Natural Capital Committee

Natural Capital Terminology

August 2019

This paper will be updated periodically

Contents

Introduction

The Natural Capital Committee (NCC) recently reviewed the principal natural capital terms used in its advice. This paper provides a summary of this terminology, recognising that in some cases the definitions may differ from the literature.[1,2] This guide will be reviewed and updated periodically and is intended to be used primarily for NCC purposes.

Natural Capital terminology used in NCC literature

Natural capital

Capital can be defined as a resource used / available for use in the production of goods and services. There are five types of capital[3] (see Figure 1), as follows:

I. Natural capital – that part of nature which directly or indirectly underpins value to people, including ecosystems, species, freshwater, soils, minerals, the air and oceans, as well as natural processes and functions. Natural capital underpins the four types of capital set out below. In combination with other types of capital, natural capital forms part of our wealth; that is, our ability to produce actual or potential goods and services into the future to support our wellbeing;[4]

II. manufactured capital (for example, machinery and buildings);

III. financial capital (for example, shares and banknotes);

IV. human capital (for example, knowledge and skills); and

V. social capital (for example, levels of trust and connections amongst people).[5]

[1] Landers and Nahlik, (2013), *Final Ecosystem Goods and Services Classification System* https://www.epa.gov/eco-research/final-ecosystem-goods-and-services-classification-system

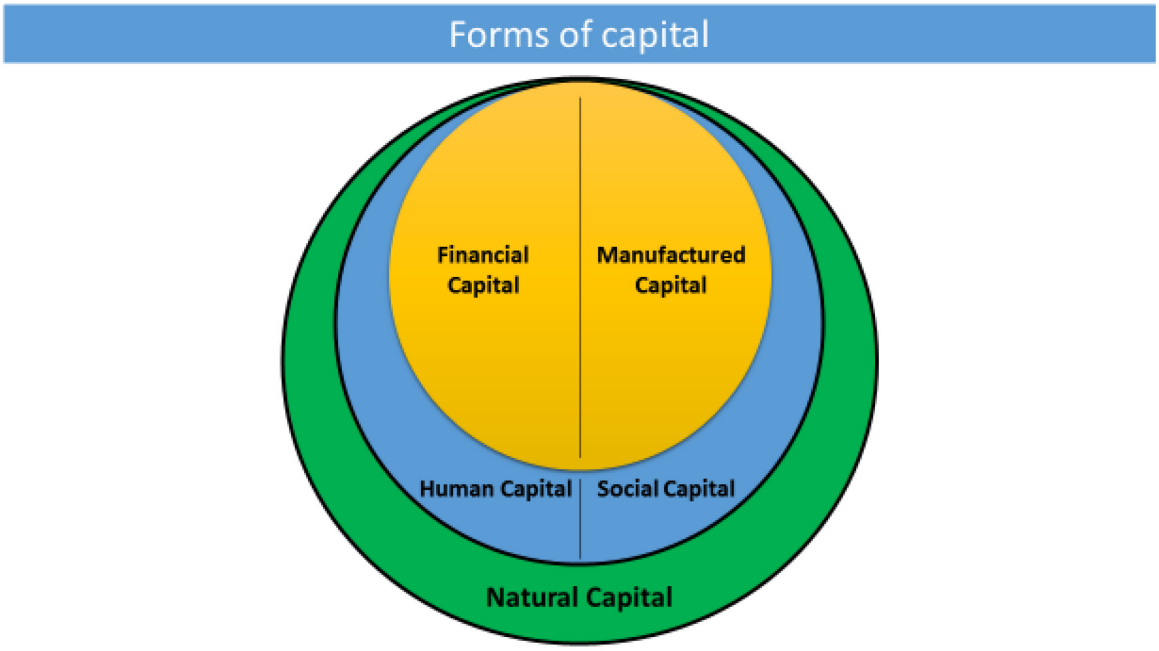
[2] Boyd (2006), *What are Ecosystem Services? The Need for Standardized Environmental Accounting Units* - https://pdfs.semanticscholar.org/7373/37d2d4761d966b3c8b9176d51ecab6a186d1.pdf

[3] Forum for the future, *The Five Capitals* - https://www.forumforthefuture.org/the-five-capitals

[4] NCC (2013), *The state of natural capital: towards a framework for measurement and valuation* - https://www.gov.uk/government/publications/natural-capital-committees-first-state-of-natural-capital-report

[5] NCC (2013), *The state of natural capital: towards a framework for measurement and valuation* - https://www.gov.uk/government/publications/natural-capital-committees-first-state-of-natural-capital-report

Figure 1 : Different types of capital



Source: NCC 2019

Natural Capital Assets

A natural capital asset is a distinctive component or grouping of natural capital components, including soils, freshwater and species (see Table 1 for further examples). Natural capital assets are not mutually exclusive - there is overlap between categories (for example, soils include species, minerals and water), illustrating the complexity of natural capital. Natural capital assets typically come in systems, rather than discrete atomised components, limiting the scope for conventional economic analysis. Natural capital assets provide ecosystem services (flows) such as pollination and water purification, which support the production of goods and services, and generate benefits (see Figure 2).[6]

Table 1 : Natural capital assets

Natural capital assets	Definition
Species	All living organisms including plants, animals, fungi and micro-organisms; the product of ongoing evolutionary processes.

[6] NCC (2017), *How to do it: a natural capital workbook* - https://www.gov.uk/government/groups/natural-capital-committee

Ecological Communities	A group of actually or potentially interacting species living in the same place. Groups of interacting species form distinctive assemblages interacting with their physical environment.
Soils	The combination of weathered minerals, organic materials, and living organisms and the components resulting from interactions between these.
Freshwaters	Freshwater bodies (rivers, lakes, ponds, ground-water) and wetlands. This includes water, sediments, living organisms and the interactions between these.
Land	The physical surface of the Earth and space for human activity. This includes the various landforms and processes which shape these (including weathering and erosion).
Atmosphere	The layer of gases surrounding the Earth including oxygen, carbon dioxide and nitrogen used by all living organisms, and the processes which give rise to climate, weather (wind, precipitation) and temperature regulation.
Minerals	Naturally occurring, non-living substances with a specific chemical composition formed by geologic processes.
Sub-soil assets	Other non-living substances in the Earth's crust including rocks and aggregates as well as non-mineral substances such as fossil fuels.
Oceans	Saline bodies of water that occupy the majority of the Earth's surface. This includes water, sediments, living organisms and the interactions between these.
Coasts	The transitional zone between land and oceans. This includes water, sediments, living organisms and the interactions between these.

Natural Capital Stock

This is defined as the extent and condition of a natural resource. For example, the total number of cod that can be harvested would be a measure of extent; and a measure of condition could be the size of adult fish (which acts as a proxy for longevity and breeding potential).[7]

Ecosystem services (flows)

The current flow of ecosystem services[8] provided by natural capital stocks and the systems within which they are embedded. These yield the welfare-bearing goods and services which provide actual or potential benefits to humans. A list of examples are provided in Table 2. Flows can be split between ecosystem and abiotic services.[9]

Table 2: List of ecosystems services (not exhaustive)

Examples of ecosystem services	Definition
Pollination	A process in the sexual phase of reproduction in some plants caused by the transportation of pollen. In the context of ecosystem services, pollination generally refers to animal assisted pollination, such as that done by bees, rather than wind pollination.
Biomass	The organic material from plants and animals, such as crops and waste from food crops, animal farming and waste from sewage plants.
Water purification	The process of removing contaminants such as chemicals, and biological and suspended solids.
Protection from flooding	Flood protection from wetlands, coastal habitats and other natural systems.
Carbon sequestration	The process of increasing the carbon content of a reservoir other than the atmosphere.

[7] NCC (2013), *The state of natural capital: towards a framework for measurement and valuation* - https://www.gov.uk/government/publications/natural-capital-committees-first-state-of-natural-capital-report

[8] Ecosystem services here must not be confused with the general service term, which are actions such as haircuts, teaching, and protection from hazards.

[9] NCC (2017), *How to do it: a natural capital workbook*- https://www.gov.uk/government/groups/natural-capital-committee

Source: NCC 2019

Goods and services

Fish, timber, farmed food and drinking water are all examples of goods that deliver benefits or are of 'value' to humans (see Table 3 for a list of examples). However, other types of goods and services can produce wellbeing even without a direct use.[10] For example, the knowledge that a valued species continues to exist can generate wellbeing.[11]

Table 3: Natural capital goods and services

Examples of natural capital goods and services	Definition
Clean water	Sea and fresh water for human use (for example, drinking, bathing, aquaculture, industrial processes); a combination of quality and quantity.
Clean air	Air quality that has no adverse impact upon human health or wellbeing.
Recreation	Active enjoyment of the natural environment, for example, walking, fishing, and canoeing.
Aesthetics	Passive enjoyment of the natural environment, for example, landscape appreciation and views.
Wildlife and plentiful supply of local Food	Wild species diversity and abundance have an important role in maintaining ecosystems, providing aesthetic and recreational value, and are of cultural and spiritual significance. Plant, animal and fungi are consumed by people; both wild and cultivated sources. This category is distinct from natural assets, species and ecological communities, in that these represent the species that are significant to England and that people care about.
Protection from hazards	Natural regulation of extreme events such as flooding, drought and landslides.

[10] Often goods and services are produced through the input of different forms of capital (for example, clean water may require inputs of both natural (vegetation, soils, particularly well-draining sandy soils, wetlands etc.) and manufactured capital (sewage systems management, and water purification machinery or processing).

[11] NCC (2014), *The state of natural capital: restoring our natural assets* - https://www.gov.uk/government/publications/natural-capital-committees-second-state-of-natural-capital-report

Equable climate	A comfortable climate that has no adverse impact upon human health or wellbeing. This is the result of both global scale and local scale effects (for example, urban cooling by trees).
Fibre	Plant and animal materials used by people for building, clothing and other objects.
Energy	All sources of energy used by people (fossil fuels, wind, tidal, wave, hydro, biomass and solar).

Benefits

In general, benefits are positive changes in human welfare (or wellbeing) that result from consuming goods, or from the knowledge that something exists (for example, from knowing that a rare or charismatic species exists even though an individual may never see it). Note that benefits can be both positive and negative (dis-benefits).[12]

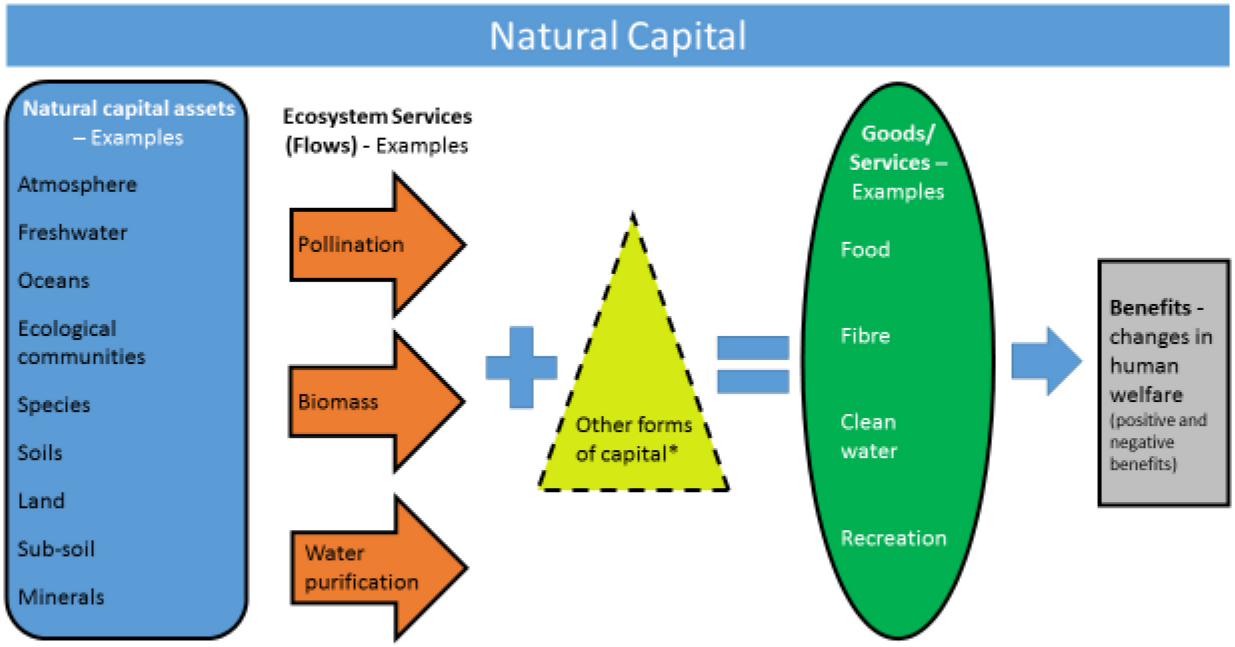
Example of Natural Capital delivering benefits to people

Natural assets come together in a variety of ways to provide ecosystem services. These ecosystem services are typically combined with other types of capital, for example human capital and manufactured capital to produce goods such as food and clean water.[13] These goods are consumed by humans, and improve overall welfare. This process is illustrated in Figure 2.

[12] NCC (2017), *How to do it: a natural capital workbook* - https://www.gov.uk/government/groups/natural-capital-committee

[13] In some cases, such as pollination, other forms of capital are not required to produce goods and services.

Figure 2 : Natural capital logic diagram



*other forms of capital include human, social and manufactured capital. Other forms of capital are not always required for goods to be produced (e.g.: pollination).

Source: NCC 2019

Extent (quantity)

Quantity refers to the extent, volume or amount of an asset, benefit or a good.[14]

Condition (quality)

Quality refers to the underlying condition of natural capital assets and their ability to maintain flows of services.[15]

Example - wellbeing changes due to extent/condition of natural assets

Wellbeing changes are often generated by changes both in extent and condition. For example, the more woodland there is, the more timber and wood is likely to be available for harvest (quantity). However, the timber yield of woodlands is very dependent upon the way they are managed and

[14] NCC (2014), *The state of natural capital: restoring our natural assets* - https://www.gov.uk/government/publications/natural-capital-committees-second-state-of-natural-capital-report

[15] NCC (2014), *The state of natural capital: restoring our natural assets* - https://www.gov.uk/government/publications/natural-capital-committees-second-state-of-natural-capital-report

the resulting structure and species composition, so the condition of woodlands matters too (quality).

Metrics

A system or standard of measurement that enables the measurement of a trend over time. For example, measurements and estimates of greenhouse gas emissions.[16]

Indicators

A single metric or a combination of metrics that indicates the state, level or trend. For example, an indicator of concentrations of particulate matter 2.5 ($PM_{2.5}$) will use the concentration of $PM_{2.5}$ as a metric to indicate the state of the atmosphere.[17]

Thresholds

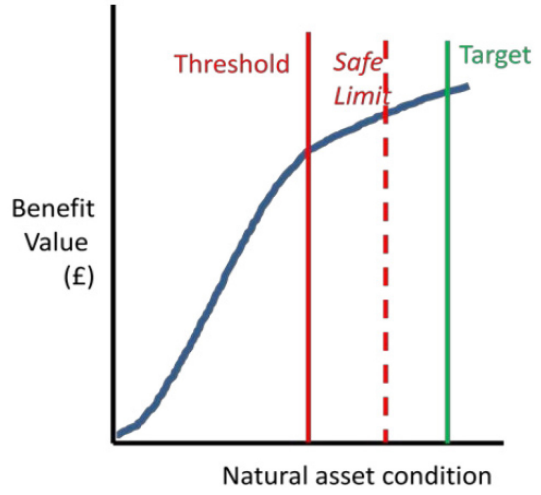
A point or level at which new properties emerge in an ecological, economic or other system, whereby a small change in a pressure or driver can lead to a relatively large change in the state of natural capital, with consequences for the benefits it provides (as illustrated in Figure 3). This new state of natural capital is called an alternative stable state. For example, species diversity of a landscape may decline steadily with increasing habitat degradation to a certain point, then fall sharply after a critical threshold of degradation is reached. Some of the best known examples arise from studies of abrupt responses in water quality in shallow lakes as a result of increases in pollution inputs.[18]

[16] NCC (2017), *How to do it: a natural capital workbook* - https://www.gov.uk/government/groups/natural-capital-committee

[17] NCC (2017), *How to do it: a natural capital workbook* - https://www.gov.uk/government/groups/natural-capital-committee

[18] NCC (2017), *How to do it: a natural capital workbook* - https://www.gov.uk/government/groups/natural-capital-committee

Figure 3 : Threshold and (safe) limits example



Source: NCC 2014[19]

Limits (safe limits)

Limits (or environmental limits) are socially determined but typically linked to physical responses, and can be defined as the point or range of conditions beyond which the benefits derived from a natural resource system are judged unacceptable or insufficient.[20]

Target

Targets are a set level of benefit or status for natural capital determined by society.[21] Targets may be determined by society in different ways (for example, through laws or voluntary agreements). An important consideration in determining targets can include the probability of crossing thresholds, related to stocks, flows, good and benefits, with some targets set as 'safe limits' to avoid deterioration of natural capital. Targets that are designed on this basis reflect what society may judge to be an acceptable risk of crossing thresholds, given the available evidence. In other cases targets may be more 'aspirational', seeking to improve natural capital.[22]

[19] NCC (2014), *The State of Natural Capital: Restoring our Natural Assets* - https://www.gov.uk/government/publications/natural-capital-committees-second-state-of-natural-capital-report

[20] NCC (2017), *How to do it: a natural capital workbook* - https://www.gov.uk/government/groups/natural-capital-committee

[21] NCC (2014), T*he State of Natural Capital: Restoring our Natural Assets* - https://www.gov.uk/government/publications/natural-capital-committees-second-state-of-natural-capital-report

[22] NCC (2015), *The economic case for investment in natural capital in England* - https://www.gov.uk/government/publications/natural-capital-committee-research-investing-in-natural-capital

Natural Capital Baseline

The starting measurement point of natural capital assets - changes relative to the baseline over time provide a measure of progress or decline. A natural capital asset baseline is essential for any proper, robust evaluation of national and corporate environmental performance.[23, 24]

Accounts

Company accounts are a systematic monetary summary of business activities over a specified period, usually a year. National income and expenditure accounts are surveys of the economic activities of a nation. These include analyses of the production of goods and services, the distribution of incomes and the expenditures of investors, consumers and the government.[25]

Inclusive Wealth Accounts

A nation's wealth comprises a great number of assets. These include manufactured, financial, human and social capital. Wealth accounts are a comprehensive assessment of the wealth represented by natural capital, measuring the total capital stock and other types of capital.[26]

Wealth accounts are crucial for understanding the value of any change in natural assets and its implications for growth and wellbeing, as well as ultimately indicating the amount of money that needs to be spent to maintain the assets intact through time.[27]

National Natural Capital Accounts

A method for organising information on changes in natural capital to conform to the principles and framework set out in the national accounts. The national natural capital accounts provide a method for aggregate valuations of the benefits and costs associated with maintaining natural capital. It should be accounted for in the same way as any other form of capital. Natural capital accounts can monitor changes to natural capital over time, highlighting priority areas for

[23] NCC (2017), *How to do it: a natural capital workbook* - https://www.gov.uk/government/groups/natural-capital-committee

[24] NCC (2015*), The economic case for investment in natural capital in England, Natural Capital Committee*- https://www.gov.uk/government/publications/natural-capital-committee-research-investing-in-natural-capital

[25] NCC (2013), *The state of natural capital: towards a framework for measurement and valuation* - https://www.gov.uk/government/publications/natural-capital-committees-first-state-of-natural-capital-report

[26] NCC (2013), *The state of natural capital: towards a framework for measurement and valuation* - https://www.gov.uk/government/publications/natural-capital-committees-first-state-of-natural-capital-report

[27] NCC (2015), *The State of Natural Capital: Protecting and Improving Natural Capital for Prosperity and Wellbeing* - https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report

investment as well as pressures on natural capital.[28] The Office of National Statistics publishes National Natural Capital Accounts for the UK.[29]

Corporate Natural Capital Accounts

Corporate natural capital accounts (CNCA) provide aggregate valuations of the benefits and costs to a business associated with maintaining natural capital, and highlight the importance of natural capital to their business. CNCA create a system for measuring and valuing natural capital over time, clearly determining the funding that is required for its capital maintenance and enhancement.[30]

Natural Capital asset maintenance

Capital maintenance is an accounting concept based on the principle that income is only recognised after a full recovery of costs has been achieved or capital has been maintained.[31, 32] In a natural capital asset context, this concerns the cost/investment required to maintain its condition. For example, the cost this year of conserving natural capital in the state that it was last year, taking measures such as repairing or replacing key components that have eroded.[33] These maintenance provisions can therefore be thought of as a measure of the money that needs to be spent in order to maintain natural capital intact through time.[34]

[28] NCC (2014), *The state of natural capital: restoring our natural assets* - https://www.gov.uk/government/publications/natural-capital-committees-second-state-of-natural-capital-report

[29] Office of National Statistics, *Environmental accounts*- https://www.ons.gov.uk/economy/environmentalaccounts

[30] Mayer, C. (2015), *Introduction to the Natural Capital Committee's corporate natural capital accounting project*: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/516945/ncc-working-paper-capital-accounting-intro.pdf

[31] Investopedia, *Capital Maintenance* - https://www.investopedia.com/terms/c/capital-maintenance.asp

[32] Capital maintenance has been reached when the amount of a company's capital at the end of a period is unchanged from that at the beginning of the period, with any excess amount treated as profit.

[33] Mayer, C. (2013), *Unnatural Capital Accounting* - https://www.gov.uk/government/publications/natural-capital-committee-initial-term-working-papers-2012-to-2015

[34] NCC (2015), *The State of Natural Capital: Protecting and Improving Natural Capital for Prosperity and Wellbeing* - https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report

Natural Capital asset enhancement

Investment in an asset which enhances the overall asset value, and/or enables the asset to be used for the provision of new services. In a natural capital context, this refers to upgrading the condition and/or increasing the size of a natural asset to deliver a wider range of services.[35]

Degradation of natural capital

The degradation of natural capital assets is typically due to five drivers: land use change, climate change, resource extraction, pollution, and invasive alien species. This subsequently leads to system failures, and to functions and services that cannot fully recover unaided within extensive timescales.[36]

Net environmental gain

Net gain is an approach to development that aims to leave the natural environment in a measurably better state.[37]

Compensation

Compensation is the act of investing in order to repair for damages resulting from an activity. In a net environmental gain context, this means compensating for environmental loss where it cannot be avoided or mitigated.[38] This would require protecting the environment and ensuring that lost or degraded environmental features are compensated for, by restoring or creating environmental features that are of greater value. For net environmental gain to be a reality, the compensation needs to include a distinct investment component that delivers a gain over and above the starting baseline.[39]

[35] NCC (2015), *The State of Natural Capital: Protecting and Improving Natural Capital for Prosperity and Wellbeing:* https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report

[36] IPBES (2019), *Global Assessment Report on Biodiversity and Ecosystem Services* https://www.ipbes.net/global-assessment-report-biodiversity-ecosystem-services

[37] Defra, *Net gain consultation* (2018): https://consult.defra.gov.uk/land-use/net-gain/

[38] Defra, *Net gain consultation* (2018): https://consult.defra.gov.uk/land-use/net-gain/

[39] NCC (2019*), Advice to government on net environmental gain*: https://www.gov.uk/government/publications/natural-capital-committee-advice-to-government-on-net-environmental-gain

Value

The monetisation of goods and services. Most natural capital goods and services are based on non-market values, where a good or service does not have an observable monetary value.[40]

Future iterations

The NCC will continue to review the list of definitions in this document and issue an update at the appropriate time.

[40] Estimated values for goods and services that are not traded for money but are valued in terms of what reasonable people should be willing to pay rather than go without them. See: https://www.oxfordreference.com/view/10.1093/oi/authority.20110803100237652