DEVELOPING CORPORATE NATURAL CAPITAL ACCOUNTS

Guidelines

For the Natural Capital Committee

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1. INTRODUCTION

1.1 Purpose of corporate natural capital accounting guidelines

This document provides practical guidelines for preparing a corporate natural capital account. It accompanies the Main Report for the project 'Developing Corporate Natural Capital Accounts' that has been undertaken for the Natural Capital Committee (NCC)[1].

The guidelines will help the individuals and teams tasked with coordinating and producing the account. For the most part, the framework is intended to be applied by organisations that have a natural capital 'stewardship' role.

Box 1.1: What is natural capital?

Capital assets have the important capacity to produce various goods and services. Nature, or 'natural capital', can be thought of in the same way. In fact, natural capital can be regarded as the source of all other types of capital: whether manufactured, financial, human or social.

The Natural Capital Committee proposes that natural capital should be defined as, *"The elements of nature that directly and indirectly produce value or benefits to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions"*.

Natural capital comprises of individual assets, which include ecological communities, species, soils, land, freshwaters, minerals, sub-soil resources, oceans, the atmosphere, and the natural processes that underpin their functioning.

Typically natural capital needs to be combined with other capital inputs (i.e. manufactured, human capital) to produce 'goods' and 'services', which can be either consumptive (e.g. timber, drinking water) or non-consumptive/'experienced' (e.g. recreation). The value of these goods and services represent the benefits that are derived by individual organisations or wider society in general.

This document:

- Describes the natural capital accounting framework and its potential applications (this Section);
- Presents 'high-level' practical steps for: (1) planning; (2) developing; and (3) reviewing a natural capital account (Section 2);
- Provides an illustrative example of the calculation of natural capital asset values within the accounting framework (Section 3);
- Sets out short checklists to assist in the preparation of an account (Section 4); and
- Provides example 'templates' for key components of an account (Appendices A-C).

The approach is based on the framework presented in the Main Report and the pilot accounts developed as part of the testing and refinement process for the framework. The guidelines should be read in conjunction with the Main Report, which provides greater detail on the rationale for corporate natural capital accounting, and the proposed approach, including the key underpinning concepts and principles.

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[1] eftec, RSPB and PwC (2015) Developing Corporate Natural Capital Accounts, Final Report for the Natural Capital Committee, January 2015.

The guidelines cannot be prescriptive, since the specific circumstances and requirements for developing an account will differ. They, however, show the main steps and considerations for getting started with an account.

It is expected the framework for natural capital accounts will evolve over time, particularly as its implementation becomes more commonplace. This will provide opportunities to assess the consistency and comparability of accounts prepared by different organisations, and facilitate updates and refinements as appropriate.

1.2   Purpose and structure of the corporate natural capital accounting framework

The purpose of corporate natural capital accounting is to produce a set of reporting statements that can be used by an organisation to monitor and measure the health and value of natural capital (as defined in Box 1.1) it owns or manages.

Whilst other forms of capital are routinely assessed – for example monitoring the productivity of workers, or rental income from property assets – the same cannot be said for natural capital and its ability to provide goods and services now and in the future.

Corporate natural capital accounting is designed to address this gap by: (i) measuring the value that the natural capital owned or managed by an organisation produces for the organisation itself and society in general (asset values): and (ii) recording the costs (liabilities) of maintaining this value.

The structure of the accounting framework is shown in Figure 1.2. The framework features two principal reporting statements:

- **Natural capital balance sheet**, which reports the value of natural capital assets, and the costs (liabilities) of maintaining those assets; and

- **Statement of changes in natural assets,** which reports the change (gain or loss) in asset values and liabilities over an appropriate accounting period.

In order to produce these reporting statements, an organisation needs to compile a range of financial and environmental data. This information populates underpinning accounting schedules, which provide the input data to the reporting statements. The intention is to pull together existing information, and, where necessary, generate new information, to aid better management of natural capital.

Figure 1.1: CNCA framework, reporting statements, supporting schedules and information
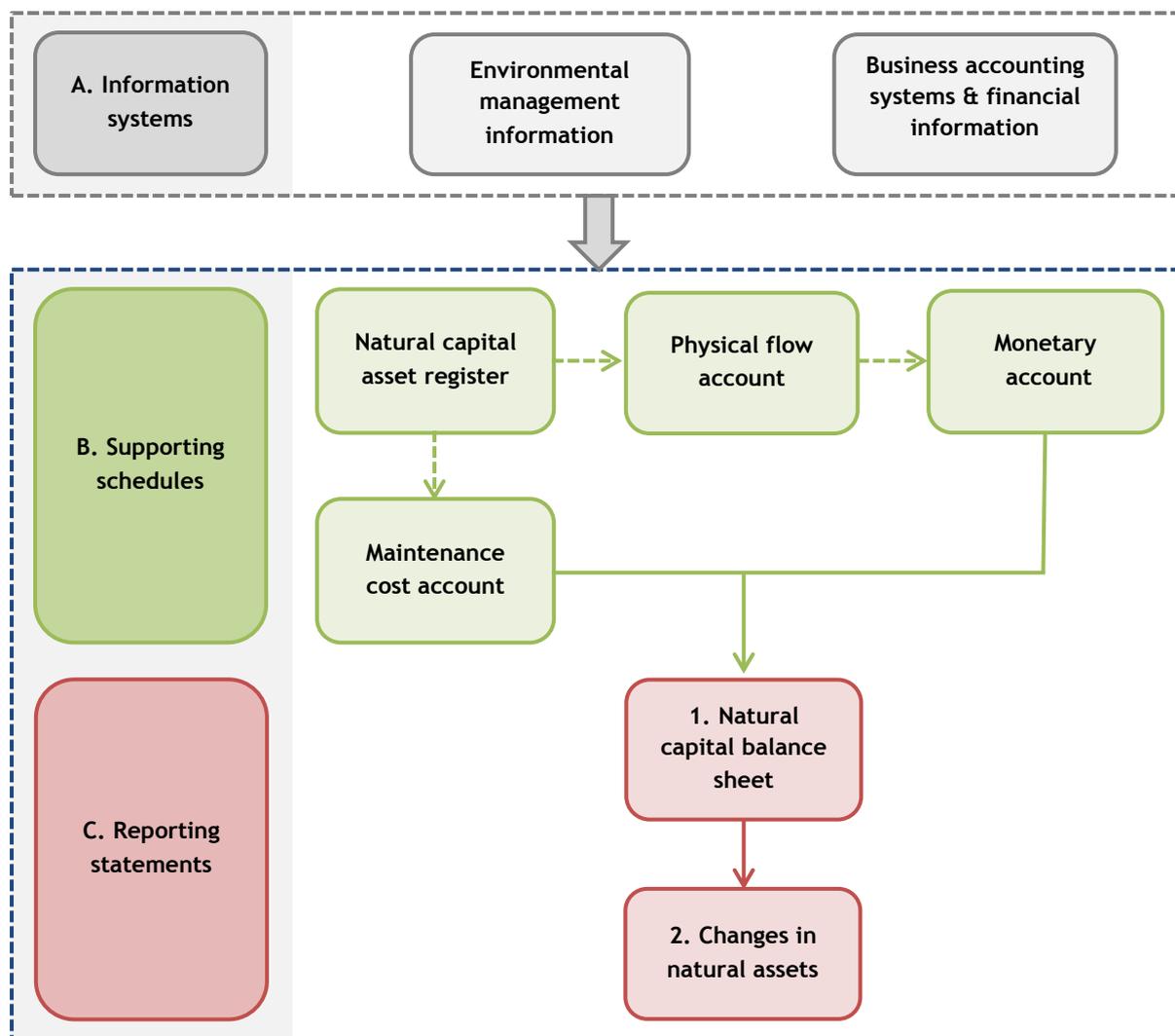
1.3 Application of the corporate natural capital accounting framework

Natural capital accounting provides an insight into the state of an organisation's natural capital: for example whether financial performance is at the expense of natural capital degradation, or whether natural capital is sufficiently healthy and stable to underpin future sustainable financial performance. It can also show the level of influence an organisation has on the value of the natural capital assets it owns or has responsibility for.

The framework can be used by organisations to support:

- Developing long-term strategies to identify:
  - Opportunities to generate new revenues to safeguard natural capital (e.g. new products/services, payments for ecosystem services).
  - The risk to revenues, liabilities, reputation and customer base of not maintaining natural capital.

- Operational decision-making: for example, investing in natural versus physical infrastructure; assessing the impacts of changes to natural assets; or prioritising the allocation of limited maintenance budgets.

- Reporting: on the health and performance of natural capital to different parts of the business, to investors, regulators, employees, and customers.

- Environmental management: supporting and enhancing overall management of natural capital.

An account may also assist in consultations with policy makers and regulators. For example, in establishing benefits and detriments of natural capital that may justify a subsidy or tax.

Note that CNCA sits within a wider field of environmental management and reporting tools. It is an addition to existing environmental monetary reporting tools that serve a variety of different purposes. In fact, CNCA can use information generated by some of these tools to report the costs and benefits associated with natural capital assets. It can also be applied at different scales, for example:

- Across the entire organisation;
- To a given asset across the entire organisation; and/or
- To all the assets in a given site of the organisation.

The potential scope for the application of the framework is broad, but it will be most effective where its use addresses a specific objective, or set of objectives, determined by the organisation.

2.   PRACTICAL STEPS

The process for preparing corporate natural capital accounts involves three main steps:

Step 1: Planning
- Determine the objective and application of the account
- Determine the scope of the account (assets, costs, etc.)
- Establish the boundary of the account (core/extended)

Step 2: Development
- Identify assets and their services
- Compile natural capital asset register
- Compile physical flow account
- Compile monetary flow account
- Compile maintenance cost account
- Prepare reporting statements

Step 3: Review
- Review lessons learnt
- Revise supporting information systems and processes
- Revise CNCA

STEP 1: PLANNING – ESTABLISHING THE SCOPE OF AN ACCOUNT

Key tasks:

- Define the objective of the natural capital account;
- Specify the baseline;
- Determine stewardship criteria for natural capital assets;
- Determine scope and boundary of the natural capital account;
- Determine the scope of costs and benefits;
- Determine the timescale for flows of asset value and maintenance cost; and
- Identify data and information requirements.

Step 1.1   Define the objective of the natural capital account

All the relevant parts of an organisation should agree on the objectives for preparing a natural capital account at the start of the process. This will help with determining the scope of the exercise, communicate the findings and agree on any actions that could follow.

The pilot accounts summarised in the Main Report demonstrate that different organisations have different perspectives on how information provided through a natural capital account can be used in their business. Examples include:

- Improving reporting on environmental outcomes;

- Informing internal budget allocations;
- Demonstrating the overall societal value delivered by investments, and
- Understanding the potential for the development of new markets and revenue streams, including funding for natural capital maintenance.

Step 1.2   *Specify the baseline*

The baseline for an account provides the reference point against which the changing states of natural capital over time can be evaluated. Gains and losses in physical and monetary measures of natural capital are expressed relative to this baseline.

The natural capital baseline should be consistent with the natural capital management objectives of the organisation. Some possible options include:

- Maintaining the current extent and condition of natural capital, implying that the baseline would be set at the existing situation (the status quo) and assuming that this prevails over time;

- Restoring natural capital and benefits to some important historical level, implying that the baseline would be set in relation to a historical reference point; or

- Enhancing natural capital to meet the organisation's, or wider social objectives, including regulatory requirements or Government policy, implying that the baseline would be set at a 'target' level.

Note that this set of options is indicative only and is not exhaustive.

Setting the baseline is also dependent on determining the extent of the natural capital, along with its condition and the expected flow of benefits over time. Specifying the baseline and getting agreement on this could require significant effort in terms of data requirements and agreement across the organisation. However, it can be subject to ongoing review and refinement as improved/updated data concerning the status and condition of natural capital becomes available, or lessons are learnt through initial iterations of the accounts.

Step 1.3   *Determine stewardship criteria for natural capital assets*

Determining the scope of natural capital accounts requires defining the natural capital assets over which an organisation has 'stewardship'. The approach to assessing stewardship needs to be established on a case-by-case basis. Typically, stewardship of natural capital assets entails:

- A long term interest in the productive capacity of the natural assets;
- Legal obligations for the maintenance of the assets (including specific terms of leases and trust obligations); and
- The capacity to control/manage the condition and health of the assets.

Where the criteria above do not provide a clear answer, legal title of ownership may be used as a deciding factor.

Step 1.4   *Determine scope and boundary of natural capital account*

There are two types of account boundary: the core boundary which is applicable in most cases and the extended boundary that may be relevant in select applications.

The 'core' reporting boundary concerns those natural capital assets over which the organisation has stewardship responsibility (Figure 2.1).

Figure 2.1: Core reporting boundary

CORE REPORTING BOUNDARY

```
Organisation
(reporting entity)

Impacts/costs          Private benefits

Natural capital
assets

External benefits

External
beneficiaries
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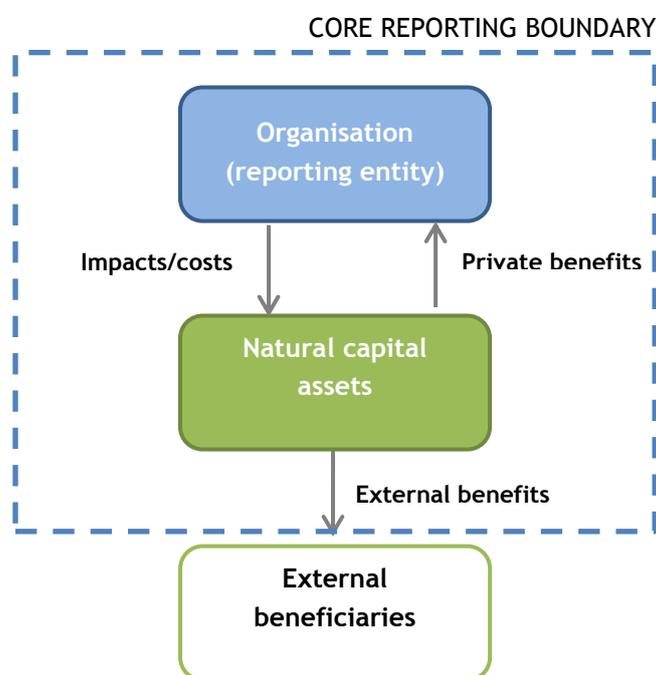
The benefits to be recorded in the account include both private asset values to the organisation and external values derived by beneficiaries outside the organisation. It is worth noting that:

- Private and external asset values should be reported in total (including the impacts of any positive or negative contribution from external entities or other external natural assets);
- Costs should cover the responsibilities of the reporting organisation for maintaining/improving the condition of the assets so that the benefits may continue to be delivered into the future; and
- The core reporting boundary will usually exclude supply chain consequences (except where the entity has a stewardship responsibility).

In order to address some of the constraints of the core reporting boundary, it may be appropriate to consider an extension of the account to include interactions with other external natural assets. These interactions will account for the impacts, both positive and negative, between the reporting organisation and external natural assets (Figure 2.2).

Figure 2.2: Extended reporting boundary
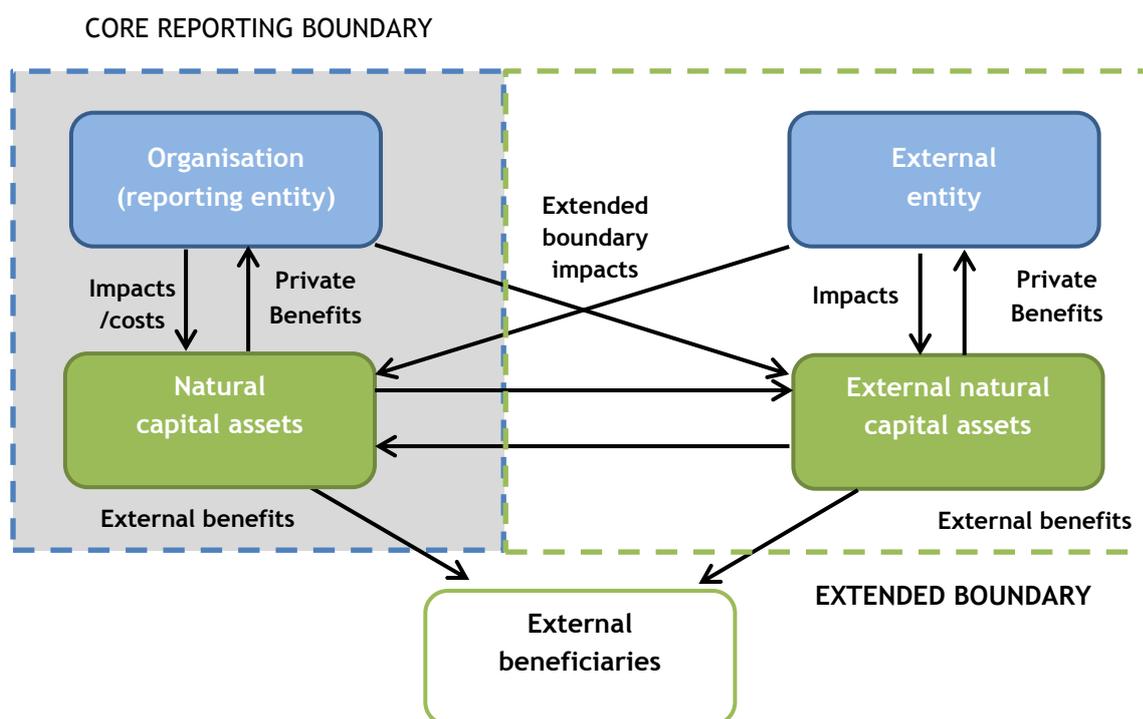
An extended report will comprise two separate statements analysing:

- The organisation's impact on external natural assets; and
- The impacts of external entities and external assets on the organisation's natural capital.

Note that these statements should report the incremental impacts on benefit levels due to the contribution to/from the reporting organisation, rather than total benefits/costs that may be distributed over many beneficiaries.

In practice any extension to the core reporting boundary should be confined to natural capital assets for which there are significant interactions (such as effluent emissions to particular rivers or coastal waters). It is not proposed that the extension applies to generalised impacts such as carbon emissions to the atmosphere, or end of life product impacts.

Step 1.5   Determine the scope of costs and benefits

The relationship between natural capital assets and the benefits they provide is complex and challenging to measure directly. Work led by the Natural Capital Committee has helped to establish the conceptual basis for defining natural capital assets, ecosystem/abiotic services, and economic benefits (Figure 2.3).

Figure 2.3: Natural capital concepts

Natural assets	**Accounting units** *Major land use categories*	**Services**	**Benefits** *Asset values*
Species Ecological comms. Soils Freshwater Land Atmosphere Minerals Sub-soil assets Coasts Oceans *Plus natural processes and functions that underpin their operation*	Mountains, moors & heaths Enclosed farmland Semi-natural grassland Woodlands Freshwaters Coastal margins Marine	*Ecosystem services* Provisioning Regulating Cultural *Abiotic services* Minerals Fuels Renewable	Food Fibre (timber) Energy Freshwater Clean air Recreation Aesthetics Amenity Wildlife Equable climate

Other capital inputs (e.g. man-made, human)

Natural capital assets comprise a diverse range of elements (e.g. soils, species, and the functions provided by the interactions of these). Defining assets in these terms is correct but complex for accounting purposes. This is why the natural capital accounting framework follows the Natural Capital Committee approach of defining **'accounting units'** in terms of major land use categories (broad habitat types) to differentiate stocks of capital assets.

In practical terms, this means that an account is built up by the units of land cover, such as woodland, farmland, and grassland. This approach has the advantage that these units are spatially distinct and additive. A useful tool developed in the pilot accounts is the **'asset-benefits flow matrix'** that can be used to establish the most important natural capital assets, accounting units and benefits for inclusion in the account. An example and template is provided in Appendix A.

Although the accounting units are the building blocks of the natural capital accounts, within each unit it is important to identify the natural capital assets that are represented. This information should be recorded in the natural capital asset register. Considerations for the definition of assets include:

- Extent of the asset (e.g. size/area);
- Key measures (metrics) of an asset (quantity, quality and spatiality);
- Thresholds and critical dependencies; and
- Treatment for contiguous natural assets.

In order to derive benefits from natural capital assets, inputs are typically required from other capital inputs (e.g. man-made capital, human capital). These inputs need to be identified to establish the net asset values; i.e. the value derived net of non-natural capital production costs.

Each natural capital asset could deliver an array of ecosystem and abiotic services over time. The provision of these services is determined not only by the quantity, quality and spatial conditions of

the asset, but also by inputs of non-natural capital assets. Overall the key actions for establishing the scope of costs and benefits include:

- Identify the key goods and services provided;
- Establish how the amount and quality of goods and services vary with asset condition;
- Select the appropriate metrics to measure the level of goods and services in physical terms (e.g. volume, weight, area, quantity etc.);
- Express the physical metrics in monetary terms;
- Record what cannot be expressed in monetary terms; and
- Identify costs of production for goods and services (non-natural capital and natural capital).

Step 1.6   *Determine the timescale for flows of asset value and maintenance cost*

The framework is designed to record the value of natural capital assets and liabilities now and in the future. In principle, this means benefits and costs should be assessed in perpetuity. In practice, however, this requires asset values and liabilities to be forecast over a reasonable time period, and a residual value to be assumed. If appropriate (given the condition of natural capital), the residual value can be assumed to represent the 'steady state' level of benefit/cost.

On the reporting statements, these valuations are expressed in present value terms; i.e. discounted flows of expected benefits and cost streams (see Steps 2.3 and 2.4).

Step 1.7   *Identify data and information requirements*

Having established the scope and boundaries of an account, the final task is to identify the data and information requirements for populating it. Typically an account will require inputs from:

- Environmental management information: to define and measure the natural capital that is in the scope of the account; and
- Business accounting systems and financial information: to value the benefits derived from natural capital and to determine the costs of maintaining it.

Other supporting information may also be required; for example assessments to measure and value ecosystem service provision benefits, or analyses to estimate the future costs for maintaining natural capital assets.

It is likely that gaps will be encountered in the data requirements, but the process of producing a natural capital account should be viewed as iterative. A partial account may be developed in the first instance, which can be extended further over time as the task of preparing an account can stimulate wider and improved data collation. Note though, where an account is compiled on a partial basis this should be made clear, avoiding the risk of drawing conclusions that are not based on data.

STEP 2: DEVELOPMENT – PRODUCING AN ACCOUNT

Key tasks:

- Develop a natural capital asset register – record assets, their extent, condition, and critical features (e.g. thresholds)
- Produce a physical flow account – estimate flows of services and goods
- Produce a monetary flow account – estimate value of flows of goods and services
- Produce a maintenance cost account – cost of current and future natural capital maintenance activities; and
- Compile reporting statements – natural capital balance sheet and statement of changes in natural assets

Step 2.1   *Develop a natural capital asset register*

The natural capital asset register is an inventory that holds details of the stocks of natural capital assets that are relevant to the accounts, along with information on their condition, as measured by their extent, quality and other relevant factors.

The basic entry in the asset register is the accounting unit, as defined in Step 1. For each unit, the following data should be compiled as much as relevant:

- The boundary, extent and type of land cover (woodland, farmland, etc.);
- Major natural assets identified, (such as soil, species, freshwater, minerals etc.) that comprise the land cover;
- The condition of these assets as measured by quantity, quality and spatial configuration metrics; and
- Other important information about the natural function of the accounting unit, including major dependencies on other natural assets, critical thresholds, tipping points, non-linearities and capacities.

There is potential for a large amount of information to be collected for each accounting unit. Consequently, it is important to restrict the data requirements to those items that will provide the greatest insights into the health and productive capacity of natural capital assets. Sources for data and assumptions should be recorded in an easy to audit format that is suitable to the procedures of the organisation. Gaps should also be noted.

Step 2.2   *Produce a physical flow account*

The physical flow account records the expected flow of goods and services provided by the natural capital assets stocks that are identified in the asset register. For a given accounting unit (in a specific location), not all flows from natural capital will be significant or worth evaluating. Combing the 'asset-benefits flow matrix' with a qualitative scoring exercise (see Appendix A) can be useful in identifying the most relevant flows of services for further evaluation.

In some case it will not be possible to express all physical flows of goods and services in monetary terms. Therefore, it is important to ensure all physical data are recorded so as not to ignore any important goods and services that cannot be subsequently valued.

Step 2.3   Produce a monetary flow account

The monetary flow account measures the value of the expected flow of goods and services that are captured in the physical flow account. This includes both value derived by the organisation from natural capital assets ('private value') and wider societal benefits ('external value'). These should be based on the expected profile over time, with benefits/costs expressed in present value terms. Future values should be discounted according to the organisation's discount rate, reflecting the opportunity cost of capital.

Private values from 'market' goods can be estimated using appropriate forecasts of output prices and input costs. Data for external values and non-market benefits (e.g. informal recreation benefits) can be collected through primary research using non-market valuation methods or adapting evidence available from existing studies (value transfer).

Step 2.4   Produce a maintenance cost account

The purpose of the maintenance cost schedule is to hold all the information necessary to calculate the cost of maintaining/enhancing natural capital assets. This includes:

- A description of the natural capital maintenance activity required;
- Details of the level of activity required over time; and
- A profile of the costs incurred, split between those that are legal requirements and remaining costs necessary for full capital maintenance.

Relevant activities could include recurring (land) management measures, as well as restoration actions to enhance the condition of natural capital if this is relevant to the organisation (e.g. to meet regulatory requirements). In addition, if failure to maintain assets or external impacts (e.g. disease) leads to increases in future costs to restore the natural capital, then these higher remediation costs need to be represented in the schedule in order to reflect the full liability.

The cost profile is discounted at the organisation's discount rate to provide the natural capital maintenance liability for the natural capital balance sheet.

Step 2.5   Compile reporting statements

Natural capital balance sheet

The natural capital balance sheet reports the value of the (in-scope) natural capital assets and the ongoing costs of maintaining those assets. Mirroring accounting terminology, valuations are referred to as 'asset values' and the maintenance requirements as 'liabilities'. Structuring the balance sheet to separate assets and liabilities follows the general accounting principle that mandates the full disclosure of each. An example template is provided in Appendix B.

Two components of asset value are recognised:

- Private value: representing the internal economic benefit of the natural capital to the organisation.

- External value: reflecting the value that natural capital provides to all other beneficiaries.

Asset values may also be segregated between renewable resources (e.g. provision of ecosystem services) and non-renewable resources (e.g. minerals), as these are subject to very different

management and utilisation decisions. Non-renewable assets should be assumed to be resources that cannot be renewed in a meaningful management timescale (e.g. typically 100 years).

The liabilities are differentiated as costs incurring due to the legal obligations of the organisation and other maintenance costs.

Statement of changes in natural assets

The purpose of the statement of changes in natural assets is to report the movement of the natural capital asset values and liabilities over the accounting period. An example template is provided in Appendix C. The statement provides a breakdown of reasons for changes in net natural capital:

- **Cumulative gains/(losses):** how the quality and hence the value of the assets (the profile into the future) has changed in the accounting period relative to the baseline value. The quality of the asset may change due to investments in improvements or external impacts.

- **Additions/(disposals or consumption):** how the quantity and hence the value of the assets (the profile into the future) has changed in the accounting period relative to the baseline condition. The quantity of natural capital assets could change through acquisition, creation, or disposal and natural events (e.g. storms, flooding).

- **Revaluations and adjustments** – this accommodates changes in measurement of the value other than quality or quantity; for example due to external changes (such as prices and market preferences), but can also include any adjustments such as significant changes in valuation methodology, baseline assumptions, etc.

- **Maintenance liabilities** – this records changes in the total cost of maintaining both the private and external values, which can include increases in the costs of maintenance that arise as a consequence of failing to perform adequate maintenance in previous period(s).

The statement distinguishes between changes in private and external values, so that any changes in these aspects are explicit.

STEP 3: REVIEW – IMPROVE AND REVISE ACCOUNT

Once an initial natural capital account is produced, the exercise should be reviewed to establish lessons learned, and make appropriate revisions to the monitoring and reporting regime in future. This should include establishing the critical data and information gaps to be fulfilled to improve the coverage of an account.

The process of reviewing an account may have important implications for supporting information systems (both financial and environmental), and management processes. Key questions to consider include:

- Did the account achieve the original objectives? If not, why not?
- How useful is the information for managing natural capital? What could be improved?
- How useful is the information to key stakeholders?
- How much time and resource was required? Is this acceptable? How can the process be more efficient?
- What additional data, information systems and changes to management processes are required to improve the natural capital account?

The review process may also involve comparison of the natural capital account to conventional financial accounts. These accounts have different objective, scope and measurement method and hence they are expected to produce different results. Their comparison is, nevertheless, useful in several ways:

- Natural capital accounting aims to report the full (asset) value of the benefits, and the full maintenance costs (liabilities) associated with natural capital. Comparing these values with those reported under financial accounting illustrates the proportion of natural capital value and cost that is already captured by conventional accounts.

- Financial accounts recognise the private value of tangible assets. Comparing the financial net book value of land assets with the natural capital accounting private values demonstrates how much of this value is reported under financial accounts and opens up questions around the elements of value that financial accounting does not include.

- The difference between liabilities recognised under financial accounting and the natural capital maintenance liability reported under natural capital accounting highlights the extent to which full natural capital maintenance is missing from financial accounts.

Understanding the difference between the values produced by these two accounts enhances the understanding of which investments generate what type of value. This, in turn, should help with prioritising investments, understanding time lines (different asset values and liabilities will have different time profiles) and developing new products or markets (to capture external non-market values if possible or appropriate).

3.   EXAMPLE OF ASSET VALUE CALCULATIONS

This example illustrates how the basic elements of natural capital asset values are calculated and used in the preparation of a corporate natural capital account.

The example concerns a single plot of agricultural land (an accounting unit), which would be aggregated with other units (both agricultural and/or other assets) to construct consolidated reporting statements. The example is a basic abstraction but even at this level it produces valuable information for management.

3.1   Opening value - baseline

The agricultural land produces food and biodiversity benefits which are valued at £450k per year in total. For simplicity the example shows the total value only: in practice the total value would be split between private value and external value components. The operating costs of the farm (sowing, harvesting and selling) are £250k per year, giving a net benefit of £200k per year. Finally there are natural capital maintenance costs of £100k per year for maintaining hedges, ditches and monitoring the condition of the soil.

These values have been selected as suitable baseline values for the initiation of the account at Year 0. Although this example uses the same annual value over time, a typical assessment would take into account variations over a forecastable time horizon and then make assumptions about the residual value in order to calculate present values for the flow of benefits and costs in perpetuity. The values from this example (Table 3.1) generate a benefit value of just over £5 million (total asset value) and a maintenance liability of just over £2.5 million[2].

This opening balance sheet presentation is shown in Figure 3.1.

Figure 3.1: Baseline balance sheet

Opening Balance Sheet	£'000
Assets	
Baseline value	5,065
Liabilities	
Maintenance provisions	(2,532)
Total net natural capital	**2,533**

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[2] The opportunity cost of capital (discount rate) used is 4% and this is applied in all discounting calculations in the example.

Table 3.1: Present value calculations for baseline scenario (£'000)

DiscountRate	4.0%													
Discount Factor	1	0.962	0.925	0.889	0.855	0.822	0.790	0.760	0.731	0.703				0.676

Baseline Valuation	**Total**												**Steady**	**Residual**
Year		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total**	**State**	**Value**
	(Inc RV)													
All Benefit Flows	15,750	450	450	450	450	450	450	450	450	450	450	4,500	450	11,250
Operating Costs	(8,750)	(250)	(250)	(250)	(250)	(250)	(250)	(250)	(250)	(250)	(250)	(2,500)	(250)	(6,250)
Net Benefit flow	7,000	200	200	200	200	200	200	200	200	200	200	2,000	200	5000
Discounted Net Benefit	**5,065**	200.0	192.3	184.9	177.8	171.0	164.4	158.1	152.0	146.1	140.5	1,687.1		3,378
Maintenance costs	(3,500)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(1,000)	(100)	(2,500)
Discounted NC maint	**(2,532)**	(100.0)	(96.2)	(92.5)	(88.9)	(85.5)	(82.2)	(79.0)	(76.0)	(73.1)	(70.3)	(843.5)		(1,689)

3.2   Accounting for changes in asset value

By Year 3 an under-investment in maintenance has resulted in a corresponding fall in benefits as depicted in Figure 3.2. The projected flow of benefits beyond Year 3 is the expected lower levels of benefit associated with the Year 3 level of maintenance spend.

Figure 3.2: Profile of expected costs and benefits at Year 3
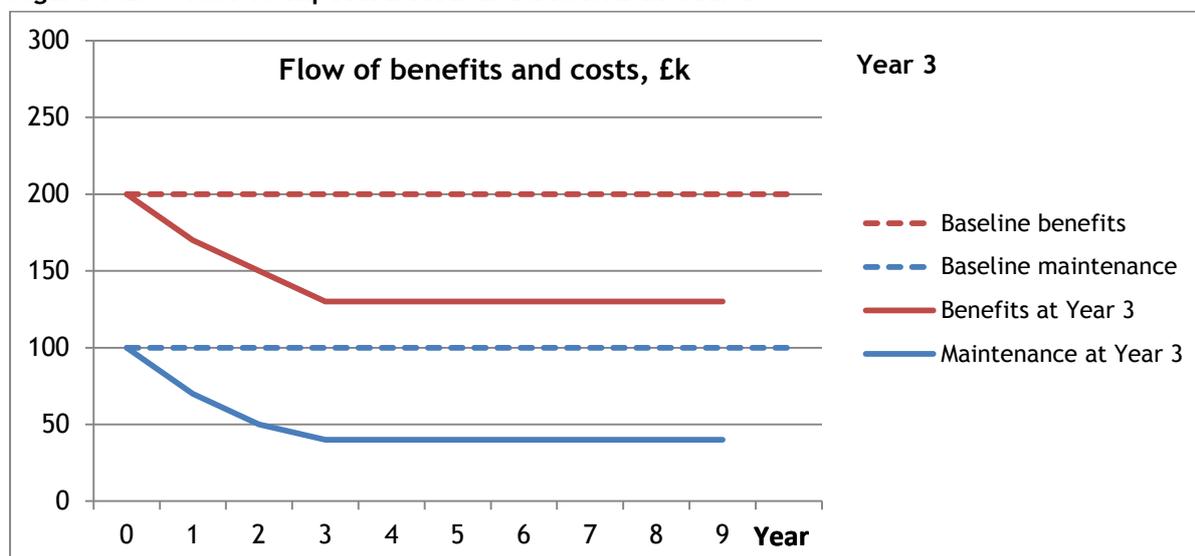
In response to this degradation, by Year 5 an improvement plan is in place, incurring higher maintenance spend, with a forecast to rise in benefits levels above the original baseline by Year 8 (Figure 3.3).

Figure 3.3: Profile of expected costs and benefits at Year 5
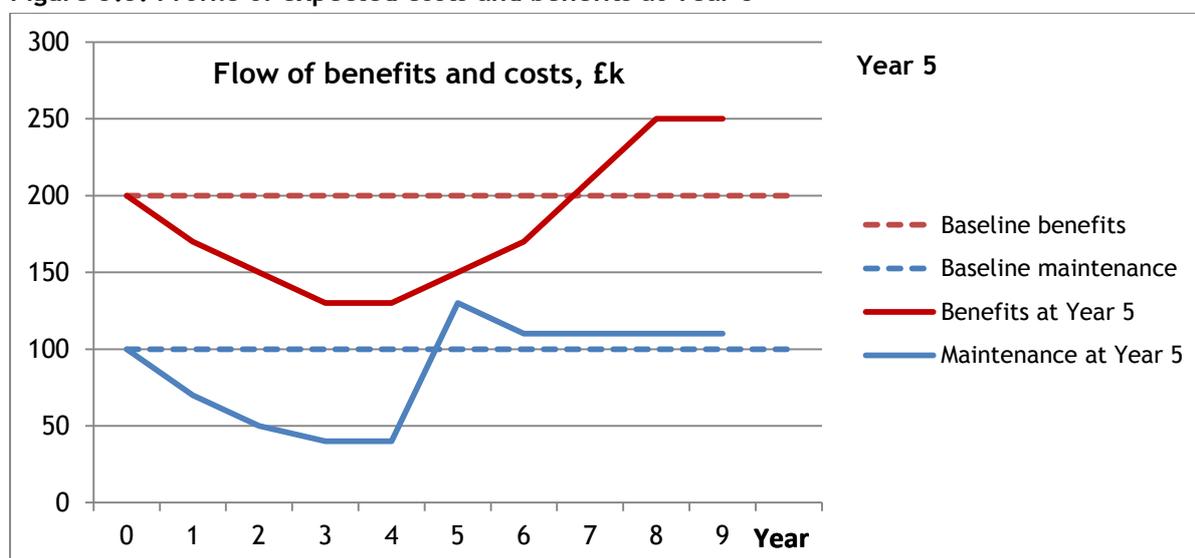
By Year 3 the discounted benefits had fallen to £3.3 million, a loss of £1.8 million against the baseline, which was the cumulative loss reported for that year – see balance sheet reported below (Figure 3.4). Although the Year 3 maintenance costs were below the baseline maintenance level, the reported liability was retained at the baseline level (£2.5 million) as that was the expected requirement to maintain the baseline level of benefits.

At Year 5, the recovery and enhancement plan aimed to improve asset values to £6.3 million by Year 8, a gain of £1.2 million against the baseline. The higher level of liability was reflected in the accounts in Year 5, to capture the natural capital commitment of the organisation. Although the plan forecast to improve asset values the full value of improvement was not reported until the underlying level of benefit had been attained, i.e. at Year 8, as shown in the profile of gross asset values by year below, in Figure 3.5.

**Figure 3.4: Illustration of natural capital balance sheet position for selected years**

	Year 0	Year 3[a]	Year 5	Year 6	Year 7	Year 8
Assets	£k	£k	£k	£k	£k	£k
Baseline value	5,065	5,065	5,065	5,065	5,065	5,065
Cumulative gain/(loss)	-	(1,784)	(1,315)	(815)	185	1,185
Gross asset value	5,065	3,281	3,750	4,250	5,250	6,250
Liabilities						
Maintenance provisions	(2,532)	(2,532)	(2,790)[b]	(2,750)	(2,750)	(2,750)
Total net natural capital	**2,533**	**749**	**960**	**1,500**	**2,500**	**3,500**

Notes:
[a] Benefits from Year 3 onwards are discounted to provide a present value in Year 3 terms, the actual benefits delivered in years 0-2 are bygones. Similarly in Year 5 only the values from year 5 onwards are included in the present value calculations.
[b] Liabilities in Year 5 are higher than the long run steady state, to reflect the higher spend in Year 5.

Figure 3.5: Present value of underlying benefits stream by year
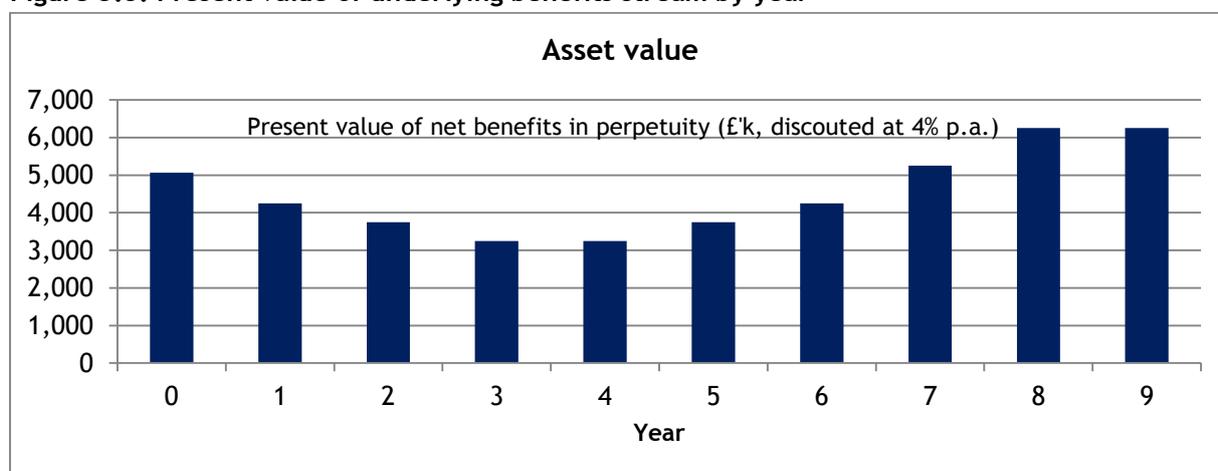
The balance sheet at Year 7 demonstrates that the asset value has exceeded the baseline by posting the first cumulative gain. The further improvement at Year 8 generates the steady state asset value of £6.3 million, which compares to the long run maintenance costs of £2.8 million, yielding a net natural capital figure of £3.5million.

4. CHECKLISTS FOR DEVELOPING AN ACCOUNT

Step 1 Planning a natural capital account

1.1 Define the objective of the natural capital account	
Rationale: It is important to define (and prioritise) the objectives for the account as this may influence the way in which the activity is performed. It should answer the question for the organisation: "Why are we doing this?"	**Example:** If the main aim is to understand the full value of a particular natural asset, the focus will be on accurate valuation (especially external values), but if it is to ensure long term sustainability of a particular asset then focus on determining the long run costs of maintenance will be more important than valuation.
Checklist of potential objectives – decide which of these, or others are relevant for your organisation: • Highlight natural capital risks to an organisation • Inform on external values • Identify new natural capital market opportunities • Manage natural capital more effectively • Conserve or restoring natural capital • Inform land use decisions • Support environmental governance and reporting • Support information for government/regulators • Explore new approaches/learning	

1.2 Specify the baseline	
Checklist for potential baselines (Note that this set of options is indicative only and is not exhaustive): • Restoration of natural capital to historic level • Enhancing natural capital to meet a target level • No net loss and maintaining current level of natural capital	**Rationale:** The baseline should be consistent with the organisation's natural capital management objective to ensure that the account provides a genuine reflection of performance against this objective.

1.3 Determine stewardship criteria for natural capital assets	
Checklist: • Does the organisation have a long term interest in the productive capacity of the assets? • Does the organisation have legal obligations for the maintenance of the assets? • To what extent does the organisation have the capacity to control/manage the condition and health of the assets? • Does the organisation own the assets?	**Rationale:** It is important to set out the criteria for identifying which assets are within the scope of the account.

1.4(a) Determine scope and boundary of natural capital account	
Checklist: • Is the account for the whole organisation or a specific unit? • Are there complex inter-dependencies/ interactions between the organisation and natural capital assets that inform the appropriate scale/ scope? • What level of resource will be needed and what is available?	**Rationale:** It is important to set out the scope/boundaries early on to allow more effective planning and control of the development of an account.

1.4(b) Decide if an extended reporting boundary is relevant (necessary)	
Checklist: • Are there interactions with external natural capital assets that are fundamental to the activities of your organisation (including impacts on unowned assets)? • Are interactions with external natural capital assets within the scope of the legal and regulatory framework within your organisation operates? • Can a cause-effect relationship with external assets be reasonably established? • Can impacts on external assets be reasonably estimated?	**Rationale:** The extension account can be complex, so it is important to set the scope and scale of this exercise appropriately in order to keep the project manageable.

1.5 Determine the scope of costs and benefits	
Rationale: This step provides an overview of the asset types and main ecosystem services (and/or non-renewable resources) provided.	
Advice: • Use broad habitat categories unless there is justification to do otherwise • Use ecosystem services classification to categorise benefits unless there is justification to do otherwise • Use this step to focus data collection efforts on the most significant benefits/costs	Checklist: • Use an asset-benefits matrix (or similar tool) to help identify main ecosystem services (and/or non-renewable resources) • Identify natural capital maintenance/enhancement activities and actions

1.6 Determine the timescale for flows of asset value and maintenance cost	
Checklist: • What is the period over which costs and benefits can be reasonably forecast? • What approach can be taken to estimating residual values? • How frequently will accounts be published? • How frequently will cost and benefit estimates change? • Are there points in time when stewardship may be transferred?	**Rationale:** CNCA aims to promote the long term sustainability of natural capital; hence the focus should be on ensuring that benefits and costs of maintenance are supportable over the very long term, ideally in perpetuity. There may be situations in which the timeframe may be restricted, such as when a lease expires and stewardship transfers to another party.

1.7 Identify data and information requirements	
Checklist – identify data to populate: • The natural capital asset register • The physical flow account • The monetary account • The maintenance cost account	**Rationale:** Environmental data are already collected and management systems already in use by organisations. Their relevance for the CNCA will need to be further explored. This will be an iterative and evolving process, with the task of preparing an account helping to identify data needs, and updated data facilitating revisions of an account.

Step 2   Developing a natural capital account

2.1 Develop a natural capital asset register	
Rationale: This step defines the assets, their extent, condition and any relevant thresholds and criticalities. This step also starts to identify key asset maintenance activities.	
Advice/sub-steps:	**Checklist:**
• Structure asset register by asset accounting units and broad habitat type (unless alternative structure is appropriate) • Select suitable quantity or (spatial) extent metrics – usually area for land cover, but sometimes others, such as volumes or linear features. • Select suitable quality indicators to reflect the condition of the asset. Usually a range of quality measures and spatiality may be needed to capture all important dimensions of condition. • Establish any criticalities or dependencies on other natural assets (e.g. upstream farmland on water quality). • Establish key maintenance requirements to maintain asset quality. • Establish baseline extent, quality. Measure current values if different from baseline. • Use the stock account data to construct the initial NC asset register.	• What is the baseline stock and condition? Does the current state differ from baseline? • How does service level vary with quality? Linearly over a certain range? What are the limits? • What are the trends in quality - improving or declining? • Is there a long term management plan? What are the key maintenance activities? Is it sufficient to maintain asset condition in the long run? • To what extent are quality indicator measures proxies? How reliable are they?

2.2 Produce a physical flow account	
Rationale: This step defines the flow of benefits of ecosystem services overtime for each asset defined in the asset register.	
Advice/sub-steps:	**Checklist:**
• Select measures for ecosystem goods • Select measures for non-renewable goods. • Establish relationship between flow and asset condition overtime. • Make assumptions on asset condition over time. • Estimate the baseline service flows • Estimate existing flows and future projections	• Does the flow depend on variables other than asset condition? (e.g. local population for scale recreation benefits.)

2.3 Produce a monetary flow account
Rationale: This step evaluates the costs and benefits for each asset overtime to calculate a discounted benefits flow.

Advice/sub-steps:	Checklist:
• Identify appropriate valuation method(s). • Identify available guidance and valuation evidence for benefits (e.g. carbon values) • Specify discount rate/opportunity cost of capital for calculating present values • Estimate profile of benefits over time, discounted at opportunity cost of capital	• Does the flow of benefits over time depend on variables other than asset condition? (e.g. local population for scale recreation benefits)?

2.4 Compile maintenance cost account
Rationale: This step compiles information on the costs of maintaining natural capital.

Advice/sub-steps:	Checklist:
• Record requirements for enhancing natural capital over baseline, or restoring natural capital to the baseline level • Record maintenance activity(ies) and requirements over time • Estimate costs of activity(ies) • Estimate profile of costs over time, discounted at opportunity cost of capital	• Will assumed maintenance activities ensure that baseline/target level of natural capital is sustained?

2.5 Prepare reporting statements
Rationale: This step produces the reporting statements that are core to the CNCA framework.

Advice/sub-steps:	Checklist:
• Aggregate values across all assets • Prepare Natural Capital Balance Sheet • Prepare Statement of Changes in Natural Capital • Prepare commentaries and notes to the accounts	• Does the overall result present a true and fair view? • Are the salient features captured (i.e. improving or depleting natural capital)? • Are value changes due to changes in quantity, quality or market factors?

Step 3   Review and improve a natural capital account

3. Improve and revise account

Checklist:	Rationale:
• Did the account achieve the original objectives? If not, why not? • How useful is the information for managing natural capital? What could be improved? • How useful is the information to key stakeholders? • How much time and resource was required? Is this acceptable? How can the process be more efficient? • What additional data, information systems and changes to management processes are required to improve the natural capital account?	a natural capital account should be reviewed to establish lessons learned, and identify refinements and improvements for future iterations. This should include establishing the critical data and information gaps to be fulfilled to improve the coverage of an account.

GLOSSARY

Accounting unit: basic unit for which data are collected. This is likely to be a delineated plot of land of a single land cover type, so that accounting units are spatially distinct and additive.

Additional provisions for maintenance: the present value (PV) of expected costs of natural capital maintenance or enhancement activities, over and above any legal and requirements.

Additions (/disposals/consumption): the increases (or decreases) in private/external asset value arising from additions, disposals or consumption of natural capital assets.

Asset (accounting): A resource with economic value that the organisation owns/controls with the expectation that it will provide future benefit.

Asset (natural capital): components of the stock of natural capital including biotic (living) and abiotic (physical conditions and non-living) elements of the natural environment. This covers non-renewable assets such as minerals and energy reserves, along with ecological communities, species, soils, land, freshwaters, minerals, sub-soil resources, oceans, the atmosphere, and the natural processes that underpin their functioning.

Asset-benefits flow matrix: a screening tool used to identify the most relevant flows of services for inclusion in an account.

Baseline (asset value): a reference scenario against which subsequent changes in the state of natural capital can be measured.

Baseline external value: the present value (PV) of non-market benefits (or dis-benefits) as assumed in the baseline, calculated in perpetuity.

Baseline private value: the present value (PV) of expected revenue streams less all direct production costs (costs of sale) as assumed in the baseline, calculated in perpetuity.

Broad habitat types: UK National Ecosystem Assessment (UK NEA) classification of eight broad habitat types identified within the UK.

Core natural capital account: reports on the asset value and costs associated with natural capital maintenance over which the reporting entity has ownership/stewardship interest.

Cumulative gain/loss: impact on the asset value (in present value terms) arising from changes in asset condition (excluding additions, disposals and changes).

Discount rate: the rate of interest used to adjust the value of future flows of revenue, costs or income to present value terms, accounting for time preferences and attitudes to risk (e.g. and organisation's opportunity cost of capital).

Discounting: The process of expressing future values in present value terms. This allows for the comparison of flows of cost and benefit over time regardless of when they occur.

Ecosystem services: the benefits provided by ecosystems and the biological diversity contained within them to society and human activities.

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

Exchange value: observed market prices for goods and services which reflect actual transactions.

Extended natural capital account: a supplement to the core natural account boundary that considers: (i) the material impacts of an organisation on other external natural assets (i.e. the impact on natural capital owned/under the stewardship of other private or public organisations, or completely 'unowned'); and (ii) the impact of external natural assets on those of the organisation.

External value: the value (benefits) that natural capital asset provide to society and other beneficiaries, rather than to the reporting entity.

Net book value (accounting): the value of the assets of a company, which is (at its simplest) equal to the cost of the assets minus accumulated depreciation.

Legal maintenance obligations: the present value (PV) of expected costs associated with any legal or contractual obligations to preserve natural capital, calculated in perpetuity.

Legal requirements: the proportion of the natural capital liability that an organisation is required by law or contract to perform.

Liability: the cost of managing and maintaining natural assets to a specified condition.

Maintenance cost account: the costed schedule of current and future maintenance activities for natural capital assets.

Monetary flow account: records the value of the expected flow of goods and services from natural capital assets. This includes both value derived by the organisation from natural capital assets ('private value') and wider societal benefits ('external value') from natural capital.

Natural capital: the elements of nature that directly or indirectly produce value to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions.

Natural capital asset register: an inventory that holds details of the reporting entity's natural capital asset stocks, including their condition, as measured by their extent, quality and other relevant factors.

Natural capital balance sheet: a reporting statement that presents the value of the natural capital (assets) and the ongoing costs of maintaining natural capital (liabilities) at a specific point in time (the reporting date).

Net asset value: the value of natural capital assets net of non-natural capital production costs.

Non-renewable assets: natural capital assets that cannot be renewed in a meaningful management timescale (e.g. typically 100 years or so).

Other requirements: the cost of the maintenance requirements in addition to legal requirements (e.g. either to meet the baseline or an enhanced condition of natural capital).

Physical flow account: records the expected flow of goods and services which are dependent on the natural capital assets stocks. The purpose of the physical flow account is to identify and quantify the flow of goods and services provided by a natural capital accounting unit, or an aggregation of accounting units over time.

Present value: A future value (cost or benefit) expressed in present terms by means of discounting.

Private value: the internal economic benefit of the natural capital to the reporting entity. This value should typically be assessed using existing and forecasted market prices.

Productive capacity: the ability of the (natural) asset to continue to provide ecosystem services and/or flows of resources.

Renewable resources: assets that can be renewed in a meaningful management timescale (e.g. typically less than 100 years or so). These assets enable the provision of ecosystem services.

Revaluations and adjustments: changes to asset value (in present value terms) due to changes other than condition or quantity, such as economic variables, valuation assumptions or methodology.

Statement of changes in natural assets: a reporting statement that presents the change in natural capital asset values and liabilities over the accounting period.

Stewardship: refers to the ownership/quasi-ownership rights of the organisation in reference to the natural capital asset. This can either take the form of ownership of the asset or a legal/regulatory obligation to maintain these assets.

Total maintenance provisions: represents the full natural capital maintenance requirement of the company (e.g. legal plus other requirements).

Total net natural capital: an indicator of the net worth of the natural capital assets reported on the balance sheet; the gross natural capital asset value less total maintenance provisions.

APPENDIX A: ASSET-BENEFITS FLOW MATRIX

	Ecosystem service/renewable/non-renewable resource				
	Service 1	Service 2	Service 3	…	Service n
Scope of financial account					
Land cover unit 1					
Land cover unit 2					
…					
Land cover unit n					
Scope of natural capital account					
Land cover unit 1					
Land cover unit 2					
…					
Land cover unit n					

Establishing coverage of account – individual service/land cover cells:

Included in account
Partly included in account
Not included in account

*Establishing service provision - individual service/land cover cells:*

- ● Significant service flow by habitat
- ○ Potential but not significant service flow
- – No service flow by habitat

Example of application of asset-benefits flow matrix (Great Windsor Park, The Crown Estate)

	Ecosystem services[1]									
	Aesthetics	Clean Air	Clean Water	Energy	Equable climate	Fibre	Food	Hazard protection	Recreation	Wildlife
Scope of financial account										
Gardens	●	○	○	○	○	–	–	○	●	○
Agriculture	–	–	○	○	○	○	●	–	–	○
Parkland	●	–	○	○	○	–	●	○	●	●
Woodland	●	●	●	○	●	●	–	●	●	●
Scope of natural capital account										
Gardens	●	○	○	○	○	–	–	○	●	○
Agriculture	–	–	○	○	○	○	●	–	–	○
Parkland	●	–	○	○	○	–	●	○	●	●
Woodland	●	●	●	○	●	●	–	●	●	●

Key:

- ●   Significant ecosystem service flow by habitat
- ○   Potential but not significant ecosystem service flow
- –   No ecosystem service flow by habitat
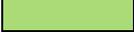
- Included in account
- Partly included in account
- Not included in account

APPENDIX B: NATURAL CAPITAL BALANCE SHEET

| | Year A | | | | | Of which reported in fin accts |
| | Non-Renewables | | Renewables | | Total | |
	Private £'m	External £'m	Private £'m	External £'m	Value £'m	£'m
Assets						
1 Baseline value						
2 Cumulative gains/(losses)						
3 Additions/(disposals or consumption)						
4 Revaluations and adjustments						
Gross asset value						
Liabilities						
5 Legal provisions						
6 Other maintenance provisions						
Total maintenance provisions						
Total Net Natural Capital						

APPENDIX C: STATEMENT OF CHANGES IN NATURAL CAPITAL

| | Year A | | | | |
| | Non-Renewables | | Renewables | | Total |
	Private £'m	External £'m	Private £'m	External £'m	Value £'m
Movements in:					
1 Cumulative gains/(losses)					
2 Additions/(disposals or consumption)					
3 Revaluations and adjustments					
4 Maintenance liabilities					
Change in natural capital					