Business @ Biodiversity

Sustain Value ICF INTERNATIONAL

B@B Workstream 1: Natural Capital Accounting for Business: Guide to selecting an approach

Final Report

31 October 2014

Author: James Spurgeon, Sustain Value

Supporting companies:

VICAT

BODEGAS Y VIÑEDOS CODORNÍU RAVENTÓS DESDE 1551

HEIDELBERGCEMENT

EDF

BRITISH AMERICAN TOBACCO

Acknowledgements

The author would like to thank Strahil Christov, EU project manager, for providing overall direction and support, Roger Adams of ACCA for his input as expert advisor, and ICF for project administrative support.

We are particularly grateful to the following EU Business and Biodiversity (B@B) Full Member organisations: British American Tobacco, Codorníu, S.A., Desso, EDF/EIFER, HeidelbergCement AG, Kering, Lafarge, Interserve/Landmarc, Royal Dutch Shell and Vicat who have provided their time and expertise to help develop this document and tool. However, the views in this document do not necessarily represent the views of those organisations.

Thanks are also extended to the following EU B@B NCA Members for providing valuable comments on earlier drafts: Beatrice Bellini (Nanterre Paris West University), Tobias Hartmann (whilst at Global Nature Fund), Marion Hammerl (Global Nature Fund), Joel Houdet (Synergiz), Katja Kriege (Global Reporting Initiative), Jariath Malloy (Carbon Disclosure Standards Board), Dorothy Maxwell (whilst at Natural Capital Coalition) and Guy Ziv (University of Leeds).

About the author

James Spurgeon is a director at Sustain Value, a consultancy that specialises in helping businesses to manage their natural capital and sustainability risks and opportunities using value based approaches. He has over 20 years experience quantifying and valuing environmental and social impacts and assets, and developing associated decision-support tools. He is also the main author of several related guides including the World Business Council on Sustainable Development's 'Guide to Corporate Ecosystem Valuation' and 'Business Guide to Water Valuation', and IPIECA's 'Ecosystem services guidance for the oil and gas industry'.

Suggested citation:

Spurgeon, J.P.G (2014) Natural Capital Accounting for Business: Guide to selecting an approach. Final report to the EU Business and Biodiversity Platform, performed under the ICF contract.

List of acronyms

ARIES	ARtificial Intelligence for Ecosystem Services
B@B	Business and biodiversity
BBOP	Business and Biodiversity Offsetting Program
BROA	Business risk and opportunity assessment
CDP	Carbon Disclosure Project
CEV	Corporate Ecosystem Valuation
EBBC	European Business and Biodiversity Campaign
Env.	Environmental
EFA	Environmental financial accounting
EMA	Environmental management accounting
EROVA	Environmental Risk, Opportunity & Valuation Assessment tool
ESG	Environmental and social governance
ESIA	Environmental and social impact assessment
EU	European Union
FSC	Forestry Stewardship Council
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
IBAT	Integrated Biodiversity Assessment Tool
IFAC	International Federation of Accountants
IFC	International Finance Corporation
IIRC	International Integrated Reporting Council
IMA	Institute of Management Accountants
InVEST	Integrated Valuation of Ecosystem Services and Trade-offs
IPIECA	The global oil and gas industry association for environmental and social issues.
ISO	International Standards Organisation
LCA	Life Cycle Assessment
M&A	Mergers and acquisitions
NC	Natural capital
NCA	Natural capital accounting
NVI	Natural Value Initiative
PS	Performance Standard
R&D	Research and development
TIMM	Total Impact Measurement & Management
WRI	World Resources Institute
WBCSD	World Business Council for Sustainable Development

Contents

Executive summary

Aim

The objective of this Guide is to help companies understand what is meant by natural capital accounting (NCA) for business and to help them select NCA approaches suitable for their specific circumstances. The Guide and decision-matrix tool developed as part of this study to help do this represent an initial attempt that requires building upon and updating in due course.

Approach

The project has been undertaken as part of the NCA workstream of the EU Business and Biodiversity (B@B) Platform. The Guide has been developed with the input of 10 Full Member companies of the NCA workstream, and review by other NCA Member companies. It has involved an initial questionnaire survey, two workshops and several of the Full member companies piloting the tool.

Business case

The continuing decline in natural capital and rise in associated regulations will increasingly result in businesses having to undertake some form of NCA. Furthermore, many businesses are already conducting NCAs because they recognise the benefits they can gain from doing so. This includes improved integrated decision-making, reduced risks and costs, new and enhanced revenues and a range of reputational and strategic benefits.

Definitions

For the purposes of this document, this study defines natural capital accounting for business as: ***Identifying, quantifying and/or valuing environmental dependencies and impacts to inform business decision-making and reporting***'.

A more comprehensive definition is: '***Identifying, quantifying and/or valuing natural capital impacts, dependencies and assets, as well as other environmental impacts and liabilities, to inform business decision-making and reporting***'. In effect, these definitions really represent 'environmental accounting for business'.

There are many definitions available for natural capital itself. According to the Natural Capital Coalition (NCCa, 2014), natural capital is '***The finite stock of natural assets (air, water, land, habitats) from which goods and services flow to benefit society and the economy. It is made up of ecosystems (providing renewable resources and services), and non-renewable deposits of fossil fuels and minerals'***.

Figure 1 below shows the main components of the environment covered by this Guide and decision-matrix tool. These comprise: natural capital (split into living/biotic and non-living/abiotic components together with other planetary processes); the benefits these generate (ecosystem services and abiotic services); and environmental impacts (those directly impacting natural capital and 'other environmental impacts' such as air emissions).

Figure 1 Representation of natural capital components used in the Guide

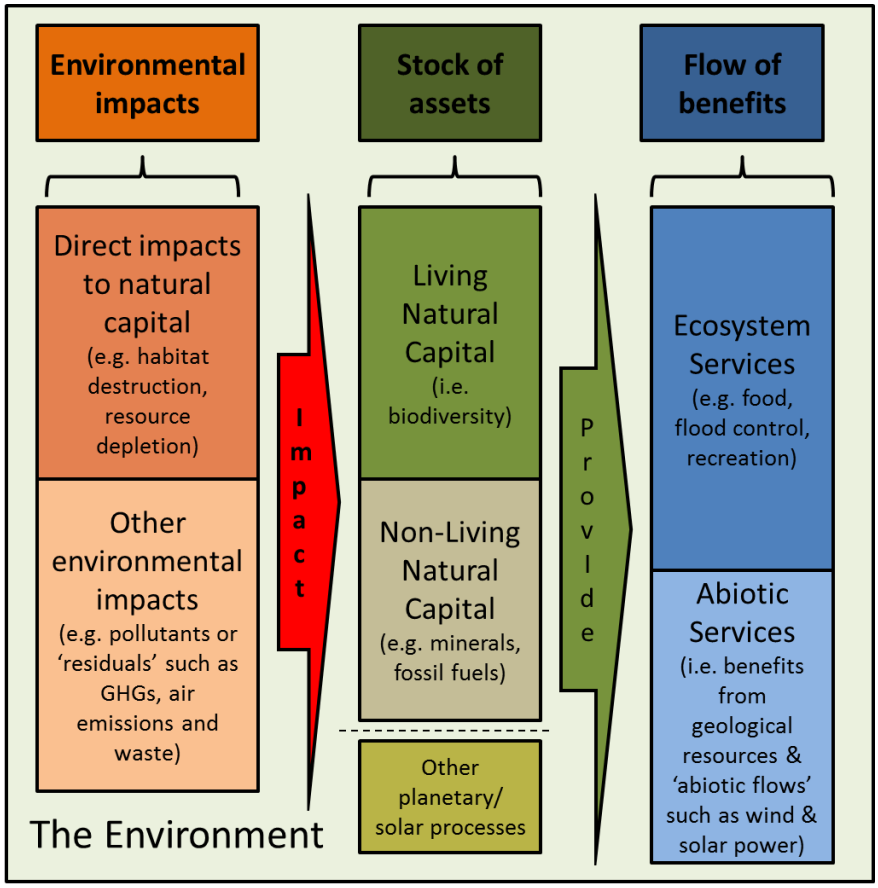
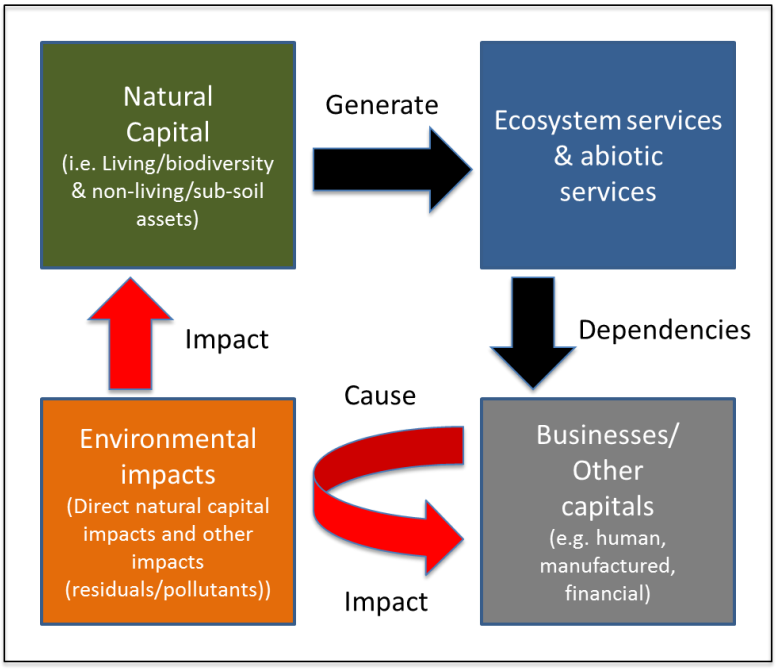


Figure 2 below shows how the main components are interrelated with each other, and with businesses and other forms of capital.

Figure 2 Inter-relationships between natural capital, ecosystem & abiotic services, businesses and other capitals, and environmental impacts



Scope of the Guide

The Guide has a broad scope covering approaches that 'take the environment into account in business decision-making and reporting'. However, the main intended focus is on 'living' natural capital (i.e. biodiversity) rather than non-living natural capital (e.g. minerals). This aligns with the EU's 7th Environmental Action Plan definition of natural capital, which focuses on biodiversity. The Guide also covers accounting for 'other environmental impacts', which include the impact of pollutants such as greenhouse gases (GHGs), air emissions and waste etc.

Content of the Guide

The Guide sets out 12 principles proposed to help guide companies in selecting an appropriate NCA approach. These have been grouped to cover four sequential aspects to consider: basics, aim, tips and selection.

A 'high level method' is then proposed for selecting a suitable NCA approach based on a Summary Table that describes 11 alternative NCA for business approaches. The categories are simply applied for the purposes of this document. The approaches range from assessing impacts and dependencies to undertaking environmental profit and loss accounts. The Summary Table alone may suffice to help companies make the right selection.

A more complex and granular 'Decision-matrix method' is also set out, based on an interactive matrix in an Excel spreadsheet (on the EU B@B website). It uses a set of two initial questions, and seven main questions that companies can consider. This approach was adopted in preference to a decision-tree due to the complexities of the topic and the considerable added flexibility the matrix approach provides (it is effectively an interactive decision-tree).

Two tables are then provided that highlight a selection of guidance documents and tools available to help implement each of the 11 proposed NCA approaches. This is just an initial attempt at covering a complex exercise.

Finally, a complementary set of four steps is put forward that can further guide a company on their journey to selecting and then implementing the right NCA approach(es).

Phase 2 of the NCA workstream.

The document concludes with a number of possible studies to be undertaken in the second phase, put forward and voted on by the Full Members. Although yet to be finalised, key contending studies include i) a more detailed review and analysis of guidance, methodologies and tools available to support alternative NCA for business approaches; and ii) mapping of NC valuation applications and initiatives from a business and government perspective.

1 Introduction

This section sets out the aims and contents of this Guide. It begins by outlining the broad scope adopted in terms of what NCA for business means, which is effectively: ***'taking the environment into account in business decision-making and reporting'.*** It also describes the process behind the Guide's development and highlights the business case as to why companies should adopt some form of NCA.

1.1 Aim and target audience

The objective of this Guide is to help businesses decide what form of NCA is most suitable for them to undertake. It can be applied at different levels in a variety of contexts within a company. It is targeted at corporate and operational staff in accounting, environmental, sustainability, strategy, management, risk, design, R&D and communications related roles.

1.2 Contents

In Section 1 the Guide begins by explaining the scope of 'natural capital accounting for business' and highlighting the business case for companies to undertake NCA.

Section 2 then defines 'natural capital accounting for business' and discusses some of the terminology around the topic.

Section 3 sets out some key principles for companies to consider when deciding on what form of NCA approach to adopt.

The Guide then provides two complementary methods that companies can use to select what form of NCA approach to undertake, as follows:

Section 4 introduces a **High–level Selection Method.** The first method simply comprises a Summary Table describing 11 alternative NCA for business approaches

Section 5 introduces a **Decision-matrix Selection Method.** This second method builds on the first, and comprises a decision-matrix and set of accompanying questions that businesses can interrogate to determine what form of NCA for business they may wish to adopt. The matrix is provided in the main text, but is also available as a separate interactive Excel worksheet.

Then, in Section 6,for each NCA approach specified, a selection of best practice guidelines and tools are identified.

Section 7 then suggests four steps to help companies apply the selection methods and implement the outcome.

Finally Section 8 identifies a number of potential topics that could be covered in Phase 2 of the NCA workstream.

Box 1 Quote from Vicat on managing biodiversity and the tool

'In France, legislation for industrial activities such as cement manufacturing requires us to take the environment, in particular biodiversity, into account at every step of our decision-making and reporting. We must anticipate and avoid or reduce negative impacts; restore habitats; and inform shareholders about how our company takes fauna, flora and habitats into account in our economic activities. Moreover, in so doing, we deal with other stakeholders such as local communities and NGOs just as much as we do with shareholders and investors.

Because biodiversity and the environment mean different things to our stakeholder partners and because there are so many alternative ways to take biodiversity and the environment into account, the NCA selection matrix tool provides us with valuable guidance. The matrix is easy to use and has guided us to referenced methodologies that we will use for reporting on our involvement in the National Strategy for Biodiversity project.

We need to be aware of new methodologies, material business cases, and other case studies to help our field staff in the quarries adapt the way in which we quarry. In return, we are pleased that our experience has been able to help inform the matrix.'

Thierry Meilland-Rey, Cement Quarries Manager, Vicat

1.3 Scope of NCA

The Guide considers NCA for business in its widest sense, in that it effectively covers 'taking the environment into account in business decision-making and reporting'.

However, a key focus is how businesses can specifically take 'biodiversity' into account, with particular emphasis on the assessment of biodiversity and ecosystem services (ES). Less emphasis is provided on biodiversity 'management' (i.e. how to manage biodiversity) per se, and on assessing 'environmental impacts' (e.g. relating to greenhouse gas (GHG) emissions and waste). Further explanation of NCA and associated terms are provided in Section 2.

Social capital (including human and relationship capital) is not covered, although similar concepts apply and such factors should also ideally be considered in business decision-making.

1.4 The process

This Guide and the two approaches were developed under the NCA Workstream of the second EU B@B platform. The outputs are based on contributions from 10 Full member multi-national companies through a questionnaire survey, two workshops and independent pilot testing. These companies cover oil and gas, utilities, aggregates, food, manufacturing and land management services. The Guide has also been reviewed by a number of B@B NCA Workstream organisations covering a range of companies, consultancy firms, government ministries and NGOs.

1.5 Why should businesses undertake NCA?

A company may undertake NCA either because it needs to satisfy a specific requirement or because it recognises it may benefit from enhanced decision-making or reporting.

As this Guide sets out, numerous alternative NCA approaches exist which businesses could adopt to enable biodiversity and environmental issues to be taken into account in their decision-making. Many companies also already have processes in place that identify and assess environmental impacts and data that include biodiversity related issues. So the additional effort required may not be particularly onerous.

Box 2 Quote from Shell on managing NC and the tool

'For Shell, as a responsible operator, it is clearly important that we protect the environment and understand our dependency on Natural Capital (NC), as well as understand how our neighboring local communities rely on these same natural resources for their livelihoods. In order to appropriately manage and monitor our impacts and dependencies on NC, we need to be able to measure them effectively as well as have appropriate processes to integrate such information into project decisions. The guidance presented in this document is highly relevant when companies seek to navigate this new landscape of NC and think about where and how NC valuation and accounting can be business relevant. For Shell, environmental impacts and dependencies are identified and prioritised through an Impact Assessment process and operational standards. We use a risk-based approach to assess the significance of impacts and determine mitigations. NC offers a complementary methodology which takes a value-based approach to informing decisions and prioritising mitigation actions'.

Deric Quaile, Manager, Environmentally Sensitive Areas, Shell

A growing number of policies and regulations are being established globally, which will increasingly require companies to take into account and minimise biodiversity and environmental considerations (e.g. see Waage et al, 2013). In the EU, this requirement is in part now being driven by the goal that by 2020, '***Member States, with the assistance of the Commission, will map and assess the state of ecosystems and their services in their national territory by 2014, assess the economic value of such services, and promote the integration of these values into accounting and reporting systems at EU and national level.'*** (EU Biodiversity Strategy to 2020, Objective 2, Action 5 – see (EU, 2011)). The recent EU Directive on non-financial reporting (see Box 3) is a step in this direction in relation to businesses.

Box 3 EU Directive on non-financial reporting

The European Parliament adopted on 15 April 2014 the directive on disclosure of non-financial and diversity information by certain large companies and groups[1]. Companies concerned will be required to disclose in their management report relevant and material key performance indicators concerning environmental aspects, as well as a variety of other issues such as social and employee-related matters, human rights and bribery issues.

Companies will retain significant flexibility to disclose relevant information in the way that they consider most useful, or in a separate report. They may use international, European or national guidelines according to their own characteristics or business environment (for instance, the UN Global Compact, ISO 26000, GRI G4 or the German Sustainability Code).

Most of the NCA approaches covered in this Guide are currently voluntary, although there are exceptions, for example in relation to conducting Environmental Impact Assessments (EIA) (under the EU EIA Directive[2]). Even in situations where there is a requirement for a specific assessment (e.g. an EIA), it can be advantageous to undertake additional NCA approaches (e.g. by also assessing dependencies and/or monetary values), which may enhance the analysis and outcome.

Furthermore, the business case for companies to undertake NCA is continually growing. This is due to factors such as increasing natural resource scarcity, habitat decline, population growth, changing consumer preferences, innovative environmental markets and increasing competitive advantage around managing sustainability issues. These all lead to enhanced business risks and opportunities that can be evaluated and managed through

[1] http://europa.eu/rapid/press-release_STATEMENT-14-291_en.htm

[2] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0031&from=EN

various forms of NCA. Some example business decisions that NCA can help make are shown in Box 4.

Box 4 Example business decisions that NCA can help make

- Prioritising effort on environmental issues
- Identifying which risks should be addressed
- Selecting preferred investments/options through evaluating trade-offs
- Determining the optimum mitigation measure to implement
- Investigating the nature and extent of potential revenues from environmental markets
- Identifying and managing natural capital risks within the supply chain

Put simply, many benefits can be gained by businesses from better measurement, consideration and management of biodiversity and environmental issues. Some example benefits suggested by Full Members during this project are shown in Box 5.

Box 5 Potential benefits to companies from adopting NCA

- **General decision-making**
  - Improved sustainability decision-making
  - Integrated thinking and reporting
  - Better relations with stakeholders and regulators
  - Gain and develop experience and capacity around NC
- **Operational**
  - Cost savings
  - Improving / securing raw material supply and quality of raw materials
  - Inform selection of optimum impact mitigation measures
  - Provide programme certainty
  - More engaged workforce
  - Meet client/government requirements
  - Long-term raw material stock security
- **Financial**
  - Maintain and enhance revenues
  - Understand and make most of new environmental markets
  - Maintain social licence to operate
- **Risks**
  - Manage and reduce risks
  - Help ensure security of supply of natural resources
  - Become more aware of potential price increases
  - De-risk future uncertainty
  - Flattening investment risks (reducing risks of sunk costs/ false investments)
- **Reputation**
  - Maintain and enhance reputation
  - Demonstration of creating shared value
- **Strategy**
  - Increase external uptake by standard setters and national governments
  - Help inform internal and external communications
  - Help prioritise NC risks and opportunities
  - Map stakeholders and engage them in managing NC too
  - Inform strategic biodiversity action plans

2 Definitions and categorisations

This section provides a brief discussion and set of definitions around key 'NCA for business' terms and categorisations. It also helps explain the scope of the Guide and clarifies how the terms are used within the document.

2.1 Natural capital accounting for business

This study defines natural capital accounting for business as: ***Identifying, quantifying and/or valuing environmental dependencies and impacts to inform business decision-making and reporting***'.

A more comprehensive definition is: '***Identifying, quantifying and/or valuing natural capital impacts, dependencies and assets, as well as other environmental impacts and liabilities, to inform business decision-making and reporting***'. In effect, these definitions really represent 'environmental accounting for business'.

To be more technically correct, the definition for NCA for business should only include impacts and dependencies around 'natural capital' and not 'other environmental impacts'. As is explained later, for the purpose of this document, natural capital can be split into living (i.e. biodiversity) and non-living (e.g. minerals) components.

Furthermore, some people interpret NCA for business as only focusing on biodiversity aspects. This should technically be referred to as 'biodiversity accounting for business'. It is actually biodiversity that this NCA workstream is most interested in addressing - due to concerns over the decline in biodiversity and the lack of consistent methodologies to account for it in business.

Key elements of this project's broad interpretation of NCA for business include the fact that it covers:

- Both natural capital and 'other environmental impacts'[3] (which as detailed later include pollutants, also known as 'residuals' e.g. air emissions, dust and waste, as well as noise etc.).
- Business assets (e.g. ecosystems on landholdings) and dependencies (e.g. how companies depend on ecosystem services).
- Business impacts (i.e. impacts to natural capital and environmental impacts affecting other capitals too) and liabilities (i.e. past and potential future impacts which the company may have to pay for in terms of compensation and/or clean-up costs).
- Both quantity and quality perspectives (for example, for assets such as biodiversity and water).
- Qualitative (e.g. descriptive and high/medium/low), quantitative (e.g. physical units and indices) and/or monetary valuation.
- All types of internal business decision-making as well as external corporate reporting (which may or may not require a 'set of accounts').

Best practice NCA for business would also allow for parameters to be measured in a comparable way at regular intervals (for example over a year).

2.2 Definitions relating to natural capital

This section provides a brief review and discussion of key natural capital related definitions. In doing so, it highlights the broad use of terminology and sets out how the terms are used

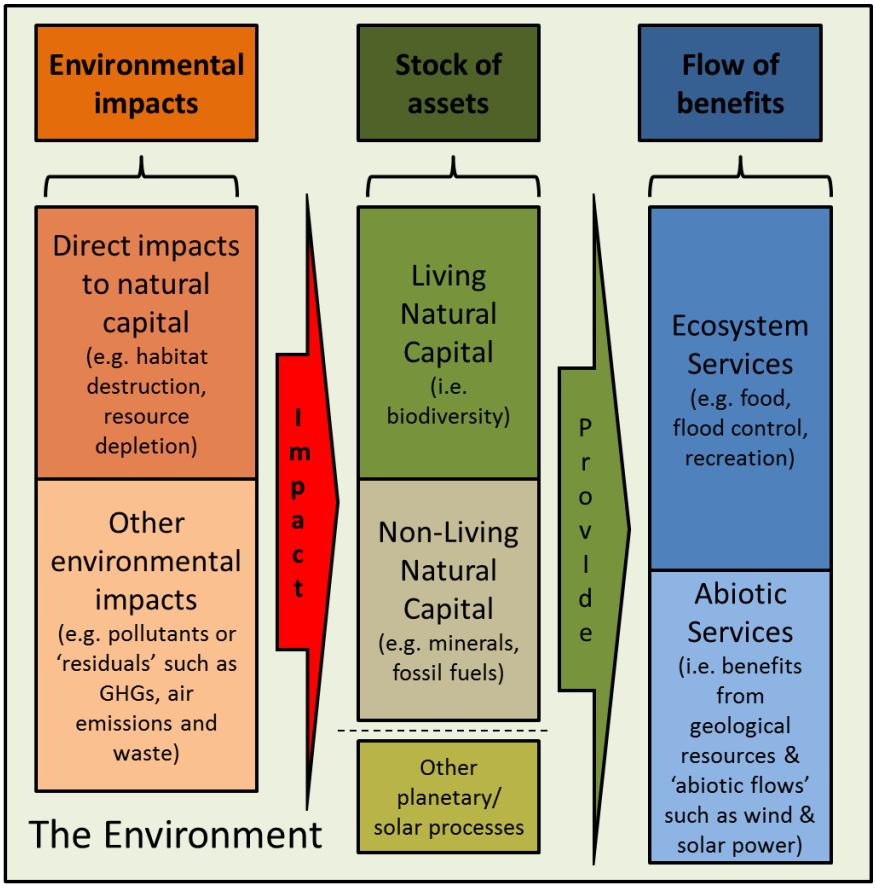
[3] Technically speaking, these 'other environmental impacts' such as waste and air emissions are related to natural capital in that they spoil the quality of land and air respectively. However, they are often considered distinctly from 'natural capital' per se, as most of the impact affects humans rather than biodiversity or minerals etc.

within the document. Figure 2.1 presents a visual interpretation of some of the key terms used and their inter-relationship. Readers are advised to refer to other documents referenced below for more detailed explanations of definitions.

Technically, natural capital refers just to the '*stock*' of environmental assets. As such, it is an 'asset' (i.e. capital base). As with other capitals, it generates a '*flow*' of benefits to people over time (i.e. equivalent to the 'interest' that accrues annually from financial capital). It is the flow of benefits that effectively gives the asset its value. As a result, the term natural capital sometimes covers both the stocks and the flows of benefits relating to the natural environment (e.g. Maes et al, 2013).

Furthermore, the term natural capital is sometimes used more broadly to cover all aspects relating to the 'environment'. In this sense it refers to environmental resources (i.e. true natural 'capital' or assets/stocks) plus the ensuing flow of benefits (i.e. ecosystem services and abiotic services), plus also other environmental impacts, for example caused by pollutants or 'residuals'. The latter relate to liquid, gas and solid waste emissions that can impact both natural capital and other types of capitals, especially human capital, and are explained in more detail below. TEEB's (2013) 'Natural capital at risk: The top 100 externalities of business' includes pollutants in their interpretation of natural capital and their valuation calculations.

Figure 2.1 Representation of natural capital components used in the Decision-Matrix



The Natural Capital Coalition[4] recognises that some natural capital valuation tools are starting to include externality costs associated with business related pollutants (e.g. health

[4] The NCC is a global, multi-stakeholder platform to build the business case and support the uptake of natural capital measurement, management, reporting and disclosure in business and investor decision-making. Formerly known as 'TEEB for Business'.

impacts and environmental damages), and they intend to include these in their forthcoming Natural Capital Protocol (NCCa, 2014).

This broad use of the term natural capital representing the environment is perhaps increasingly likely to be adopted by businesses in the future because of the concept of the six[5] capitals as defined within Integrated Reporting (IIRC, 2013) which may become more mainstream. In the context of integrated reporting and the six capitals, 'natural capital' might be broadly interpreted to represent 'environmental' issues.

This Guide adopts the definition of natural capital put forward by the Natural Capital Coalition (NCCa, 2014), which is: '***The finite stock of natural assets (air, water, land, habitats) from which goods and services flow to benefit society and the economy. It is made up of ecosystems (providing renewable resources and services), and non-renewable deposits of fossil fuels and minerals***'.

Natural capital can be categorized in a number of different ways. Given the EU's emphasis on natural capital equating to biodiversity (see Box 6), this document adopts a focus on 'living' natural capital, whilst also considering 'non-living' natural capital.

Box 6 The EU's perspective on the definition of natural capital

The EU's 7th Environmental Action Programme[6] defines natural capital as '***biodiversity, including ecosystems that provide essential goods and services, from fertile soil and multi-functional forests to productive land and seas, from good quality fresh water and clean air to pollination and climate regulation and protection against natural disasters***'. This definition and another elsewhere in the same EU document emphasizes that natural capital is equivalent to 'biodiversity' and the 'ecosystem services' that it provides. In this respect, it is important to note the EU's intention to give higher regard to helping better manage biodiversity and ecosystem services through NCA approaches as opposed to dealing with mineral and fossil fuel resources, or for that matter other environmental impacts such as pollutants, all of which are generally well addressed through other EU mechanisms.

Living natural capital thus represents biodiversity, comprising stocks of genes, species and ecosystems[7]. The European Environment Agency and United Nation's System of Environmental-Economic Accounting (UN-SEEA, 2013) Experimental Ecosystem Accounting refer to these as 'Ecosystem Assets'.

Non-living natural capital are geological resources (i.e. abiotic resources) comprising stocks or 'sub-soil assets' that include minerals, earth elements, fossil fuels, gravel, salt and sand etc.

Natural capital (both living and non-living both individually, and in combination) gives rise to a variety of human benefits known as 'ecosystem services'[8]. These can be defined as the flow of benefits to humans arising from the environment. For the purposes of the tool, we use the term 'ecosystem services' to refer to those benefits flowing from living natural capital[9] (i.e. biodiversity or genes, species and ecosystems), and 'abiotic services' for those services arising from non-living natural capital. The latter include human benefits from

[5] The six capitals are Natural, Human, Social and relationship, Financial, Manufactured and Intellectual.

[6] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D1386&from=EN

[7] Ecosystems are made up of both biotic and abiotic components interacting together and giving rise to ecological & bio-physical processes.

[8] Ecosystem services comprise provisioning, regulating, cultural and supporting services (e.g. see TEEB). See also Landers & Nahlik (2013) and CICES (2013) for other ways to classify ecosystem services.

[9] Technically speaking, the concept of 'ecosystems services' also covers all benefits arising from natural capital, and non-living components of natural capital also form an integral part of ecosystems (i.e. are part of living natural capital). In this document, it is the sub-soil assets such as oil, minerals and metals they are considered as 'non-living natural capital'.

geological resources such as minerals and fossil fuels, and from 'abiotic flows', which are geo-physical cycles such as wind, solar, hydro and geo-thermal.

'Renewable resources' as per the NCC definition effectively includes living natural capital and abiotic flows. On the other hand, 'non-renewable resources' include sub-soil assets (i.e. non-living natural capital). Ecosystem assets, ecosystem services, and sub-soil assets such as minerals are also considered as 'depletable', whilst abiotic flows or services are considered 'non-depletable'.

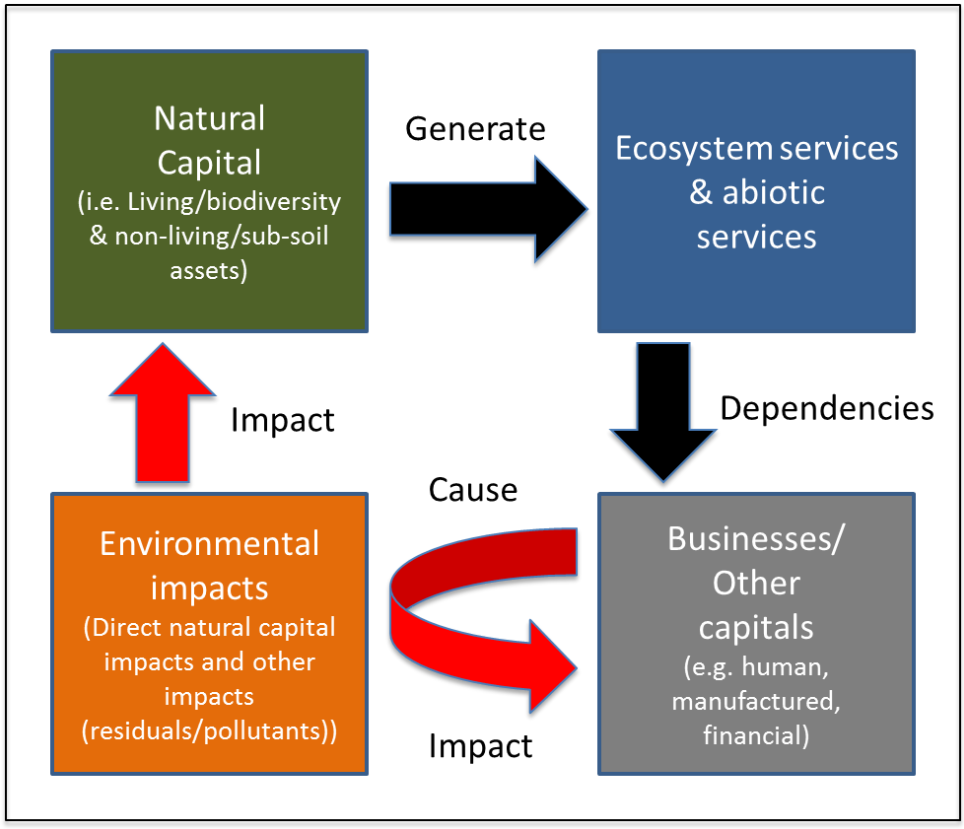
For the purpose of this document, environmental impacts are separated into two main types. Firstly, there are 'direct impacts to natural capital', for example through habitat destruction and resource depletion. These impacts should effectively be accounted for anyway through assessing changes in living natural capital stocks and ecosystem services.

Secondly, there are 'other environmental impacts' or 'residuals', which include 'pollutants'. These occur as a result of business and human activities that may affect natural capital or other forms of capital, such as human or manufactured capital (see Figure 2.12). They include air emissions (e.g. of GHGs, SOx, NOx, dust etc.), discharges (e.g. chemicals, metals and organic matter), solid waste, noise, vibration and light pollution. UN-SEEA (2014) defines residuals as 'flows of solid, liquid and gaseous materials, and energy that are discarded, discharged or emitted by establishments and households through processes of production, consumption or accumulation'. Residuals are effectively the equivalent of 'other environmental externalities' as described in the WBCSD Guide to Corporate Ecosystem Valuation (WBCSD, 2011). Impacts they cause are typically accounted for separately from natural capital, in terms of units (e.g. tonnes) of emission or waste generated, which can increasingly readily be converted to monetary values (e.g. Euro per ton of pollutant). Most of the monetary value damages associated with residuals relate to impact to human health rather than to natural capital.

Accounting for pollutants and residuals in quantitative terms (e.g. tonnes of NOx emissions) effectively records the 'output' of a business activity. The actual 'impact' or 'outcome' of that emission, for example on natural and human capital, is not captured in those quantities. That is one of the advantages of monetary valuation of impacts, in that this typically represents the estimated change in value to society arising from a unit of output (e.g. pollutant).

Figure 2.2 shows the inter-relationships between natural capital, ecosystem and abiotic services, businesses and other forms of capital, and environmental impacts. Natural capital provides ecosystem services and abiotic services, which in turn support all businesses and other forms of capital (i.e. they are dependent, directly or indirectly) upon the flow of benefits provided by natural capital). Businesses and other forms of capital cause a range of environmental impacts, which impact upon natural capital as well as directly on businesses and other forms of capital (e.g. air emissions affect human health).

Figure 2.2 Inter-relationships between natural capital, ecosystem & abiotic services, businesses and other capitals, and environmental impacts



It is important to recognise that environmental impacts may be positive as well as negative. For example, direct impacts to natural capital can include habitat creation and restoration, and waste products can be used beneficially e.g. through recycling.

When it comes to evaluating natural capital and associated flows of value, it is important to recognise that the 'stocks' of natural capital are not static. They may degrade or improve over time and there may be a significant management input/cost required to maintain the value of the stock and associated flow of benefits. Dealing with climate change impacts and growing populations are key reasons that stocks of natural capital must be maintained. These are all issues that businesses may need to address when accounting for their impacts and dependencies.

2.3 Definitions relating to business accounting and environmental accounting

The term 'accounting' from a business perspective relates to the identification, measurement and communication of economic information about a business entity to inform internal and external decision-making. A definition for accounting along with definitions for related business accounting and environmental accounting concepts are provided in Box 7.

There are two main branches of accountancy: management and financial. The former relates to internal decision-making and the latter to corporate reporting for external purposes. As can be seen in Box 7, the same differentiation applies for environmental accounting in a business context. These are important differences that are drawn upon in the classification of NCA approaches later in this document.

In terms of the UN-SEEA approach to national environmental accounting, emphasis is placed on understanding changes in annual stocks of natural capital assets, whilst accounting for residuals and for environmental related expenditures are also important. The UN system also focuses both on measuring physical units and monetary values. All these

concepts are drawn upon in this document in relation to the NCA approach classification and differentiating between them.

Box 7 Definitions relating to accounting and environmental accounting

With respect to business, the term '**accounting**' can be defined as 'the process of identifying, measuring and communicating economic information to permit informed judgements and decisions by users of the information' (American Accounting Association in Drury, 2001).

Management accounting is concerned with providing information to managers within an organisation to help them make better internal decisions (e.g. and improve the efficiency and effectiveness of existing operations). It is unregulated, focuses on the whole business both at the aggregated and disaggregated levels, and can be considered as 'internal accounting' (based on Drury, 2001).

Financial accounting is concerned with providing information to external stakeholders (e.g. investors, tax authorities and creditors). This is regulated for public limited companies, requiring annual financial accounts (including profit and loss accounts and balance sheets), is focussed more on the whole business, and can be considered as 'external accounting' (based on Drury, 2001).

Environmental management accounting (EMA) can be broadly defined as the identification, collection, analysis and use of two types of information for internal decision-making: i) physical information on the use, flows and destinies of energy, water and materials (including packaging and wastes) and ii) monetary information on environment-related costs, earnings and savings (United Nations Working Group on EMA in IFAC, 2005). This perhaps focuses more on 'other environmental impacts' rather than on biodiversity elements.

Environmental financial accounting (EFA) deals with accounting for and reporting on environment related market transactions and events that affect, or are likely to affect, the financial position of an enterprise (UNCTAD, 2002).

Full cost accounting is a sub-category of EMA and EFA, and involves the consideration and estimation of external environmental impacts and costs (based on IFAC, 2005). This means including values for 'externalities' that would otherwise be omitted from any financial decision-making or reporting. As such it builds on EMA, and relates more to the monetary valuation aspects of NCA.

Environmental economic accounting involves accounting for the interactions between the economy and the environment, and the stocks and changes in stocks of environmental assets (UN-SEEA, 2014). This includes environmental impacts as well as natural capital.

Materiality in the context of NCA means that an issue is of potential significance to the business or its stakeholders. According to the Sustainability Accounting Standards Board, the concept of materiality recognizes that some information is important to the fair presentation of an entity's financial condition and operational performance. From an Integrated Reporting perspective it relates to matters that 'substantively affect the organization's ability to create value over the short, medium and long term' (IIRC, 2013). GRI 4 defines material aspects as those that reflect the organisation's significant impacts or that substantively influence the assessments and decisions of stakeholders (GRI, 2013).

3 NCA for Business 'Principles'

This Section identifies two sets of principles. The first set covers 'Principles for selecting an NCA for business approach'. These are effectively top tips that companies should consider when deciding what form of NCA to undertake. They have all been proposed by the NCA Full Members as part of this study.

The second set relates to 'Principles for implementing NCA for business'. These are Principles to adhere to when undertaking the selected NCA for business approach.

This study has not investigated the latter, so just a few example sets of Principles are highlighted that may be relevant.

3.1 Principles for selecting an NCA for business approach

When deciding on which NCA approach to undertake, businesses should adhere to the 12 Principles set out in Table 3.1. They fit under four sequential categories: Basics, aim, tips and selection. Several of them tie in closely with the Decision-matrix questions.

Table 3.1 Principles for selecting an NCA approach

Basics	1. **Understand your company's relationship with NC and the environment**. This also applies to your product's or project's relationship or whatever you are selecting to assess. 2. **Understand the level you want to apply NCA at**. NCA can be applied at a project/site, product, company, supply chain or regional level, and it is important to begin to narrow down the scope. 3. **Know your legal obligations**. It is essential to adhere to any legal requirement in terms of which approach (and potential guidance document) to adopt. 4. **Know your limitations and constraints**. It is important to recognise your company's constraints and select an appropriate approach, and/or supplement in-house skills with the right expertise.
Aim	5. **Carefully define the issue to be assessed**. The more you can specify what is to be assessed the easier it will be to select an NCA approach. Ideally get it written down and agreed amongst those in the team selecting the approach. The selection process may be iterative and help define the problem too. 6. **Build a business case**. This is essential to get buy in to justify your approach, and will help refine the objective of your assessment. 7. **Consider complementing existing company approaches**. It can be more cost-effective to link any NCA approach with any existing company decision-making and data collection/reporting approaches and processes. 8. **Consider addressing forthcoming compliance requirements**. There are numerous new environmental regulations and market mechanisms that will increasingly affect businesses, so potentially align the approach with what is most relevant to your business. 9. **Consider aligning it with external initiatives**. There may be local stakeholder and/or industry natural capital initiatives where synergies can be gained.
Tips	10. **Start simple**. Adopt a tiered approach by starting 'simple' (e.g. use a qualitative or quantitative approach focused on a project or product) and then grow in complexity, for example ultimately ending up undertaking valuation at a corporate level. 11. **Seek advice**. Accounting for NC and environmental issues is complex, especially when quantifying and valuing them, so make the most of industry colleagues, consultants, NGOs and/or academics for advice to help with understanding the issues, concepts and potential applications for NCA.
Selection	12. **Select an approach that best meets business needs**. Ultimately, a company should choose an approach that best meets its needs, whether directly or indirectly. It is important to have used a balanced perspective from within the company (i.e. a balanced team) to go through the selection process (e.g. involve agricultural, environmental & accountant perspectives if say in food/drink industry).

3.2 Principles for implementing NCA for business

Principles to follow for actually implementing NCA approaches are outside the scope of this Guide. Once decided upon what NCA approach to apply (see Section 4), you should consider following a relevant sets of principles to implement the approach, if they exist. This could include, for example:

- The GHG accounting and reporting standard principles (WRI and WBCSD, 2004).
- The Guide to Corporate Ecosystem Valuation (CEV) principles (WBCSD, 2011).
- The Business and Biodiversity Offsetting Program (BBOP, 2009) biodiversity offsetting standards.
- Principles for finance teams to follow in Environmental and Social Accounting: A Guide for Financial Decision-making (A4S, in press)

In particular, it is worth noting that the Natural Capital Coalition will be developing an appropriate set of principles as part of the Natural Capital Protocol.

Other suggestions arising from this study in relation to Principles and tips for implementing NCA include the following:

- Follow the mitigation hierarchy (avoid, minimize, restore, offset and compensate)
- Develop co-activities at sites that are compatible with and help preserve or enhance NC, e.g. beekeeping at quarries.
- Only deforest/destroy as a last option with a minimising impact principle (i.e. only what is required) and continually restore old quarried areas.
- Use conventional risk management approach (i.e. probability and magnitude based approaches).
- Use internationally recognized protected area management categories.
- Align with public reporting requirements
- In particular focus on assessing NC that the business can actually influence.
- Follow existing standards.
- Use readily available databases and models.
- Adhere to the definition of materiality as provided by GRI.
- Follow GHG scope 1, 2 and 3 categories to avoid double counting. Equivalent scopes are:
  - Scope 1 = Direct footprint from land occupier/owner;
  - Scope 2 = Indirect purchased NC (e.g. timber, water, minerals etc.);
  - Scope 3 = Indirect footprint/value chain, employee business use of NC, product use etc.

4 High-level Selection Method

This section sets out a rapid 'High-level Selection Method' for companies to choose the right NCA approach for their context. The approach simply comprises a Summary Table that identifies and describes 11 categories of NCA approach. This includes types of NCA 'assessment' more commonly used in decision-making and types of NCA 'sets of account' more commonly used in corporate reporting. The Summary Table also briefly explains what each approach is best for doing.

Section 5 then introduces a more comprehensive approach to selecting an NCA approach using a Decision-matrix tool, which builds on the Summary Table.

4.1 Introduction

It can be difficult for a company to know where to start when it comes to NCA. Your company may already be doing a lot of relevant work on the topic and you may only need to slightly adjust your existing approach. For others there may be considerable scope for improvement, which may require a long journey to get there.

This section provides a high-level approach for companies to select an NCA approach suitable to their needs. It begins with a Summary Table that identifies different categories of NCA approach for business and briefly explains what they can be used for.

Section 5 then provides a more detailed supplementary approach for selecting NCA approaches based on a fairly comprehensive and inter-active Decision-matrix.

For each NCA category, Section 6 goes on to highlight a selection of guides, tools and examples available to help companies implement the approach.

Section 7.2 then provides a complementary set of Steps that companies can follow when selecting an NCA approach.

4.2 NCA Summary Table

The intention of the Summary Table (see Table 4.1 overleaf) is to be a simple resource that businesses can use to help determine what form of NCA approach they should adopt.

For the purposes of this document, 11 NCA approaches for business have been identified. These have been split into three categories. Those mainly used to help decision-making (effectively 'types of assessment'); those mainly used for corporate reporting (effectively 'sets of accounts'); and those that can be used for both. The Summary Table defines each approach and briefly explains what they are good for doing.

It is acknowledged that overlaps exist between approaches and that the categorisation could be done in many different ways. However, it is hoped that this provides a useful starting point, which can be built upon and improved in the future.

Reflecting on the earlier definitions provided, environmental management accounting broadly relates to the 'types of assessment' used in NCA 'decision-making' approaches. On the other hand, environmental financial accounting broadly covers some of the 'sets of accounts' used in NCA 'reporting' approaches.

Table 4.1 NCA for Business Approach Selection Summary Table

Category	No.	NCA for business approach	Description	What is this approach good for?
Type of assessmenType t - for decision-making	1	Dependency	Determines the nature and extent to which companies depend on NC.	Determining the nature and extent of any dependencies (direct or indirect) on NC, for example to understand potential risks and costs arising from resource scarcity and future price changes.
	2	Impacts	Determines the nature and extent to which companies impact NC and cause other environmental impacts	Determining the nature and extent of impacts (direct or indirect) relating to NC and the environment to inform impact mitigation and selection of a preferred option.
	3	Risk/opportunity & materiality	Involves identifying & quantifying NC and other environmental related risks and opportunities. The potential materiality may also be assessed.	Determining the nature & extent of NC and environmental risks & opportunities to inform materiality and management priorities.
	4	Valuation (full cost accounting)	Involves valuing the importance of NC and other environmental related costs and benefits to society (i.e. stakeholders) & the company (i.e. shareholders) associated with a range of business aspects - for internal management purposes. It is a form of full cost accounting relating to management decisions.	Determining the nature & extent of NC and environmental related values (in qualitative or monetary terms) from the perspective of stakeholders and/or the company/shareholders to inform costs to companies, trade-off analyses (e.g. option appraisals), asset valuations, new environmental markets, net impact strategies, and stakeholder distribution/compensation issues etc.
Both	**5**	Inventory	Documents information about the nature and extent of NC on a piece of land and/or other environmental outputs (e.g. pollutant/residuals) generated.	Determining the type and quantity (hectares, individuals) of habitats and organisms (especially rare and endangered ones) that exist on a landholding and how they change over time. For other environmental impacts (e.g. GHGs) determining the type and quantity of emissions and discharges (e.g. developing an inventory of GHG emissions).
	6	Indicators	Involves using physical units, indicators and indices for assessing NC and other environmental impacts (e.g. pollutants).	Covering a wide range of potential NC and environmental impact parameters using quantitative measures, which can be particularly useful for comparing alternative options and for reporting purposes. The metrics can be compared between options and years, but the disadvantage is that they are non-comparable between parameters.

Category	No.	NCA for business approach	Description	What is this approach good for?
Set of accounts for reporting	7	Env. Profit & Loss Account (full cost accounting)	Applies societal monetary values to company NC and other environmental impacts along the value chain. It is a form of full cost accounting, which can be applied from product to company level.	Assessing the relative scale of costs and benefits to stakeholders in monetary terms associated with NC and other environmental impacts. This is particularly useful for helping to focus where risks are, improvements should be made, and for assessing net impacts.
	8	Env. Balance Sheet (full cost accounting)	Includes information (physical and/or monetary values) on the NC assets typically owned or managed by a company on landholdings. It is a form of full cost accounting at a site or corporate level.	Determining the nature, extent and value of NC assets a company owns/manages on its land, and how this changes each year.
	9	Env. Financial Accounting - Env components	Involves including and specifying financial components of a conventional financial profit & loss account and balance sheet that directly or indirectly relate to NC and other environmental impacts.	Determining the actual financial implications to a company of NC and other environmental impacts in terms of assets, liabilities, profits and losses.
	10	Env. Financial Accounting - Site management costs	Involves assessing the financial cost implications of maintaining NC (i.e. habitats, species and ecosystem services) to a certain quality that are under company ownership or management on landholdings.	Determining what the future financial cost (liability) is for a company if they are to maintain the NC they own or manage in good condition in the coming years.
	11	Integrated Financial NCA & reporting	Involves including physical units as well as societal and financial values within a fully integrated set of balance sheets and profit & loss accounts.	Comprehensively accounting for all company impacts and dependencies using a mix of physical, societal value and financial metrics, and reporting changes in stocks and flows of value on an annual basis.

Note: NC = natural capital; Other environmental impacts = pollutants/residuals such as air emissions and waste

5 Decision-matrix Selection Method

This section builds on Section 4 by introducing a more detailed Decision-matrix tool developed to add greater granularity to the selection process. The tool is interactive and can be found in a separate Excel worksheet (on the EU B@B website). However, the matrix is also displayed in this Guide (See Tables 5.1 and 5.2) and can be used directly through visual interpretation.

The Decision-matrix Method starts with two 'Initial Questions' to test if you are ready to apply the tool. Having passed this hurdle, the matrix tool links the 11 NCA approaches identified in Section 4 to seven 'Main Questions'. These questions are set out in the text below, with an explanation of the response options shown in the matrix tool. By answering some or all of the questions, you can narrow down the options to identify a preferred NCA approach that most suits your requirements.

5.1 How to apply the Decision-Matrix

You should start by answering the two 'Initial Questions' to determine if you are ready to proceed with the Decision-matrix tool. If ready, you can then answer some or all of the seven Main Questions. There is no right or wrong question order or number of questions that must be answered. Options for the order of Main Questions include:

- Select the questions in the order that seems most relevant to you.
- Start at question 1 and progress through to question 7.
- Use the guidance in Box 8 to focus on which questions to answer depending on the main aim of your selection.

Based on the responses to each question, use the Decision-matrix tool to filter out NCA approaches not relevant (i.e. the cell is blank), or not so relevant (the cell has a 1 in it) compared to those that are most relevant (the cell has a 2 in it). This is done using the Excel filter function and de-selecting the blanks and the 1s. It may be best to just filter out the blanks for each question first, or you can filter out 1s as well. Use your own judgement.

Additional questions can then be selected and the same process applied to filter out other NCA options. This can be applied as many times as you want for different questions and sub-questions. You should end up with a narrowed down selection of NCA approaches after answering each question.

Because the responses are numbered (i.e. with a 1 or 2), you can also add up scores if desired to help rate and rank the NCA options.

Box 8 Additional guidance on the order to answer questions

The following are a few select examples of different potential aims for NCA, with guidance to help you focus upon which questions should be asked and in what order:

1. **How can we better understand our dependencies on NCA?**
First answer Qu 1, then 4iv, then try 2 and 3B iv and then any others you have an opinion on.

2. **How can we better understand our impacts on NC/biodiversity?**
First answer Qu 1, then 4iii, then try 2 – and then any others you have an opinion on

3. **How can we best report on biodiversity/NC for our shareholders?**
First answer Qu 3Ai, then 2 and then any others you have an opinion on

4. **How should we calculate the financial impact of the project we have to offset?**
First answer Qu 5 iv then 3Biv

5.2 The Initial Questions

Before applying the NCA Decision-matrix tool, the following two questions should be answered:

Qu 1: Do you generally understand what your company's direct and indirect impacts and dependencies are on biodiversity and the environment? This may, for example, be through discussion with an expert or having already completed some form of NC impact and dependency assessment, such as the Ecosystem Services Review, or some form of high-level environmental assessment.

If '**Yes, fairly well or fully**': Go to Qu 2.

If '**Somewhat or No**': Consider exploring this question with an expert or undertake a high level combined dependency and impact assessment (i.e. as covered by NCA approaches 1 and 2). Once you have a better understanding, then return to the Decision-matrix and select any of the seven Main Questions.

Qu 2: Do you have a specific scope or problem to apply the Decision-matrix to? Piloting has shown that it is important to have a specific and agreed scope or problem to be solved.

If '**Yes**': Then make sure it is written down and understood by team members. Now go to the Main Questions.

If '**No**': Spend more time trying to define a problem and when written down and agreed, then go to the Main Questions.

5.3 The Seven Main Questions

First decide which order to answer the questions (see 5.1 above for advice), and then begin to answer them. For each question, use the filter function in Excel to narrow down potential NCA approaches. Then select another relevant question, or sub-question option, and use the filter function again, and so on. Stop when you have identified one or just a few NCA approaches to take forward.

1. **What aspect of the business do you want to target for analysis?**
   Select one or more response options if considered appropriate.

   i. **Products or set of products.** The assessment is focussed on a product (e.g. .a car) or part of a product (e.g. component of a car).

   ii. **Projects or an operational site.** Note that it is important to select the appropriate spatial scale for such assessments. This should cover the overall 'area of influence' of a project. This requires thinking about the 'socio-ecological system' (i.e. interactions between the business, ecosystems and people potentially affected).

   iii. **The company or a business unit.** The assessment would focus on the company or business unit's main locations and direct activities.

   iv. **The value chain, or part of it, which can include upstream (i.e. suppliers) and/or downstream (i.e. consumption and disposal).** This may be a product, project or company value chain – assessing issues associated either up or downstream, or both.

   v. **A region/landscape that the business is in.** This may be an international region (e.g. Central America), a country, part of a country, a river catchment/watershed or simply s relatively small area that a business operates in. This type of assessment investigates natural capital and environmental impacts in a broader area (socio-ecological system) than just where a company's environmental footprint is. The assessment is likely to be for more

strategic purposes and could for example help identify areas/countries to operate or invest in (or avoid), for marketing/reputational purposes or to help inform government policy or potential payments for ecosystem services etc.

Box 9 Codorníu's pilot decision-matrix application

This box shows the results of the one of Codorníu's pilot applications of the decision-matrix highlighting how each question was answered.

Problem: What is the impact on biodiversity in Penedès region derived from our strategy of biological fight against Lobesia botrana, as opposed to chemical fight?

1) What business aspect do you want to target for analysis?

v) Region/landscape (delete blanks)

2) What is the business aspect's main relationship to natural capital & environmental issues?

iii) Indirect, along value chain (delete 1s)

3) What is your company's main intended use of implementing NCA?

B) For internal purposes

iii) Supply chain management (delete 1s)

4) What element of NC are you interested in assessing?

iii) Impacts on NC (biodiversity) (delete blanks)

5) What units of measurement are you most interested in considering?

iv) Monetary (Externalities) (delete 1s). We are now left with just CEV

6) To what extent do you want to limit resources to undertake the NCA?

Full effort (no need to delete any)

Result: Use NCA approach 4) CEV/Full cost accounting

The two pilot applications we undertook raised a few interesting points:

- Participants involved in applying the decision-matrix tool can have a significant influence on the answers selected, for example whether they are an agriculturist, ecologist or accountant. It can be difficult to answer some questions without an expert view.
- The "problem to be solved" needs to be very specifically defined and written down in order to have all the participants bear in mind what specific problem you want to solve. When applying the questions, the debate may also generate an iterative process that makes individual's positions clearer, requiring refinement of what the problem is.

2. **What is your business aspect's main relationship to natural capital (functioning ecosystems) and environmental issues?** Answer one or more options. If ALL three options are equally relevant, ignore this question.

   i. **Directly through landholdings/ownership of land.** Your company is likely to affect natural capital directly through landholdings where biodiversity may be affected.

   ii. **Directly but not on your own land.** Your company does not own the land, but is likely to have direct natural capital and environmental dependencies and impacts on land (for example a manufacturing site causing pollution nearby or a tourism operator that depends on an attractive landscape).

iii. **Indirectly through the value chain.** Your company is most likely to have impacts and dependencies along your value/supply chain.

3. **What is your company's main intended use of implementing NCA?** You may select as many of these columns as you want from A and B (i.e. the answers are not mutually exclusive), but do try to focus on just one or a few.

A) For external applications (i.e. mainly for using to inform shareholders and stakeholders)

i. **Corporate reporting and disclosure**. NCA can inform reporting of corporate activities of relevance to shareholders, the investment community and wider stakeholders, especially with a move towards Integrated Reporting.

ii. **To include in financial reporting**. NCA can inform the extension of financial accounts to incorporate environmental elements.

iii. **Evaluating 'shared value' and/or 'net impacts'**. Increasingly there is a trend towards companies demonstrating the creation of shared value (i.e. creating not only financial value for shareholders but also societal value for stakeholders), and companies generating a positive net impact in relation to say biodiversity, water, the environment and/or social impacts.

iv. **Compliance**. Elements of NCA may be necessary to comply with regulations, such as Environmental Impact Assessments as part of a permitting process.

v. **Labelling**. This could be a form of corporate labelling (e.g. in terms of ISO 14000 and ISO 26000) or product labelling/certificates.

vi. **Mergers and acquisitions (M&A)/Environmental and Social Governance (ESG)**. NCA has considerable potential for helping assess a more complete value of companies targeted for mergers and acquisitions, by taking into account potential NC related risks and opportunities. Similarly it can help the investment community evaluate ESG criteria in a more rigorous way in relation to investment decisions and advice.

vii. **Payments for Ecosystem Services (PES)**. Some NCA approaches can help inform companies in different aspects relating to either themselves or others developing PES schemes. These can for example involve charging people/business for ecosystem benefits they receive at a site (e.g. tourism related) or paying people/businesses to undertake (or not to) certain activities in one location which will benefit people/businesses elsewhere (e.g. to improve water quality and flows). Different NCA approaches can feed into determining the suitability of, and appropriate level of payments.

B) For internal applications (i.e. to inform internal company decision-making)

i. **Identifying risks and opportunities.** NCA can help identify a range of risks and opportunities that can be used to inform internal management decisions, for example relating to scarcity of resources and new pricing regimes.

ii. **Comparing options – trade-offs (e.g. capital investments/infrastructure appraisals).** NCA can inform decisions in relation to selecting between alternative options through assessing trade-offs, in particular alternative capital investment options, for example, comparing the potential for green/natural infrastructure instead of man-made infrastructure.

iii. **Supply chain management.** NCA can inform sourcing, procurement and management of suppliers based on their natural capital footprint credentials and risks of supply chain disruption, for example through changes in ecosystem service flows, climate change impacts and resource over-exploitation.

iv. **Land management.** NCA can involve assessing the value of 'idle' lands in terms of what ecosystem services exist and to help justify investments towards maintenance or restoration.

v. **Other internal management purposes.** NCA can be used to inform many other internal management considerations. This includes for example product pricing, product design, marketing strategies, management actions and monitoring programs.

vi. **Strategic applications/prioritisation.** NCA may also be used for a variety of strategic purposes that includes, for example, prioritisation of sustainability/CSR actions, differentiating from competitors, anticipating regulations, developing innovative solutions etc.

4. **What components of natural capital and the environment are you interested in assessing?** Feel free to screen using one, more or all responses. If including multiple approaches (i.e. several of the below options) try only de-selecting 'blanks'.

i. **Assets/stocks of living natural capital (i.e. ecosystems, plants, animals and genes)**. This is effectively the physical natural asset base, which includes ecosystems (habitats), plants, trees, animals and genes. This represents the asset base from which benefits/values arise (i.e. ecosystem services as dealt with below). It should include assessing at a minimum the 'quantity' (extent) and 'quality' (condition) of the stock, and potentially the cost of maintaining it in good condition.

ii. **The benefits/values from living natural capital (i.e. ecosystem services)**. This represents the actual benefits or values (i.e. ecosystem services) arising from (flowing from) the physical stock of biodiversity assets.

iii. **Impacts on living natural capital**. This covers impacts the company has on the stocks of, and potentially the flows of benefits from, biodiversity assets. In particular this would include land conversion and over-extraction of resources. It may also include impacts from pollutants too.

iv. **Dependencies on living natural capital**. This covers the dependencies that the company has, whether directly or indirectly, on the stocks of, and flows of benefits arising from, biodiversity assets.

v. **Non-living natural capital (minerals and abiotic services)**. Company impacts and dependencies on these type of assets and services are excluded from this Guide.

vi. **Other environmental impacts (e.g. pollutants/residuals)**. This covers all other environmental impacts associated with pollutants/residuals such as GHGs, air emissions, noise and waste. These may affect natural capital but they also impact upon other capitals, including human, social and manufactured capital.

5. **What form of measurement are you most interested in considering?**
Select one, two or three column options depending on how many forms of measurement you want included. Note that you may not know at the outset if monetary valuation is the right option. Sometimes it is best to start with undertaking qualitative or quantitative approaches and then decide that monetary valuation may further help in decision-making.

   i. **Qualitative.** This is typically descriptive, or may be in the form of a rating (e.g. high/medium/low) or a binary measure (e.g. 'is all timber procured from FSC sources?' which requires an initial yes/no answer). Qualitative rating levels may apply to 'risk', 'significance', 'materiality', or 'value', and must be explicit as to what they refer to. Binary measures can then be useful for targeting efforts, for example impact assessments can be concentrated on non-Forestry Stewardship Council (FSC) procured wood, as opposed to FSC certified wood. Advantages of qualitative assessments are that they are easy and cheap to establish and extremely useful for comparing options. However, the disadvantages are that they are often subjective and are difficult to calibrate, aggregate & standardize in terms of reporting across time and between different organisations.

   ii. **Quantitative.** These are typically in physical units (m^2, hectares, tons etc.), although they may also be terms of indicators (e.g. m^3 per ton of product or 'indicator-species' representing the health of a habitat), or complex indices (e.g. Shannon-Weaver Index indicating the level of wildlife diversity). Units may reflect quantity and quality, and for species, could include levels of rarity (e.g. endangered or endemic). Advantages are that physical metrics are useful for standardized reporting but they need to be selected with care, and often different organisations use totally or slightly different metrics making comparisons challenging. A major disadvantage of single aggregated quantitative metrics is that they have little meaning in any other related context, for example, in relation to financial outcomes. Regulators will need to develop a consistent set of rigorous quantitative metrics that can be used by business for NCA.

   iii. **Monetary Values.** Monetary valuation simply means converting an impact, dependency or asset (e.g. a forest or wetland) into a monetary value whether it is in dollars, Euros, or other currency. Note that some expenditure related values may be included in this approach, but for a fully 'expenditure' focussed approach, see (iv) below. An advantage of using monetary values is that it results in a useful and consistent metric (money), which allows aggregation of impacts into a single well-understood metric that allows comparison. However, disadvantages include the fact that valuations for some impacts are not always reliable or possible, they can be relatively costly to assess with any degree of accuracy, and different approaches may result in different estimates of monetary value. See Box 10 for more details.

   iv. **Expenditures.** The focus here would be entirely on actual or potential company expenditures relating to natural capital and pollutants.

6. **Whose perspective are you most interested in?**
Select one or both columns and select 1s or 2s depending on how important that perspective is.

   i. **Stakeholders/Society.** These analyses assess impacts and dependencies from an external stakeholder or societal/public value perspective (i.e. what it will cost society). As such, the company considers the impact on others, which may in turn affect how the company makes decisions that ultimately affect its bottom-line. Impacts to external stakeholders that do not directly affect a company are known as **'externalities'**. Such impacts can be assessed qualitatively,

quantitatively or in monetary terms, with various valuation techniques having evolved to help determine the latter (see Box 10 for a further discussion).

ii. **Shareholders/Company.** These analyses assess impacts and dependencies from an internal company and shareholder or financial/private value perspective (i.e. what it will cost the company). Such values are more commonly measured in monetary terms based on market values or financial costs incurred by companies. For example, this includes direct values such as actual water charges, environmental fines and taxes, and loss of manufacturing productivity due to a lack of water. It also includes indirect values such as a reduced share price due to an adverse impact affecting the company's reputation. The advantage of focusing on these is that financial values are of more immediate relevance to shareholders. A disadvantage is that financial values do not reflect the full value of costs that a business may have on society and stakeholders.

Box 10 Discussion on societal/externality values

Societal (externality) values

These are values that affect stakeholders outside of the business (i.e. they are 'externalities' or 'economic' or 'public' values). They can be usefully split into direct use values (e.g. food and recreation), indirect use values (e.g. storm protection and carbon sequestration) and non-use values (e.g. protecting iconic and rare species). The latter relate to more theoretical 'willingness to pay' values people may have for maintaining biological assets (e.g. species or habitats) that they may not necessarily use. Societal values closely overlap with well-being values, and it is not always possible to place a monetary value on them. They not only relate to natural capital but also to changes in human health (i.e. affecting human capital) and to buildings (i.e. affecting manufactured capital), for example through environmental impacts (residuals) such as air emissions and dust. Societal values are typically stated either as qualitative or monetary values.

Advantages of monetising environmental impacts

Monetary valuation provides a universal means to compare differing impacts on the environment such as water use, waste, GHG, air and water pollution and land use. It also provides a means to compare business units, companies and industry sectors using a common scale. Finally it translates environment impacts (and additions or loss of natural capital) into business and economic terms through valuation in common currencies (e.g. euros) that are universally recognized in the business/financial/governmental world.

In addition, monetization takes into account the differences in relative value of ecosystem services in terms of geographic differences. For example, a litre of fresh water has a higher value in a water stressed area with high human needs for fresh water or biodiversity dependencies versus an area with plentiful fresh water and low dependencies.

Problems associated with monetary valuation

It is important to recognise the difficulties and dangers of going down a monetary valuation approach for biodiversity. NCA is NOT about 'privatizing' nature, although potential unintended consequences may arise and need to be considered (e.g. private companies purchasing large tracts of land). Determining accurate estimates of monetary values can be challenging, in particular for some regulating services where data is poor, and for some cultural services, especially relating to aesthetic and spiritual values. Correct calibration of monetary values for some aspects of biodiversity is inherently difficult, especially relating to species and habitat values.

The need for a standardised protocol

Although a number of environmental valuation techniques exist (see WBCSD, 2011), there is need for an international protocol to encourage standardised monetary valuation of natural capital. Indeed, this is the remit of the Natural Capital Coalition (see NCC, 2014a). However, until that is developed (or perhaps even then), there will be a risk of under or overvaluation – potentially encouraging wrong behaviours. The current problem is that with today's relatively limited understanding of natural capital's societal values, current risks are far greater.

7. **To what extent do you want to limit the resources (e.g. time, budget and skills) to undertake the NCA approach?**
   Ignore the question if resource constraints are not an issue at all.

   The Decision-Matrix highlights those NCA approaches that require a relatively modest level of resources to undertake (2), somewhat more (1) and a great deal of resources (blank). However, note that any approach can be undertaken relatively briefly/crudely or in great detail. Involving experts can also potentially significantly reduce the time and costs needed (particularly if professional judgement and/or 'value transfer' approaches are used). Those NCA approaches with a blank generally require more management & expertise to conduct, whilst those with a score of 1 do to a lesser extent.

Box 11 EDF pilot: Which NCA approach could help refine the biodiversity strategy of a power production site?

Considering ecosystems and their interaction with corporate activities is becoming vital for businesses - not just for regulatory reasons but also because of businesses' dependencies on functioning ecosystems. This document guides companies in the growing "natural capital tools jungle" in order to help them integrate their inter-relationships with nature in their decisions.

The matrix tool was tested by EDF to answer the following question: "Which tool or approach could help us to build a strategic action plan for biodiversity at a power production site?" Our aim was to achieve a strategic action plan that would be consistent with the biodiversity and ecosystem services impacts and dependencies at the site (as previously identified through undertaking an Ecosystem Services Review) and proportionate with the corresponding stakes. Having answered the 6 questions, two categories of approaches were suggested by the matrix i) risk/opportunity and ii) valuation. The final selection has yet to be made because we are not yet familiar enough with the methodologies and tools referenced by the matrix and supporting tables. Further investigation is required.

This initiative helps paves the way for businesses to better take biodiversity and ecosystem services into account in their decision-making. However, further improvement/development of the tool and additional guidance on the proposed methodologies and tools would really add further value. Additional feedback from other companies using the decision-matrix could also usefully help inform future versions of the tool.

Table 5.1 The NCA Decision-matrix tool (first 3 Main Questions)

Cat-egory	No.	NCA Approach	1) What business aspect do you want to target for analysis?					2) What is the business aspect's main relationship to NC (functioning ecosystems) & environmental issues?			3) What is your main intended use of implementing NCA?												
								Direct		Indirect	A) For external purposes							B) For internal purposes					
			i) Product	ii) Project/ site	iii) Company	iv) Value chain	v) Region/ landscape that business is in	i) Through ownership of land	ii) Direct footprint - but on other's land	iii) Along the value chain	i) Corp report-ing	ii) Financial report-ing	iii) Shared values/ net impcts	iv) Comp-liance	v) Labell-ing	vi) M&A/ ESG	vii) PES	i) Risks & opps	ii) Comparing options - trade-offs (e.g. capital investments)	iii) Supply chain manage ment	iv) Land manage-ment	v) Other internal manage ment	vi) Strategic/ prioritise
Type of assessment - for decision-making	1	Dependency	2	2	2	2	2	2	2	2	1		1	1	1	2	2	2	2	2	2	2	2
	2	Impacts	2	2	2	2	2	2	2	2	1		2	2	2	2	1	2	2	2	2	2	2
	3	Risk/opportunity & materiality	2	2	2	2	2	2	2	2	2	1		1	1	2	1	2	2	2	2	2	2
	4	Valuation (full cost accounting)	2	2	1	2	2	2	2	2	1	1	2	1	1	1	2	2	2	2	2	2	2
Both	5	Inventory		2	2		1	2	1	1	2		1	1	1	1	1	1	1	1	2	1	1
	6	Indicators	2	2	2	2	2	2	2	2	2		2	1	2	1	1	2	2	1	1	2	2
Set of accounts - for reporting	7	E Profit & Loss	2	1	2	2		2	2	2	2	2	2		2	2		2		2		2	2
	8	E Balance Sheet		2	2			2	2		2	2				2	1	2	1		2	1	1
	9	E Financial Accounting - Env components		1	2			2	2	2	1	2				2		2				1	2
	10	E Financial Accounting - Site management costs		2	2			2			1	2				2	2	2	2		2	1	1
	11	Integrated Financial NCA & reporting	1	2	2	2		2	2	2	2	2	2		1	2		2		2	1	2	2

Key: 2 = Very important/relevant; 1 = Quite important / relevant; Blank = not important / relevant (However this is generic only and there will be exceptions)

Table 5.2 The NCA Decision-matrix tool continued (Main Questions 4 - 7)

Cat-egory	No.	NCA Approach	4) What component of NC & the environment are you most interested in assessing?						5) What form of measurement are you most interested in considering?				6) Whose perspective are you most interested in?		7) To what extent do you want to limit resources to undertake the NCA?
			Living natural capital (LNC) (i.e. biodiversity)				Non-living Nat Capital (NLNC) (abiotic - minerals, wind energy)	Other environ-mental impacts							
			i) Assets/ stocks of LNC (i.e. ecosystems, plants, animals, genes)	ii) Flows of benefits from LNC (i.e. ecosystem services)	iii) Impacts on LNC (on assets & benefits)	iv) Depen-dencies on LNC (assets & benefits)	v) Impacts & dependencies on NLNC (abiotic) assets and flows of benefits	v) Other env impacts (e.g. pollutants/ residuals such as GHGs & waste)	i) Qual-itative (e.g. high/ med/ low)	ii) Quant-itative (physical units/ indices)	iii) Monetary values (impacts, depend-encies etc in money terms)	iv) Expend-itures (only actual amounts of money paid)	i) Stake-holder/ Society (public/ externality) values	ii) Share-holder/ company (financial/ private) values	
Type of assessment - for decision-making	1	Dependency	2	2		2			2	1	2	1	1	2	2
	2	Impacts	2	2	2			2	2	2	1	1	2	2	1
	3	Risk/opportunity & materiality	2	2	2	2		2	2	2	1	1	2	2	1
	4	Valuation (full cost accounting)	2	2	2	2		2	2	1	2	2	2	2	1
Both	5	Inventory	2	2	2	2		1	1	2	1	1	2	1	
	6	Indicators	1	1	2	1		2	1	2	1	1	2	1	2
Set of accounts - for reporting	7	E Profit & Loss			2	2		2		1	2		2	1	
	8	E Balance Sheet	2	2	1	1				1	2		2	1	
	9	E Financial Accounting - Env components	1		2			1				2	1	2	1
	10	E Financial Accounting - Site management costs	2			1						2	1	2	1
	11	Integrated Financial NCA & reporting	2	2	2	2		2		2	2	1	2	2	

Key: 2 = Very important/relevant; 1 = Quite important / relevant; Blank = not important / relevant (However this is generic only and there will be exceptions)

5.4 What next?

By applying the tool filter to the above questions, you should end up with one or two potential NCA approaches. If not, go back and play around with the selection/de-selections of 1s until you have narrowed down the options.

Once you have decided on one or more potential approaches move on to Section 6 to identify potential guidelines and tools to refer to. The list of guidelines and tools is not exhaustive and may require you to do some additional research, but it at least provides a useful starting point. Subsequent B@B NCA workstream outputs may provide additional guidance on the available guidelines, tools and potentially case studies too.

As part of this process you should establish whether you have the appropriate in-house skills to proceed internally or whether you need to additional external expertise or advice to implement your selected approach.

It may also be important to build a business case to justify to others in your company why you should implement the NCA approach. As part of this you may also establish what resources and data are required, and put in place a strategy for implementation.

For documentation purposes, you may wish to adapt the tool by hiding those columns not relevant to the selection (with the filter switched off) to leave the relevant columns and numbers on display.

Finally, it is important to be aware that this Guide and Decision-matrix tool just represents an initial attempt at helping companies select an NCA approach. There is plenty of scope in the future to update the Guide and decision-matrix tool and information on available guidelines and tools.

6 Guides and tools

This Section identifies a selection of relevant guidelines and tools available for each NCA for business approach. This analysis has not been a major part of this study. It is anticipated that in due course the tables could be expanded, improved upon and updated over time, as new guidelines are published and new tools developed.

For each NCA approach, Table 6.1 suggests some general guides (split by general coverage, products, projects/sites, value chain and company levels) and sector specific guides to assist implementing the approach. Table 6.2 then suggests some example tools that could be used for each NCA approach.

The Tables are not exhaustive, and are based on just a brief review of what is available. In particular they draw upon on some of the guides and tools identified and explained in WBCSD (2013) 'Eco4Biz: Ecosystem services and biodiversity tools to support business decision-making'; Natural Capital Coalition (2014b) 'Valuing natural capital in business: Taking stock: Existing initiatives and applications; and Jones (2014) 'Accounting for biodiversity'.

It is important to note that some companies prefer to develop and use their own bespoke tools for NCA. These can be relatively cost-effective to develop and tend to be more closely aligned to other internal company tools, data collection and criteria used to inform internal decision-making. However, they must be developed by people with an appropriate level of expertise, as it is a complex topic. Furthermore, if the results are to be used externally, some form of verification is likely needed to add credibility.

Table 6.1 Summary of example guides

Category	No	NCA for business approach	Useful general guides				Useful sector guide
			Products	Project/site	Value	Company	
Type of assessment - for decision-making	1	Dependency	WRI – Corporate Ecosystem Services Review				- IPIECA Ecosystem Services Guidance for oil & gas - CEFIC Biodiversity and Ecosystem Services guide for chemicals industry
						- Business & Biodiversity Interdependence Indicator - Natural Value Initiative - Ecosystem Services Benchmark	
	5.	Impacts	Corporate biodiversity management				
			- EU Product Environmental Footprint - Life Cycle Assessment: ISO 14040 & 14044. - IBIS	- National Environmental Impact Assessment guidelines, - Convention on Biological Diversity guide to biodiversity in ESIAs, - IFC Performance Standards (PS) (especially PS6), - Defra Offsetting metrics guide		EU Organisation Environmental Footprint	- WBCSD Cement industry environmental and social impact assessment (ESIA) guide - IPIECA Ecosystem Services Guidance for oil & gas
	3	Risk/opportunity & materiality	- WRI – Corporate Ecosystem Services Review				IPIECA Ecosystem Services Guidance for oil & gas
	4	Valuation (full cost accounting)	- Natural Capital Protocol WBCSD Guide to Corporate Ecosystem Valuation (CEV), - WBCSD Business Guide to Water Valuation, - International Federation of Accountants (IFAC) Environmental Management Accounting, - IMA (1996) Tools and Techniques of Environmental Accounting for Business Decisions. - GNF How companies value natural capital				- WBCSD Business Guide to Water Valuation. - Apparel/textiles and food/beverage guides being developed by NCC. - USA's Net Environmental Benefit Assessment – for oil contaminated sites
				- Defra guide to value ecosystem services,			
Both	**5**	Inventory		- Natural Inventory Approach (NIA), - UN System of Environmental-Economic Accounts (SEEA) - Central Framework, - UN SEEA - Experimental Environmental Accounts (EEA).		- Natural Inventory Approach (NIA), - UN System of Environmental-Economic Accounts (SEEA) - Central Framework, - UN SEEA - Experimental Environmental Accounts (EEA).	

Category	No	NCA for business approach	Useful general guides				Useful sector guide
			Products	Project/site	Value	Company	
	6	Indicators		- UN SEEA - Experimental Environmental Accounts (EEA). - GRI G4 Reporting, - Streamlining European Biodiversity Indicators (SEBI) 2010 Biodiversity Indicators - Carbon Disclosure Project (CDP) - Biodiversity Indicator Partnership BIP Indicators		- UN SEEA - Experimental Environmental Accounts (EEA)., - GRI G4 Reporting, - Streamlining European Biodiversity Indicators (SEBI) 2010 Biodiversity Indicators, - Carbon Disclosure Project (CDP) - Biodiversity Indicator Partnership (BIP) Indicators	- Various GRI sector guidelines,
Set of accounts - for reporting	7	Env. Profit & Loss Account (full cost accounting)	PUMA/Kering Environmental Profit & Loss Account GNF How companies value natural capital				
	8	Env. Balance Sheet (full cost accounting)		- Normative biodiversity metric - WBCSD Guide to Corporate Ecosystem Valuation, UK's Defra is developing an approach		- Normative biodiversity metric - WBCSD Guide to Corporate Ecosystem Valuation, - UK's Defra is developing an approach	
	9	Env. Financial Accounting - Env components		- ACCA/KPMG/FFI report, - UN SEEA - Central Framework, - UNCTAD Guidance Manual: Environmental and financial reporting for environmental costs and liabilities.		- ACCA/KPMG/FFI report, - UN SEEA - Central Framework, - UNCTAD Guidance Manual: Environmental and financial reporting for environmental costs and liabilities.	
	10	Env. Financial Accounting - Site management costs		UK's Defra is developing an approach		UK's Defra is developing an approach	None yet
	11	Integrated Financial NCA & reporting		Houdet et al (2014) What natural capital disclosure for integrated reporting? Designing & modelling an Integrated Financial – Natural Capital Accounting and Reporting Framework.		Houdet et al (2014) What natural capital disclosure for integrated reporting? Designing & modelling an Integrated Financial – Natural Capital Accounting and Reporting Framework.	None yet

Table 6.2 Example potentially useful tools

Category	No	NCA for business approach	Potentially useful tools
Type of assessment - for decision-making	1	Dependency	- BESMetrics (Biodiversity and Ecosystem Services) - Business & Biodiversity Interdependence Indicator, - EBBC Biodiversity Check, - WRI – Corporate Ecosystem Services Review,
	2	Impacts	- BESMetrics (Biodiversity and Ecosystem Services) - Business and Biodiversity Offsets Programme (BBOP) Standard, - - EBBC Biodiversity Check - Ecologically based Life Cycle Assessment (ELCA), - EcoMetrix, Eco-Synergy, - Environmental Risk, Opportunity and Valuation Assessment (EROVA), - Integral Biodiversity Impact assessment System (IBIS), - Integrated Biodiversity Assessment Tool (IBAT) - NatureServe Vista, - ReCiPe, - SIMA Pro, - Total Contribution, - Total Impact Measurement & Management (TIMM),
	3	Risk/opportunity & materiality	- Biodiversity Risk Opportunity Assessment (BROA), - EBBC Biodiversity Check - Environmental Risk, Opportunity and Valuation Assessment (EROVA), - Natural Capital Analyzer, - Local Ecological Footprinting tool (LEFT) - WBCSD Biodiversity in the Global Water Tool, - WRI Corporate Ecosystem Services Review
	4	Valuation (full cost accounting)	- ARtificial Intelligence for Ecosystem Services (ARIES), - BP SAM (Sustainability Assessment Model) - Co$ting nature - E.Valu.A.Te, - Environmental Risk, Opportunity and Valuation Assessment (EROVA), - Integrated Valuation of Environmental Services and Tradeoffs (InVest), - Green Infrastructure Valuation Toolkit (GIVT), - Multi-scale Integrated Models of Ecosystem Services (MIMES), - NatureServe Vista, - SERVES, - TESSA
Both	5	Inventory	- Environmental Risk, Opportunity and Valuation Assessment (EROVA), - Integrated Biodiversity Assessment Tool (IBAT) - Natural Inventory Approach (NIA),
	6	Indicators	- Business and Biodiversity Interdependence Indicator - Carbon Disclosure Project (CDP), - GRI G4 Reporting, - LIFE Methodology. - Natural Value Initiative
Set of accounts - for reporting	7	Env. Profit & Loss Account (full cost accounting)	- Estell, - Natural Capital Analyzer, - Natural Capital Management System - PUMA/Kering Environmental Profit & Loss Account, - Total Contribution, - Total Impact Measurement & Management (TIMM), - TruePrice, - True Value
	8	Env. Balance Sheet (full cost accounting)	- Natural Inventory Approach (NIA). - Normative Biodiversity Metric,
	9	Env. Financial Accounting - Env components	None yet
	10	Env. Financial Accounting - Site management costs	None yet
	11	Integrated Financial NCA & reporting	None yet

7 Process for adopting NCA approaches

7.1 Introduction

There is no single right way for companies to go about determining what form of NCA approach they should be using. Some suggested steps are included below that may be of use to companies in conjunction with using the High-level and/or Decision-matrix NCA selection methodologies.

7.2 The Four Step Process

Step 1 – Review natural capital and environmental relevance

Start by reviewing the relevance and significance of natural capital and environmental issues (e.g. residuals) for your business. This can be achieved using some form of high-level dependency and impact assessment approach. In doing so, companies may wish to add an element of consideration of risks and opportunities and their potential materiality. This approach could initially be applied to a single project or product (or selection of), or to the business as a whole.

Step 2 - Build on existing company approaches

Based on the outcome of Step 1, consider how existing company approaches can be adapted to include key NC and/or environmental residuals to inform decision-making and/or reporting. A natural progression may take the form of the following:

i. Identifying impacts and dependencies

ii. Developing an inventory

iii. Qualitative valuation

iv. Quantitative assessment

v. Evaluate risks and opportunities

vi. Monetary valuation

Step 3 - Experiment with new NCA approaches

If there is a potential NCA approach that looks promising for your requirements, consider piloting the approach on a project or product (or selection of). You may wish to adopt an approach and tool already tried and tested by others, or it may be worthwhile developing your own bespoke approach that suits your specific context. However, if you attempt the latter make sure you involve appropriate expertise, as it is a highly complex topic.

Step 4 - Implement and embed the NCA approach

Once comfortable with an NCA approach, you may want to further test it and then roll it out wider within your company. Ultimately you should ideally embed it within your company processes. You may also wish to promote the approach more widely for other companies to adopt too (as PUMA has done for the EP&L).

8 Recommendations for Phase 2

A number of potential study options for Phase 2 of the NCA workstream to address were identified, which included:

1. Converting this technical document into a simpler, shorter glossy document.
2. Reviewing and analysing available guidelines, tools and examples for alternative NCA for business approaches. This would also effectively expand on and improve Tables 6.1 and 6.2.
3. Mapping business NC valuation applications compared to how governments and policy makers use NC valuation (e.g. for taxes, PES, land use planning and zoning).
4. Exploring the role of and value to be gained from reporting on company expenditures on managing natural capital – in particular maintaining and restoring habitats.
5. Investigating how NC impacts and values can be better linked into LCA.
6. Exploring further the concept of E balance sheets (i.e. for land holding companies, and those that have major suppliers with large landholdings).
7. Investigating the extent that investment-rating agencies are considering how companies adopt NCA approaches.

Based on an opinion poll, options 2 and 3 were considered by the NCA Full Members as the most popular for taking forward.

References

A4S (in press) Environmental and Social Accounting: A Guide for Financial Decision-making. The Prince's Charities Accounting for Sustainability Project.

BBOP (2009) Principles on biodiversity offsets. The Business and Biodiversity Offsets Program.

CICES (2013) Common International Classification of Ecosystem Services.

Drury (2001) Management Accounting for Business Decisions. Thomson 2nd Edition. pp560.

EU (2011) EU Biodiversity Strategy to 2020.

GRI (2013) G4 Sustainability Reporting Guidelines. Global Reporting Initiative.

Houdet, J., Burritt,R., Farrell, K. N., Martin-Ortega, J, Ramin, K., Spurgeon, J., Atkins, J., Steuerman, D., Jones, M., Maleganos, J., Ding, H., Ochieng, C., Naicker, K., Chikozho, C., Finisdore, J., and Sukhdev, P. 2014. What natural capital disclosure for integrated reporting? Designing & modelling an Integrated Financial – Natural Capital Accounting and Reporting Framework. Synergiz–ACTS, Working Paper 2014-01, 62 p.

IIRC (2013) The International Integrated Reporting Framework. International Integrated Reporting Council.

IFAC (2005) Environmental Management Accounting. International Guidance Document. International Federation of Accountants, New York. pp87.

Institute of Management Accounting (1996) Tools and Techniques of Environmental Accounting for Business Decisions

Jones (ed) (2014) Accounting for Biodiversity. Routledge. pp 304.

Landers & Nahlik (2013) Final ecosystem goods and services classification system (FEGS-CS).. Report to the US Environmental Protection Agency.

Maes J, Teller A, Erhard M, Liquete C, Braat L, Berry P, Egoh B, Puydarrieux P, Fiorina C, Santos F, Paracchini ML, Keune H, Wittmer H, Hauck J, Fiala I, Verburg PH, Condé S, Schägner JP, San Miguel J, Estreguil C, Ostermann O, Barredo JI, Pereira HM, Stott A, Laporte V, Meiner A, Olah B, Royo Gelabert E, Spyropoulou R, Petersen JE, Maguire

C, Zal N, Achilleos E, Rubin A, Ledoux L, Brown C, Raes C, Jacobs S, Vandewalle M, Connor D, Bidoglio G (2013) Mapping and Assessment of Ecosystems and their Services. An analytical framework for ecosystem assessments under action 5 of the EU biodiversity strategy to 2020. Publications office of the European Union, Luxembourg.

NCC (2014a) Valuing natural capital in business: Towards a harmonised process. The Natural Capital Coalition.

NCC (2014b) Valuing natural capital in business: Taking stock: Existing initiatives and applications. The Natural Capital Coalition.

TEEB (2010) The Economics of Ecosystems and Biodiversity.

TEEB for Business Coalition (2013) Natural Capital at Risk: the top 100 externalities of business.

UNCTAD (2002) Guidance manual: Accounting and financial reporting for environmental costs and liabilities.

UN-SEEA (2014) United Nation's System of Environmental-Economic Accounting - Central Framework.

UN-SEEA (2013) United Nation's System of Environmental-Economic Accounting – Experimental Ecosystem Accounting.

Waage, S., Kester, C., Armstrong, K., (2013). Global Public Sector Trends in Ecosystem Services, 2009-2012.

WBCSD (2011) The Guide to Corporate Ecosystem Valuation.

WBCSD (2013) 'Eco4Biz: Ecosystem services and biodiversity tools to support business decision-making'

WRI and WBCSD (2004) The GHG Protocol, A Corporate Accounting and Reporting Standard.