods and services human well-being is supported.

Ecosystem processes and functions lead to the delivery of ecosystem services



Ecosystems have characteristics. These characteristics describe the ecosystem; for example its climate, its altitude and the fertility of its soil. Biodiversity is an important example of an ecosystem characteristic. Biodiversity is the variability among living organisms. This commonly refers to diversity between species, but also includes the variability in ecosystems in which species live and the genetic diversity within species. An ecosystem such as a mangrove forest can have high biodiversity, meaning that the area contains a large variety of different species and habitats. Biodiversity describes the quality or resilience of an ecosystem asset and contributes significantly to its value. Biodiversity is essential for the healthy functioning of most ecosystems. When biodiversity disappears essential functions break down and the system becomes degraded. Biodiversity is also valuable in its own right, for instance as a stock of genetic resources for products including medicines.

ECOSYSTEM SERVICES

Provisioning



The products obtained from ecosystems such as wood, water or food

Regulating



The benefits obtained from the regulation of ecosystem processes such as flood regulation and the mitigation of climate change by forests

Cultural



The non-material benefits that people obtain from ecosystems including through cognitive development, recreation, reflection and aesthetic experiences.

SUPPORTING



The services that are necessary for the maintenance of all other ecosystem services, for example soil formation or nutrient cycling. Since supporting services are a prerequisite for many other services, they are often left out of ecosystem services valuation frameworks to avoid issues of double counting.



Ecosystem Assets & Accounting

A common use of the natural capital concept is for the economic valuation of natural assets. This approach involves quantifying the stocks of natural assets such as forests or fish stocks, and then assigning them a monetary value based on the benefits that can be derived from the stocks. For the purposes of accounting, ecosystems are often called ecosystem assets.

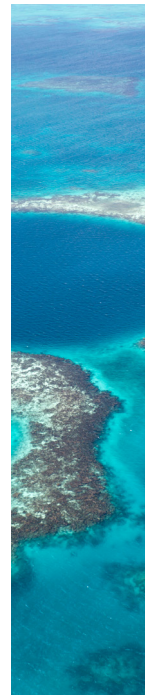
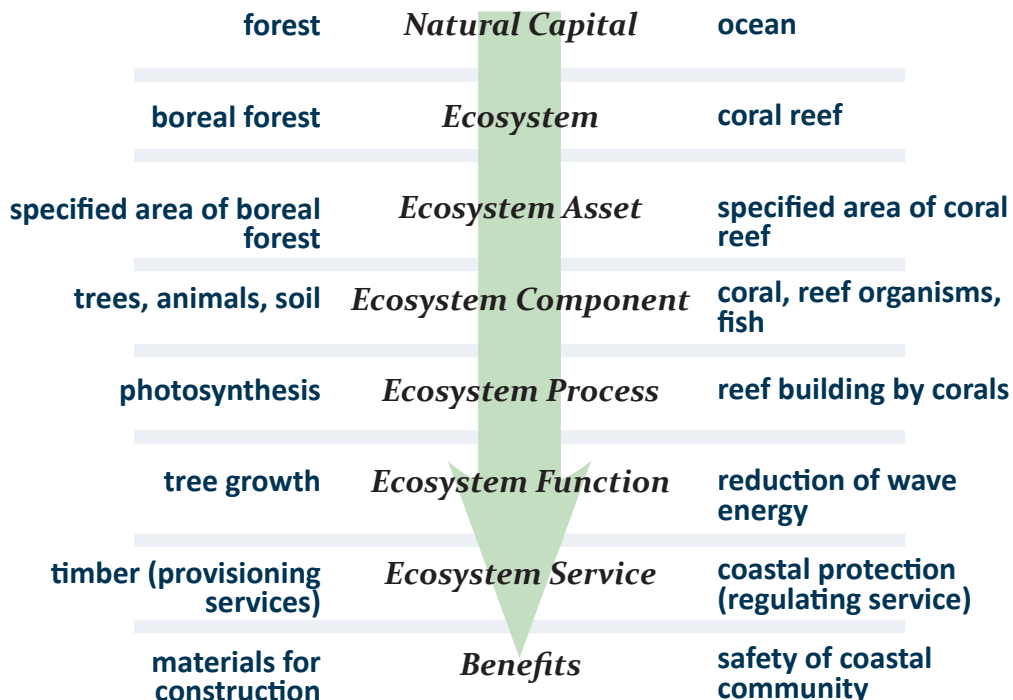
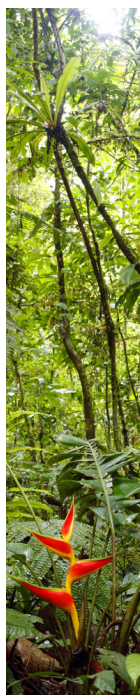
Ecosystem Assets: Spatial areas containing a combination of biotic and abiotic components that function together.

(UN Integrated Environmental and Economic Accounting system (SEEA) 2012)

The difference between an ecosystem and an ecosystem asset is one of scale. Ecosystems can be identified at different spatial scales and can overlap, whereas ecosystem assets must have a defined area and must therefore be mutually exclusive to avoid double-counting when estimating an area's economic value.

Ecosystem assets, like ecosystems, have characteristics. Biodiversity is an important characteristic of ecosystem assets (though biodiversity can also be an asset in itself). For accounting purposes, the focus is on the functioning unit (system) as the asset.

Flow from Natural Capital to Society Benefit



The examples above bring all the terminology together and shows the flow from natural capital to benefits. Both terrestrial and marine areas can be part of natural capital and can deliver ecosystem services to local communities and the wider society. The benefits received from an ecosystem service can be affected by the biodiversity of the ecosystem. For example, a coral reef will be more resilient to change and provide better nursery function for juvenile fish if it contains a wide variety of coral species. This is because the reef will be more resistant to disease and will have a more diverse structure providing fish refuges..

All the terms discussed so far are key elements in the concepts described on this page. The depleting natural environment has driven the development of the Green Economy which integrates ideas such as the ecosystem approach and green infrastructure.

Ecosystem Approach

One way of integrating biodiversity and ecosystem services into development planning and economic activity is the ecosystem approach. This method provides a way of thinking and planning that can be used at national and regional scale. For many ecosystem services, biodiversity directly contributes to human well-being. In fact, biodiversity plays a vital supporting role in ecosystems. The initial rationale behind the use of the ecosystem service concept was mainly to demonstrate how biodiversity directly affects ecosystem functions that underpin critical services for human well-being.

The ecosystem approach aims at managing at a systems level rather than focusing on individual species. It aims to

Ecosystem Approach: strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way

(Convention on Biological Diversity COP 5 2000)

include both the environment and human interactions. People, culture, the economic context and the underlying ecosystem are considered together. Adaptive management is important, both through time and space. Feedback from environmental monitoring should be integrated into subsequent decision making. A key goal of the ecosystem approach is to conserve the underlying ecosystem structure and function while implementing sustainable resource use.

As a result of efforts to include ecosystems and human goals into management there are a number of similar approaches, such as ecosystem-based management. The operative components of these concepts are similar.



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Green Economy

The rationale behind trying to quantify and assign an economic value to ecosystem services is so that they can be more effectively integrated into economic systems. The current conventional economic structures do not take into account all the environmental resources that underpin them and they often drive environmental degradation. As a result the theory of a Green Economy has grown.

Green Economy: An economic system that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.

United Nations Environment Programme (UNEP) 2010

All of the previous concepts such as natural capital and ecosystem services are important components

in the delivery of a sustainable economic system which includes the environment. In its simplest form, a Green Economy aims towards economic development but tries to achieve this in ways that do not compromise nature. The Green Economy therefore relies upon practices that safeguard our critical natural capital as an important economic asset. In order to achieve this, a Green Economy should aim to prevent the loss of biodiversity and maintain healthy ecosystem functions so that ecosystem services can be derived. It should also use resources efficiently. Practices such as renewable energy, low carbon transport, sustainable agriculture and forestry, recycling, green infrastructure as well as eco-tourism are some examples of steps towards reaching the Green Economy. Preserving the stock of natural capital in order to maintain ecosystem service delivery is an important element within the Green Economy.

Green/Natural Infrastructure

Green or natural infrastructure refers to a landscape planning approach that incorporates, or retains, nature in human modified or developed landscapes. The terms natural infrastructure and green infrastructure are often used interchangeably. The context in which the term is used will modify its meaning.

Green Infrastructure: An interconnected network of natural areas and open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife

(Benedict & McMahon, 2006).

In **landscape planning**, for example, green/natural infrastructure refers to natural spaces within and between urban centres such as green corridors and rivers. In **conservation**, green/natural infrastructure refers to connections between habitats such as habitat corridors between disconnected forests, which allow species to travel and breed with other populations.

When used within the **built environment** context, natural/green infrastructure includes urban street trees, parks and green roofs. It can be used as the

opposite of 'gray infrastructure' which refers to the man made alternative to natural systems. For example, coastal defence can take the form of a concrete sea wall (gray infrastructure) or a protective fringe of wetland (green infrastructure).

Green infrastructure opts to 'build in' valuable ecosystem services through natural means to landscape development.



Vegetation within urban areas provides a cooler climate, buffers it from strong winds and reduces flooding.

Often green infrastructure complements but does not replace the built infrastructure. For example, deforestation along the McKenzie River in Oregon (USA) has caused a decline in water quality due to the lack of natural filtration of pollutants. The response combined green infrastructure and chemical intervention by re-foresting the river banks for future improvements in water quality while using chlorination of the water for an immediate solution to the pollution problem.



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