The Environment Agency's Natural Capital Catchment Register and Account Tool and Scorecard

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Using the learning and experience from the Eftec Greater Manchester Natural Capital Account developed by Adam Booth and his team in the Urban Pioneer

Executive summary

The Environment Agency is helping to establish the natural capital evidence base so it can be used within the environment planning and delivery cycle; to support decisions about what type of investments in the environment are needed and where, and baseline and track natural capital change. Natural capital registers and accounts will support this and help to tell the environmental story of a place in a new way to different audiences.

The Environment Agency's National Natural Capital Team would like to empower others to take a natural capital approach in a robust, transparent and consistent way, while promoting collaboration and engagement. We are aiming to do this through developing a suite of tools to help inform discussions and make better decisions about integrated outcomes for a place, and engage stakeholders to identify collective priorities, benefits and risks. The Environment Agency natural capital register, account and scorecard are the first of these tools. They provide a way for others to create place-based natural capital registers and accounts, using inbuilt benefit and valuation data, and a scorecard as a ready-made engagement product.

Here we present the EA's natural capital catchment register and account tool and scorecard, invite you to use it and provide us with feedback on your experience.

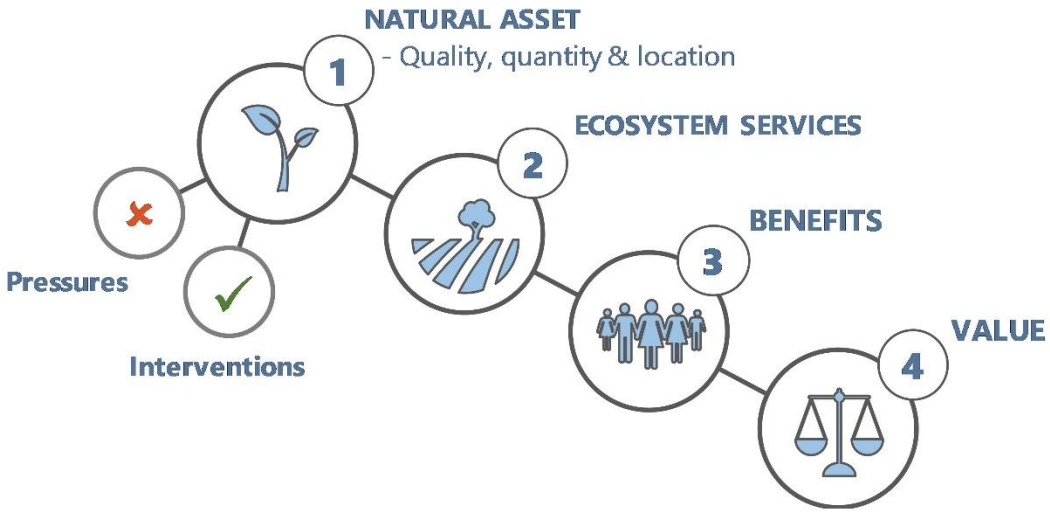
We'd like to make these tools and products even better with your help. We'll give you our register and account tool, and scorecard to use and test. It comes with a user guide with step by step instructions. In return, we'd like your feedback; tell us what can we do to make the tool and guidance better and how you intend to use this evidence.

Natural capital registers and accounts

Natural capital is our stock of 'environmental assets' such as water, soil, air and minerals that provide valuable goods and services (benefits) to people such as providing clean air and water, food and recreation as well as supporting sustainable

economic growth. Figure 1 shows the flow from natural capital (assets) to the benefits (value) people derive from it.

Figure 1: Natural capital assets, ecosystem services, benefits and values

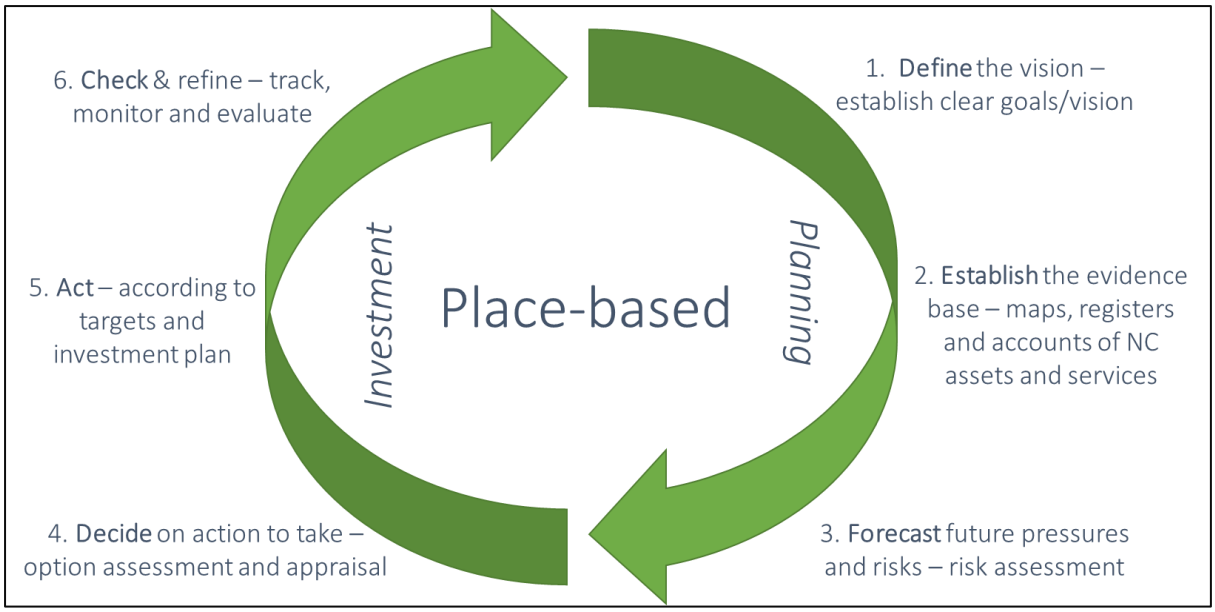


At the heart of a natural capital approach is the understanding that nature underpins human wealth, health, wellbeing and culture. Recognising the complex ways in which natural, social and economic systems interact enables us to use better evidence to support better decisions that protect and enhance natural capital so that it can continue to deliver the services and benefits we need.

Human capital, manufactured capital and financial capital are routinely considered in financial and management decisions. The natural capital approach aims to include the value from the natural environment in economic decisions and acknowledge its role underpinning all our economic activities.

A natural capital register and account is a way of presenting information about the natural environment and the value of the services it provides. The aim is to establish a framework within which organisations can account for natural capital, documenting assets in a balance sheet format that extends traditional financial reporting while staying compatible with it. Figure 2 shows where natural capital registers and accounts sit within the place-based environmental planning and delivery cycle: 2. Establish the evidence.

Figure 2: Place-based environmental planning and delivery cycle



A natural capital register and account tool can help to tell the environmental story of a place in a new way; describing some of the value produced by natural assets within a place. The outputs of the tool can help to start new conversations about the value of our natural environment with different audiences. This value can be expressed in monetary terms. By attributing a monetary value to the benefits produced by natural assets, we are able to better understand better what the local economy might lose, should those natural assets come under threat. It may help businesses to better understand the value that natural capital provides to the local area and how specific aspects support the local economy.

A natural capital register and account can:

- Start new conversations about the value that the local natural environment provides to the local economy
- Help to establish an asset and values baseline for a place
- Support prioritisation and place based planning

Some of the benefits that nature provides are too intangible to place a monetary value on and some benefits experienced from natural assets differ in magnitude from person to person. We will only ever be able to present part of the natural capital story with monetary figures. The rest we must continue to describe in words and ensure these descriptions are given equal value to any figures.

Progress is rapidly being made in the field of natural capital across organisations. Natural capital registers and accounts produced by the Environment Agency, Office of National Statistics, National Trust, Forestry Commission, Natural England, Vivid Economics and Eftec, to name a few, are among the first of their kind in the country. The story that registers and accounts tell depends upon the scale at which they are based, the data sources that are being used and the particular ecosystem services

that are analysed and highlighted. This cross cutting work is testing the theory of a natural capital approach and working towards developing best practice with common data standards.

The Environment Agency's natural capital catchment register and account tool and scorecard

The Environment Agency has developed a natural capital catchment register and account tool (hereafter called 'the register and account tool'). It records the quantity of assets in a catchment (a natural capital register). It uses this information to estimate the flow of services from the assets, and applies monetary values to some of those provided (a natural capital account). It is intended to provide decision makers with evidence to support place-based planning and investment. It should be used alongside other information (including stakeholder engagement) to help inform decisions.

As defined by the natural capital committee, a natural capital asset register is an inventory of the natural assets in an area, and their condition. The EA natural capital catchment register includes the boundary, extent and type of land cover, within the UK National Ecosystem Assessment eight broad habitat types. We aim to extend the inventory to include information on the quality and condition of the land as we further develop the tool.

The Environment Agency natural capital catchment register and account currently shows:

- An asset register showing the extent of natural capital across a specified area;
- A physical flow account showing the estimated flows of outputs that the natural capital assets produce;
- A monetary account showing the economic values in terms of benefits to wider society delivered by natural capital; and
- Asset values showing the present value of the benefits natural capital (if appropriately managed) can provide over time.

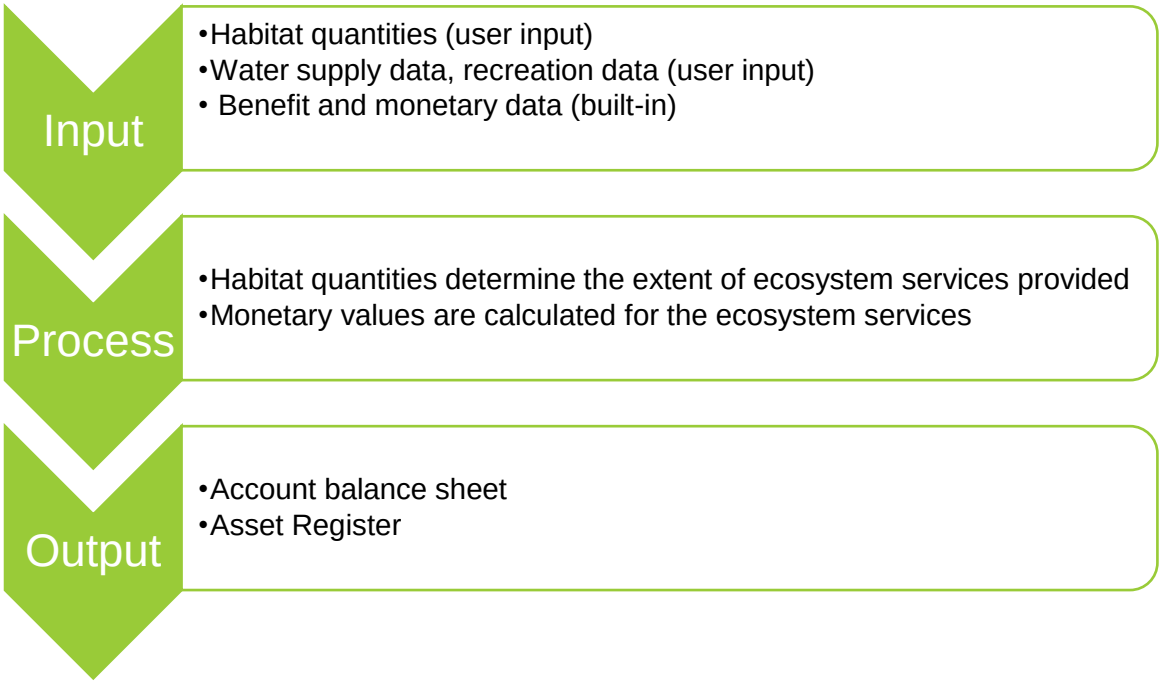
To support decision makers and their engagement with others, a catchment scorecard can be produced after the register and accounts to summarise and present that information in a visually engaging way.

How the tool works (in brief)

Full information allowing users to understand the input and output data and interpret the results of an EA natural capital catchment register and account will be provided in the User Guide.

The tool requires habitat quantities to be input by the user and automatically runs calculations using these data and built-in valuation data to generate benefit information and any associated monetary values. It provides a summary of this information in an account balance sheet. The flow chart in Figure 3 shows these steps.

Figure 3: The tool flow chart



The register and account tool provide monetary values for nine ecosystem services (Table 1) - recreation, agriculture, public water supply, timber, climate regulation, air quality and hazard regulation. All the valuation data – data used to calculate the monetary values are listed in a 'meta data' tab, within the register and account tool.

Sixteen ecosystem services are included in the account. Supporting services such as soil formation are not included to reduce the risk of duplication. Currently, the account only quantifies the benefits, with suitable robustness, for a proportion of the ecosystem services using an appropriate value. It includes information and values about ecosystem services for which we have been able to gather robust and reliable benefit and value information.

Table 1. Ecosystem services valued in the Environment Agency natural capital catchment register and accounts tool

	Ecosystem Service*	Unit used to quantify benefit	Quantified (benefit £ value included)
Cultural	Spiritual	-	No
	Health	-	No
	Amenity	-	No
	Aesthetic/sense of place	-	No
	Education	-	No
	Recreation	No. visitors to open spaces (millions)	Yes
Provisioning	Agriculture - Arable	Area of land farmed - Feed wheat (ha)	Yes
	Agriculture - Livestock	Area of land farmed - Dairy & Beef, Sheep (ha)	Yes
	Water supply	Authorised raw water quantity (m3/yr)	Yes
	Timber	Quantity of standing timber (m3)	Yes
Regulating	Climate regulation	CO_2 sequestered per habitat (tonnes)	Yes
	Air quality - PM2.5s	PM2.5s absorbed per habitat (tonnes)	Yes
	Air quality - SO2	SO_2 absorbed per habitat (tonnes)	Yes
	Hazard regulation	Flood water storage of woodlands (m3)	Yes
	Disease and pests	-	No
	Pollination	-	No
	Soil quality / erosion	-	No
	Noise	-	No

*Supporting services, such as soil formation, are not included to reduce the risk of duplication.

Key features of the register and account tool and scorecard

The key features of the register and account tool and scorecard are discussed in brief below and summarised in Table 2. Images of the register, account and scorecard are in Annexe I.

Table 2 Key features of the Environment Agency's natural capital catchment register and account tool

Tool feature	Description
Transferable, automatable and replicable	Place based, catchment scale or above, can input any habitat quantity data, in-built valuation data and automation.
Natural capital quantity data	Corine land cover (national, open source data)
Natural capital quality data	Not included at present. Additional data can be added using the Environment Agency's appraisal summary table[1]
Ecosystem service (e/s) valuation data	Nine ecosystem services are valued in £
Modelled/actual e/s valuation data	Modelled data for eight values, actual public water supply data

The register is replicable and transferable

The register has been designed to be replicated in different places and at different scales. It has been designed to be used with open-source, nationally available data (Corine land cover) which will ensure that others can create a natural capital register for their place. The User Guide will provide instructions on how to cut the national data set and apply it to the place you want to create a register and account for. If using the national habitat data provided it is best applied at WFD catchment scale or above.

Alternatively, the user can add in natural capital asset data from any source to the register as long as it is summarised into 8 broad habitat types as used in the UK National Ecosystem Assessment report (2011).

The register is transferable to multiple scales to cover, for example:

- Local Enterprise Partnerships
- Combined Authorities
- WFD catchments

The accounts are semi-automated

The data used to generate the natural capital account for a place is based on data from peer reviewed studies that estimate the flow of ecosystem services provided by a specific amount of habitat. This means that an account can be generated for any place once the natural capital register has been created. The values that are applied to the ecosystem services are built into the accounts tool and no new data needs to

[1] More information will be provided about this in the User Guide.

be added to this part of the tool. The tool uses annual average values which mostly do not change over time except for the value of carbon which follows treasury rules and increases over time.

Building the natural capital catchment register and account with open data and built in valuation data means that others can create a register and account for their place (at a scale that data allows), using a replicable and semi-automated approach.

The account section of the register and account tool provides a summary of monetary values using an account balance sheet with the following breakdown:

- Average annual benefit (£m) in year 0
- Average total value (£m) discounted over 100 years
- Where some services allow, a min/max total value (£m), discounted over 100 years

The balance sheet provides a snapshot of the quantifiable benefits that the natural capital assets in the catchment are providing. The importance and significance to society of ecosystem services that are *not* yet quantified and valued in monetary terms in the tool must be considered alongside the balance sheet during the environment planning and investment decision-making process.

The scorecard is a template to show results

The scorecard is a template based on a powerpoint slide that users will be able to enter the results of a register and account into. The purpose is to present the results in a visually concise and appealing way that communicates key messages about the value of the natural capital in a given place.

Uncertainties and limitations of the tool

Natural capital accounts typically assume assets (habitats) are in average condition to quantify the ecosystem service flow of benefits and monetary values. This assumption has been adopted in this tool. Currently, the tool does not include information about the condition of natural capital assets; the current pressures on them or risks to their condition in the future. Local, expert knowledge and judgement could be used to inform this assessment and be considered during the environment planning and investment decision-making process. The catchment scorecard provides a place to capture information about pressures on natural capital assets.

A natural capital register and account can tell a different story depending on the scale they are created at and the values that are applied for different habitats. So not all registers and accounts are comparable. Some may prioritise different stories for different places.

A confidence score, using a RAG system, has been applied to the values summarised in the account balance sheet. This is based on the confidence we have

in the input data i.e. use of assumptions, peer review, transferability. Specific assumptions that underlie benefit values in the account are detailed in the tool.

A number of key services such as wellbeing and water related services are currently under-represented within the tool, and we are looking to improve this.

Future development

The register, account and scorecard form part of a suite of tools which are being created and trialled to apply a natural capital approach in a consistent and robust way. We are releasing prototypes of the tools to help us to further develop and enhance them through user feedback. Developing these prototypes is helping us to identify and prioritise gaps in our evidence base and will help to drive common data standards.

Over the next two years, the Environment Agency Natural Capital Team will further develop the prototype tool. Bristol Avon is the site where we are trialling and testing the tools and natural capital approach and we will continue to work with the Bristol Avon Catchment Partnership to do this. We are considering the following aspects of development to enhance the tool:

- Inclusion of natural capital asset quality (condition) data to inform current pressure assessment
- Inclusion of risks to natural capital assets to inform risk forecasts and assessment
- Inclusion of more valuation data for ecosystem services, for example, health and wellbeing, additional values for hazard regulation, water quality, biodiversity and wildlife
- To position and add in qualitative data giving a more place based and local context as well as further highlighting the significance and importance of the ecosystem services not represented in the valuation process
- Include information about the beneficiaries
- Explore improvements to the functionality and processing elements of the tool

Find out more…

If you'd like to have a go at creating a natural capital register and account, and a catchment scorecard, please contact Rachel Lenane or Kathrynne Moore, Senior Advisors in the EA's Natural Capital Team:

Rachel.lenane@environment-agency.gov.uk

Kathrynne.moore@environment-agency.gov.uk

Annexe I. Images of the Environment Agency's natural capital catchment register and account tool and scorecard

The following, images 1-5, show screen shots of the Environment Agency's natural capital catchment register and account tool and scorecard. Where figures are present in the images they show data for a hypothetical catchment for the purpose of display.

1. The front page of the Environment Agency's natural capital catchment register and account tool

Natural Capital Catchment Register and Account Tool

Data sensitivity: OFFICIAL
Version v1.0
Status: BETA
Date: 08/10/2019
Owner: Natasha Lombino - Natural Capital Programme Team

Environment Agency

Introduction to Natural Capital

Natural capital is the nation's stock of 'environmental assets'; the elements of the natural world such as land, forests, biodiversity, water, soil, air, geo-diversity and oceans that provide valuable goods and services (benefits) to people such as clean air and water, food and recreation.

A natural capital approach measures the quantity, condition, and risks to natural capital assets; it indicates the values of services natural capital provides and uses this information to enable people to make better decisions to deliver a resilient environment capable of sustainable provision of services for future generations.

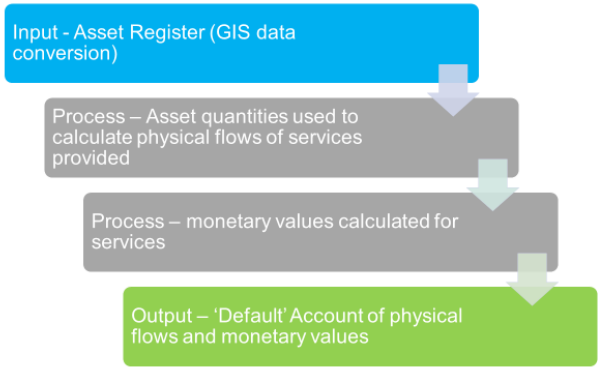
Tool description

The Natural Capital Catchment Register and Account tool uses information on the asset quantity and quality (register) to generate the physical flows and the monetary values (account) of ecosystem services we are able to quantify for a catchment. This is intended as a high level overview and evidence base for strategic planning purposes. It is considered a partial account as it is not possible to value ecosystem services accurately and some services are invaluable. It is based on open-source, nationally available datasets to allow sharing with stakeholders and partners.

Tool tabs

The Natural Capital Catchment Register and Account tool requires 'input' data on habitat quantities provided by the user for a catchment of choice. The 'process' tabs automatically run the calculations to generate the physical and monetary values. The 'output' tab summarises this information in an account. The flow chart in Figure 1 below depicts these steps.

Figure 1: Catchment Account methodology flow chart



How to use

In order to generate a Natural Capital Account for your catchment of choice, users are required to generate asset quantity information via ArcGIS data conversion. This information is required for 'input - asset register' tab. The remaining tabs will autopopulate providing an account in 'Output - default account' tab. Additional data input is required for 'Process -recreation' and 'Process - water supply'. Table 1 below details the breakdown of tabs within the tool with a brief description. The full methodology is outlined in: Natural Capital Catchment Register and Account_User Guide

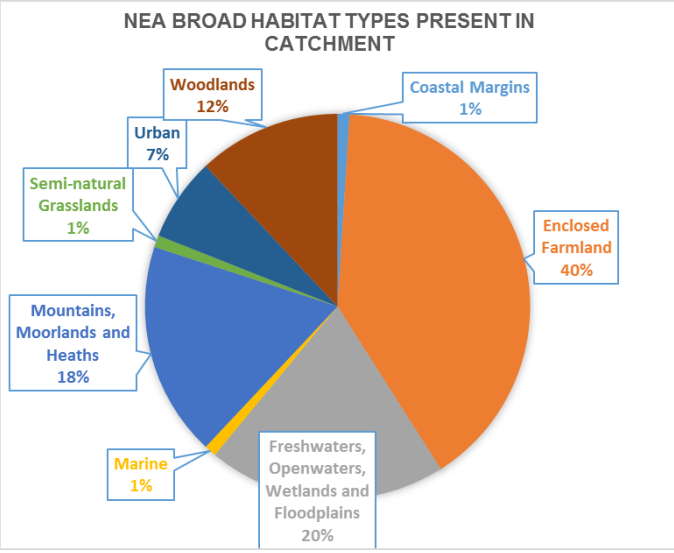
2. A table summarising the tabs within the Environment Agency's natural capital catchment register and account tool

Table 1: Natural Capital Account Tool - tab descriptions

Type of tab	Name of tab	Description
Input	Asset Register	User input of GIS data for quantity (ha) of natural capital assets (NEA broad habitat types) in the catchment.
		NB: Cells shaded green indicate data entry points
Output	Default account	Summary of physical flows and monetary values derived from the natural capital assets in the catchment. Values estimated for baseline year (year 0) and total value (over 100 years). 'Default' account assumes average asset quality.
Process	ES Recreation	Physical flow and monetary values for recreation by the habitat types. User input of ORVal recreation data.
		NB: Cells shaded green indicate data entry points
Process	ES Agriculture	Physical flow and monetary values for both livestock and arable agriculture.
Process	ES Water supply	Physical flow and monetary values for the licensed volume of water abstraction for public water supply. User input of NALD data.
		NB: Cells shaded green indicate data entry points
Process	ES Timber	Physical flow and monetary values for the quantity of timber production in woodlands.
Process	ES Climate regulation	Physical flow and monetary values for the quantity of carbon stored by the habitat types.
Process	ES Air quality (PM)	Physical flow and monetary values for the PM10 Particulates absorbed by the habitat types.
Process	ES Air quality (SO2)	Physical flow and monetary values for the volume of SO2 absorbed by habitat types.
Process	ES Hazard Regulation	Physical flow and monetary values for the costs avoided for flood mitigation by woodlands.
Metadata	Metadata	Data and evidence sources.
Discount Rates	Discount Rates	Rates used given by the Treasury in the latest Green Book.
Change log	Change log	A record of tool changes to maintain version control.

3. An example of the table and pie chart outputs from the 'Asset register' tab in the Environment Agency's natural capital catchment register and account tool

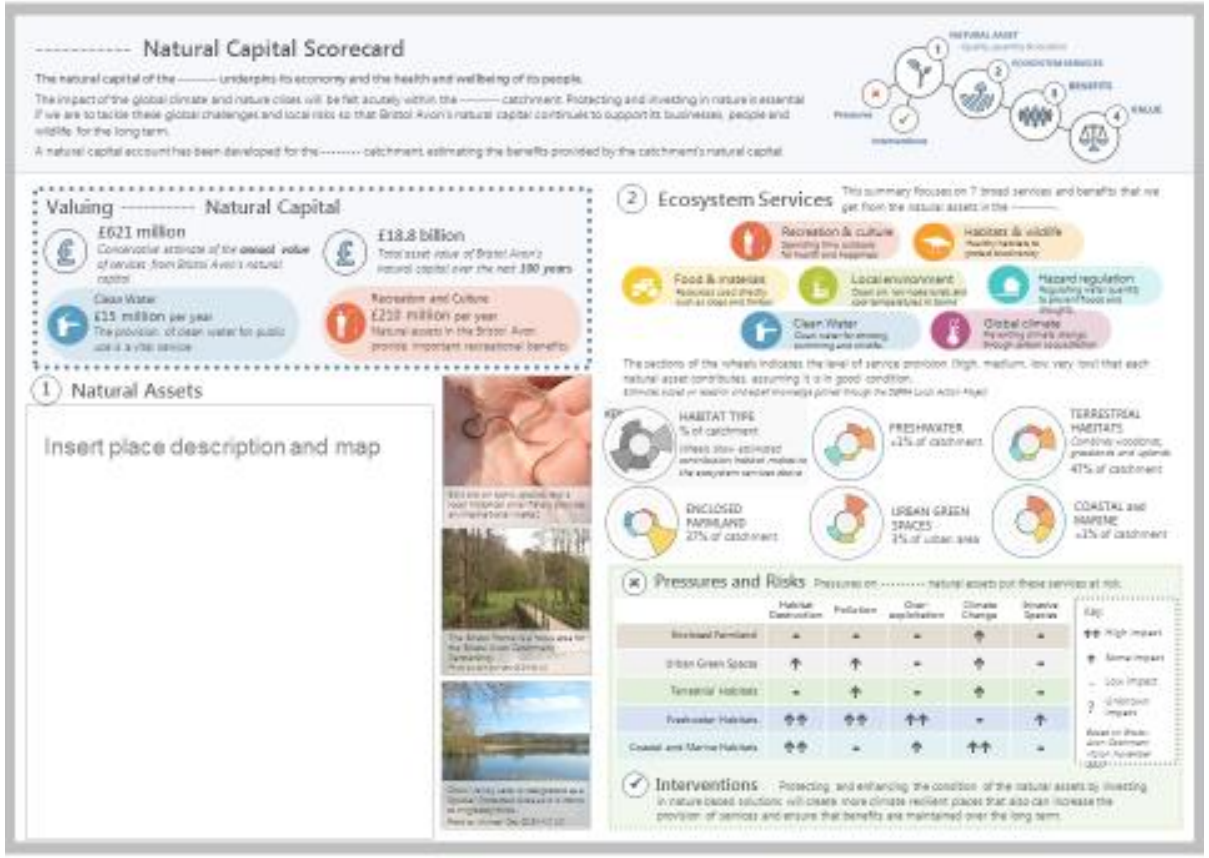
NEA Broad habitat type (Corine 2012)	Quantity (Ha)	% of total area
Coastal Margins	3000	1.0
Enclosed Farmland	120000	40.0
Freshwaters, Openwaters, Wetlands and Floodplains	60000	20.0
Marine	3000	1.0
Mountains, Moorlands and Heaths	54000	18.0
Semi-natural Grasslands	3000	1.0
Urban	21000	7.0
Woodlands	36000	12.0
Total	300000	100

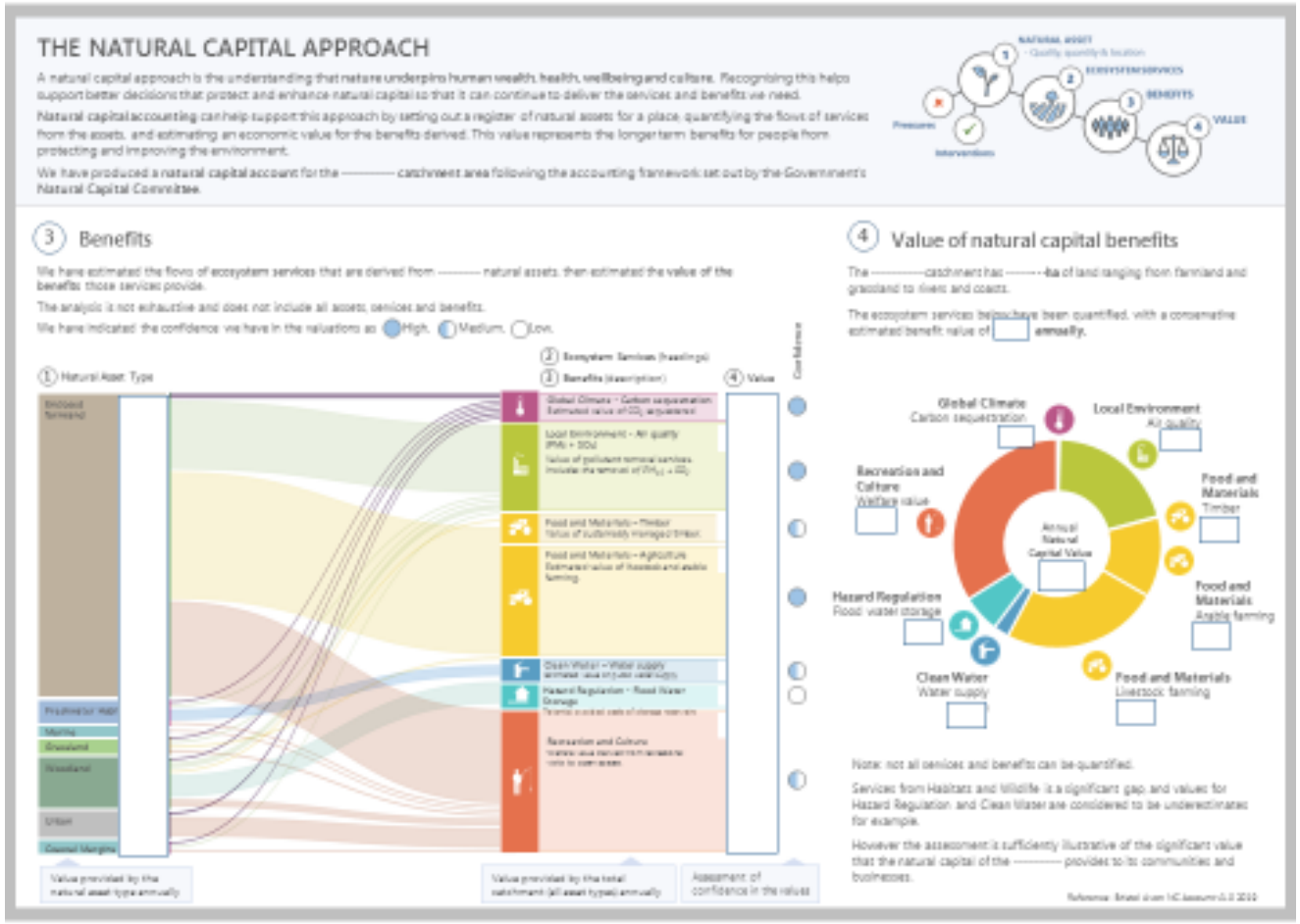


4. An example of the output from the 'Default account' tab in the Environment Agency's natural capital catchment register and account tool

	Ecosystem Service	Measure	Avg Annual benefit (£m)	Total value (£m) 100 yr (Avg)	Confidence (RAG)
Cultural	Spiritual Health Amenity Aesthetic / sense of place Education				
Cultural	Recreation	Welfare gain from recreation	168	5,028	
Provisioning	Agriculture - Arable	Associated production value	45	1,333	
Provisioning	Agriculture - Livestock	Associated production value	77	2,312	
Provisioning	Water supply	Value of public water supply	8	224	
Provisioning	Timber	Net value of sustainably managed timber	2	67	
Regulating	Climate regulation	Non-traded carbon value	7	583	
Regulating	Air quality - PMs	PM damage cost avoided	221	6,763	
Regulating	Air quality - SO2	SO2 damage cost avoided	0.24	7	
Regulating	Hazard regulation	Costs avoided of storage reservoirs	95	2,841	
Regulating	Disease and pests Pollination Soil quality / erosion Noise				
	Total quantifiable value		**£623**	**£19,158**	

5. A view of the catchment scorecard template (side 1 and side 2). Some areas of it have been left blank in this example. Any blank area and figures shown would be filled with data representing your place from the outputs of the register and account tool.




THE NATURAL CAPITAL APPROACH
A natural capital approach is the understanding that nature underpins human wealth, health, wellbeing and culture. Recognising this helps support better decisions that protect and enhance natural capital so that it can continue to deliver the services and benefits we need.
Natural capital accounting can help support this approach by setting out a register of natural assets for a place, quantifying the flows of services from the assets, and estimating an economic value for the benefits derived. This value represents the longer term benefits for people from protecting and improving the environment.
We have produced a natural capital account for the ———— catchment area following the accounting framework set out by the Government's Natural Capital Committee.
3 Benefits
We have estimated the flows of ecosystem services that are derived from ———— natural assets, then estimated the value of the benefits those services provide.
The analysis is not exhaustive and does not include all assets, services and benefits.
We have indicated the confidence we have in the valuations as High, Medium, Low.
1 Natural Asset Type
2 Ecosystem Services
3 Benefits
4 Value
Confidence
Value provided by the natural asset type annually
Value provided by the total catchment (all asset types) annually
Assessment of confidence in the values
4 Value of natural capital benefits
The ———— catchment has ———— ha of land ranging from farmland and grassland to rivers and coasts.
The ecosystem services below have been quantified, with a conservative estimated benefit value of £ annually.
Global Climate
Carbon sequestration
£
Local Environment
Air quality
£
Food and Materials
Timber
£
Food and Materials
Arable farming
£
Food and Materials
Livestock farming
£
Clean Water
Water supply
£
Hazard Regulation
Flood water storage
£
Recreation and Culture
Welfare value
£
Annual Natural Capital Value
£
Note: not all services and benefits can be quantified.
Services from Habitats and Wildlife is a significant gap and values for Hazard Regulation and Clean Water are considered to be underestimates for example.
However the assessment is sufficiently illustrative of the significant value that the natural capital of the ———— provides to its communities and businesses.