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Natural Capital: An Overview

The benefits derived from natural resources include food, recreation and clean air and water. The aim of valuing these resources is to quantify better the cost of their degradation. This POSTnote summarises how to value natural capital, discusses the advantages and challenges of approaches and describes some initiatives to secure natural capital for the future.

Overview

- Natural capital is a term used to describe those elements of the natural environment that provide benefits for humans.
- In 2015, the Natural Capital Committee, a Government advisory group, made nine recommendations on how to account for natural capital. These included the creating of a 25-year plan for the environment.
- Valuing natural capital in this way can help to manage environmental risks and to inform a wide range of decisions.
- There are a number of challenges to accounting for natural capital including a lack of financial, environmental and social data and the UK's use of other countries' natural capital.

Background

It has been estimated that the UK's population will rise by nearly 10 million in the next 25 years,[1] increasing demands on natural resources (POSTnote 516).[2,3] Evidence suggests that degradation of ecosystems will negatively affect human wellbeing (POSTnote 421). Reports such as the UN's Millennium Ecosystem Assessment[4] and The Economics of Ecosystem and Biodiversity (TEEB) global reports[5] have highlighted the importance of incorporating the natural environment into national accounting frameworks. One way to achieve this is through natural capital (NC) valuation.

What is Natural Capital?

NC is defined as 'elements of nature that directly or indirectly produce value to people, including ecosystems, species, freshwater, land, minerals, the air and oceans' (Box 1).[6] The UK's national accounts do not consider the depreciation of natural assets[7] and many of the benefits of NC are not included in GDP.[5] The failure to account properly for NC has led to a situation where benefits derived from natural assets (Box 1) are over-exploited for short term gains rather than maintained for their long term benefits.[8] For example, the destruction of woodland to make way for a new railway would yield financial benefits from reduced transport time, but also incur costs from reductions in carbon sequestration, water filtration and recreational use. By assigning a value to these less obvious benefits of NC, advocates argue that they can be more easily incorporated into decision-making processes and that this would lead to better management of our natural assets. Many national and international NC groups exist (Box 2), including the UK's Natural Capital Committee (NCC). The NCC was initially set up for three years (2012 to 2015). Its final report made nine recommendations for improving the UK's NC (Box 3).[10] The Government response broadly accepted five of these (recommendations 1, 2, 4, 6 and 9), including to establish a 25-year plan for the environment.[11]

Box 1. Natural Capital Assets and Ecosystem Services

The language of natural capital is based on accountancy. Natural capital assets such as land, oceans or minerals are referred to as 'stocks'. The services derived from these stocks are called 'flows'. These flows can be split into ecosystem and abiotic services. Ecosystem services are produced by living systems and include crops, pollination, water filtration and recreation. Abiotic services arise from geological processes and include minerals, oil, wind and tides. For example, peatbogs are an NC asset, which provide clean water and store carbon. The value of a natural capital asset is the overall benefit it adds to society (Box 4).[9]

Box 2. Natural Capital Groups and Organisations

The Natural Capital Committee (NCC)
The NCC is an independent advisory committee that produced three 'State of Natural Capital' reports between 2012 and 2015. These outlined expert advice to the UK Government about the use of NC assets, setting priorities for action and directing future research. Its membership has representation from academia and business.[6,10,12]

The Natural Capital Coalition
The Coalition is an international partnership established in 2012 originating from TEEB for business coalition. It has a focus on business, but its members also include representatives from government and NGOs. Its vision is 'a world where business conserves and enhances natural capital'.[13] It launched the Natural Capital Protocol in July 2016 to provide advice for businesses.[14]

The Natural Capital Initiative (NCI)
The NCI is a UK-based forum established in 2009, designed to support decision making on NC-related issues and to embed NC thinking in policy and practice. It has a strong focus on evidence based decision-making using data from the natural and social sciences.[15]

The Natural Capital Declaration (NCD)
The NCD is an international financial sector initiative on natural capital. Launched in 2012 at the UN Conference on Sustainable Development (Rio+20), the NCD secretariat is composed of the United Nations Environment Programme's Financial Initiative (UNEP FI) and the Global Canopy Program.[16]

Box 3. NCC Recommendations
1. The Government should develop a strategy to protect and improve natural capital and the benefits it provides.
2. The Government should assign institutional responsibility for monitoring the state of natural capital.
3. Organisations should create a register of natural capital for which they are responsible and use this to maintain its quality and quantity.
4. The Government should urgently step up action to ensure that the Office for National Statistics (ONS) and the Department for Environment, Food and Rural Affairs (Defra) meet the target of incorporating natural capital into the national accounts by 2020.
5. The National Infrastructure Plan should take account of the impact of NC on each of the main infrastructure sectors.
6. The Government should revise its economic appraisal guidance (HM Treasury Green Book).
7. The Government should drive a substantial, long term interdisciplinary research programme on natural capital to inform future iterations of the strategy.
8. The Government should determine how the plan to protect and improve natural capital is to be funded, drawing on a combination of public and private funding as proposed by the Committee.
9. The Government, working with business, NGOs and other parts of society, should fully develop a 25-year plan.[10]

The NCC was re-established this year (2016-2020) to provide advice on the development and implementation of the 25-year plan for the environment.[17] The NCC has emphasised the importance of four unfunded 'pioneer projects' to Defra to identify good practice and innovative solutions for the plan.[17] These 3-5 year projects include: a 'Catchment' Pioneer in Cumbria; an 'Urban' Pioneer in the Greater Manchester area; a 'Landscape' Pioneer in North Devon; and a 'Marine' Pioneer across two sites, one in East Anglia and an additional component in Devon to complement the Landscape Pioneer.

Renewable and Non-Renewable Natural Capital
Natural capital assets are divided into two classes: non-renewable and renewable. Non-renewable assets cannot regenerate within human timescales and so can only be used once. These assets are traded and therefore have a market price, they include fossil fuels (oil and gas) and minerals such as lithium and phosphorous.[12] Renewable assets such as forests, fish and peatbogs can provide benefits indefinitely so long as they are exploited sustainably. However, renewable assets are frequently degraded through the unsustainable management practices such as deforestation, overfishing and drainage.[4,18]

Valuation of Natural Capital

Proponents of NC accounting argue that to inform decision making, natural assets should be assigned a value, financial or otherwise (POSTnote 378).[12] Both monetary and non-monetary valuation methods exist and these can be based on market prices or non-market values (Box 4). However, valuations based on market prices require a well-functioning market and many of the benefits derived from the natural environment cannot be traded in this way, such as cultural and ecological benefits. In these cases, non-market valuation methods are required but they can be difficult to establish.[19,20] Because NC valuation attempts have primarily been aimed at business and government, which are often interested in the financial incentives for NC conservation and restoration, monetary methods are usually prioritised. The NCC's third report gave examples of financial valuation, such as the carbon storage value of 140,000 Ha of upland peatbogs, which has been estimated at £570m over 40 years.[10]

UK Environmental Accounts

While the UK national accounts incorporate some material elements of NC such as gas reserves and timber stocks, they do not incorporate less tangible aspects, such as existence value (the benefit of knowing that a particular environmental resource exists, such as an endangered species).[10] However, the Government is committed to incorporating these missing elements into the system of national accounts by 2020, and has been working with the Office for National Statistics (ONS) since 2011 to achieve this aim (Box 5).[21,22,23]

Corporate Implementation

NC accounting can also be used by business. The NCC, together with The Royal Society for the Protection of Birds, PwC and the consultancy Eftec, developed a pilot Corporate NC Accounting framework, which has been applied to a number of organisations including the Crown Estate.[10] In most cases, it has revealed a higher company value than traditional profit and loss accounts because of previously unquantified NC-based benefits. In general, international companies or those with supply chains dependent upon NC (Box 2) have a financial interest in managing environmental risks. However, companies lacking direct financial incentives might be reluctant to manage these risks in the absence of legislation as it may lead to a competitive disadvantage.[24]

Any legislation would need to be flexible enough to account for the wide variation in the types of companies affected.

Benefits and Challenges of Natural Capital

Local Government and Communities

The valuation of NC can aid with planning for environmental change (Box 6). An example of this is the Thames Estuary 2100 project, which aims to address risks associated with projected climate change and rising sea levels.[25] A major component of this project is using natural flood defences, such as saltmarshes. It is estimated that seawalls protected by saltmarsh (that act as a physical barrier) are considerably cheaper to maintain than those without (POSTnote 342).[26]

The consideration of NC valuation can also be applied to urban green space and development sites. Birmingham City Council and its partners have devised a Natural Capital Planning Tool (NCPT), which calculates how the natural infrastructure can pay back over a 25-year timeframe. The city has also produced a draft Corporate Natural Capital Account using the pilot Corporate NC Accounting framework developed by the NCC and partners mentioned above. It shows close to £400m of benefit to the local government over a 25-year term. The NCPT represents their effort to maintain these valuable services despite an increasing population (POSTnote 438).[27]

Some opponents of NC valuation suggest that because the terminology of NC reflects its primary role as an accountancy tool for businesses and government, the concept of NC can distance local people from land management decisions. For example, parallels have been drawn between NC valuation and the enclosure of common lands and urbanisation during the industrial revolution in that they both remove a connection between people and nature.[28] Birmingham City Council addressed these concerns by incorporating community engagement into the development of their NCPT. It has also been argued that environmental changes are better monitored and responded to by local communities, which have direct contact with the natural resources.[29] Globally, a large number of local groups exist for the management of NC,[30] such as Coastal Community Teams in England. They are partnerships between a local authority and a range of local stakeholders interested in coastal land management.[31]

Business

EP&L accounts (which record environmental profit and loss) place a monetary value on the environmental footprint of a business and can reveal the extent of a company's dependence and impact on natural assets. Some corporate NC accounts are now being published and a number of frameworks are available.[32,28] Puma was the first global company to establish an EP&L account in 2011,[33,34] and its parent company, Kering, published the first group-wide EP&L account in 2014.[35] In generating these accounts, businesses reveal the cost of their environmental impact to the public and investors. Puma's EP&L account revealed that the company's total environmental costs amounted to €145 million and that their largest environmental impact resulted from raw material production and processing. However, the practice can also improve evaluation of supply chain risks, potentially leading to financial savings and reduced expenses from environmental taxes.[38,39,40] Additionally, commentators suggest that there are reputational benefits to NC accounting as it can demonstrate corporate social responsibility.[41]

Box 4. Valuation Methods

Benefits derived from the natural environment have been classed into use and non-use values. Use values are those that support human consumption, whereas non-use values are those that provide intangible benefits to humans (POSTnote 378). Valuation methods comprise both monetary and non-monetary approaches.

Monetary Valuation (MV)

MV can be grouped into two main types: Market Valuation and Non-Market valuation. Market Valuation is based upon prices that reflect the market value of a particular tradable commodity. An example is pre-harvested timber measured in £/m^3. The net value can be calculated by combining this price with the quantity produced.

Non-Market Valuation comprises a number of different methods. Cost-based approaches reflect the cost of the damage that would be incurred if a particular benefit did not exist and include 'avoided damage costs' and 'replacement costs'. For example, in the absence of a salt marsh the cost of flood defences needed and the water damage that would be incurred.[36] Revealed preference approaches are based upon observed human behaviour, and include the effect of natural scenery on house prices or the time and travel costs of recreational visits. Finally, stated preference methods are based upon surveys where members of the public are asked to place a value on a given natural asset or benefit.

Non-Monetary Valuation (NMV)

NMV tends to focus on social preferences. Approaches are often similar to MV preference methods, but responses are recorded using qualitative or quantitative metrics rather than monetary ones. Participatory or deliberative tools such as focus groups and citizen juries are also examples of NMV.[37]

Limits of Valuation

Proponents of NC suggest that assigning appropriate values to NC assets should increase the likelihood of their conservation (Box 4). However, others argue that assets are likely to be managed for their monetary values only, rather than values that are difficult to measure financially, which could increase the likelihood of their degradation.[42,43] For example, the management of an asset for its financial benefits only, such as a forest for timber or flood protection is often at odds with management for its intangible benefits, such as conserving a rare habitat.[44] Because of the difficulties associated with estimating the non-use values (Box 4), there is a risk that a management strategy maximising timber production will be adopted.

Data Availability and Monitoring

There is a limited amount of data available for certain NC types, such as NC in aquatic and marine environments.[45,46] This includes data showing: what assets are present; the benefits an asset provides; how different management practices affect these benefits; the state that national assets

Box 5. UK Environmental Accounts
The UK follows the UN's 2012 System of Environmental Economic Accounting (SEEA). This consists of two main volumes: Vol 1 comprises the 'Central Framework' (SEEA-CF) and Vol 2 comprises 'Experimental Ecosystem Accounting' (SEEA-EEA)[47,48,49] (POSTnote 376). The UK has already implemented most modules covered by the Central Framework,[50] with well-established accounts for atmospheric emissions and more experimental accounts for subsoil assets such as oil and gas. The ecosystem accounts have no established standards as they are so novel. Eurostat has said that the UK is one of the world leaders in the development of these accounts.[51,52] The UK has already published some habitat-specific accounts for woodlands, farmland[53] and freshwater ecosystems,[54] and some initial and partial estimates of the total value of UK NC.[55] The NCC has called for greater efforts to develop national NC accounts by 2020 and the ONS's plans for meeting this target are set out in a review of progress to date.[23]

are currently in; how their condition affects benefits derived; and how assets interact to produce additive benefits.[10] A lack of such data can make it difficult to develop valuation methods.

Data repositories that do exist tend to hold data from a single research area only.[32] For example, the 'Earth Economics: Ecosystem Valuation Toolkit', which is a large database of references focussed on ecosystem service data.[56] Most NC practitioners are primarily based in either ecological, social or economic research and may have difficulties accessing data repositories outside their speciality.[57] Data availability presents an even greater problem in developing countries where environmental monitoring and social survey data are lacking. UK Government research grants, such as some Darwin Initiative projects, have aimed at addressing this issue.[58,59] For example, one project aims to weigh the economic benefits of wetland restoration against other development options in Sri Lanka.[60]

However, even if there was greater data availability the systematic monitoring of all natural assets would not be feasible. The NCC suggested an alternative approach of prioritising those assets known to be most at risk using a 'risk register' to improve the state of NC. This approach was not accepted in the Government response, but the need for prioritisation of NC assets at risk was acknowledged.[11]

Box 6. Natural Flood Management
Recent flooding events in the UK are estimated to have cost over £1 billion annually[61] and projected costs for maintaining current levels of flood defence are an additional £1 billion per year by 2035.[62] The high cost of structural defences has led to consideration of how whole catchment areas might be managed to reduce flood risk. This approach is referred to as natural flood management (NFM) and aims to enhance, restore or mimic natural processes (POSTnote 484).[63] As part of an integrated approach to flood management, NFM comprises measures to protect a range of natural capital assets including soil management to reduce water run-off and sediment erosion (POSTnote 502), the restoration of floodplains and rivers (POSTnote 537), and the planting of woodlands. However, landowners and managers may require financial incentives for such NC management measures if they do not reap the benefits directly.[64]

Globalisation

The majority of the UK's use of NC occurs outside the UK.[65] Natural capital assets in developing countries provide global benefits; for example, tropical rainforests store carbon. Developing countries may exploit their NC for economic growth to the detriment of these global benefits. It has been suggested that financial payments be made by developed countries to protect these assets and prevent this.[66] There are few examples of where this is being done in practice, although some attempts have been made. For example, the Reducing Emissions from Deforestation and Forest Degradation (REDD+) scheme aims to reduce carbon dioxide emissions from deforestation and conserve forest carbon stocks in developing countries (POSTnote 466). An independent effort to obtain recompense was also attempted by Ecuador in 2011, but was unsuccessful (Box 7). Wealth Accounting and the Valuation of Ecosystem Services (WAVES) is a global partnership orchestrated by the World Bank to promote the use of SEEA (Box 5) in developing countries. Launched at the 2010 Convention of Biological Diversity, the scheme is currently being implemented in eight countries. Having tested the feasibility of NC accounting in a number of locations, WAVES is now focussing on the challenges of implementation in stakeholder countries with differing contexts.[67]

Box 7. Case Study: Yasuni National Park, Ecuador
In 2011, the Ecuadorian Government pledged to leave $7.2bn worth of oil reserves in the ground if the international community paid 50% of its value in compensation.[68] This would protect a 200,000 Ha of the Yasuni National Park, an area celebrated for containing among the highest levels of biological diversity on the planet. The response from the international community was slow, which was attributed to mistrust that the oil would be exploited despite the payments. Local conservationists added to these concerns by confirming that much of the park was already being exploited and that PetroEcuador (the national oil company of Ecuador) had conducted exploratory studies and already begun construction of a road into the area.[69] Attempts by the Ecuadorian Government to mitigate these concerns included setting up the Yasuni ITT Trust Fund in collaboration with the United Nations Development Project (UNDP), whereby benefactors would be given back donations if the oil was subsequently exploited. However, in 2014 the Government confirmed that the extraction would indeed take place and drilling began in early 2016.[70]

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