Considering Whisky – a rationale and plan for focusing on the Scotch whisky sector in order to understand how natural capital can unlock private-sector investment in nature-based solutions

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List of acronyms

IUCN	International Union for Conservation of Nature
NbS	Nature based Solutions
NC	Natural Capital
SWA	Scotch Whisky Association
SEPA	Scottish Environment Protection Agency

Summary

In order to achieve transformative change in how society relates to and benefits from nature, many more sectors need to recognise and reflect nature in their decision-making. This idea of 'mainstreaming' means that private sector (for profit) organisations need to take better account of nature, but how to achieve this is not well understood.

It is hoped that Natural Capital will provide a framing and data that helps to motivate and justify private sector involvement, but when and how this happens is not well understood. Therefore, closer scrutiny into how and when business decision making engages with these issues is therefore important.

This report establishes an approach to analysing why and how private sector actors may engage in nature-based solutions (NbS). NbS refers to activities whereby actors manage nature to secure a sustainable supply of benefits and services whilst also protecting biodiversity, but we recognise that many organisations will be engaged in similar-sounding activities without using this term.

The private sector encompasses a wide range of organisations, but we identify the Scotch whisky sector as an especially productive sector to engage with and understand, that may offer insights for other sectors. The Scotch Whisky sector is directly dependent on natural resources, especially in requiring access to large volumes of freshwater for processing. Some distillery owners have already started to take restorative ecological action with some also highlighting the close connection to the natural environment in their marketing approach. The sector's multiple operational and reputational rationales that may motivate their engagement with NbS, may offer insights for other sectors for enabling more private sector involvement in nature-based solutions.

We finish this report by outlining a methodology for exploring engagement in NbS with the whisky sector. We plan a qualitative approach to understanding the experiences of those involved in strategic planning in a sample of whisky companies. We aim for semi-structured interviews with selected staff bigger companies (who may run numerous distilleries) as well as smaller companies who have/ have not to date undertaken nature-based solutions we will address two overarching research questions; 1. How, when and why do whisky companies get involved in activities-related to NbS at present?; and 2. Do – or could - Natural Capital framings, tools or data play a role in encouraging business involvement in NbS? In our early data collection we will first seek to understand some existing engagements with nature, before later exploring how natural capital framings as data might assist in further promoting or justifying their activity in support of NbS.

This will enable us to identify insights into key motivations, drivers and data that affect decision-making by whisky company actors in support of sustainability, with generalisable implications (recommendations) for future steps or changes that can encourage those and other business actors to embed sustainability considerations.

Introduction

In order to achieve transformative change in how society relates to and benefits from nature, many more sectors need to recognise and reflect nature in their decision-making. This idea of 'mainstreaming' means that private sector (for profit) organisations need to take better account of nature, but how to achieve this is not well understood.

It is hoped that Natural Capital will provide a framing and data that helps to motivate and justify private sector involvement, but when and how this happens is not well understood. Therefore, closer scrutiny into how and when business decision making engages with these issues is therefore important.

This report establishes an approach to analysing why and how private sector actors may engage in nature-based solutions (NbS), with a focus on the Scotch Whisky sector. NbS refers to activities whereby actors manage nature to secure a sustainable supply of benefits and services whilst also protecting biodiversity, but we recognise that many organisations will be engaged in similar-sounding activities without using this term.

The structure of this document is as follows. We first articulate our approach to understanding how private sector actors engage with sustainable management of nature. We then describe the rationale for focusing on the Scotch Whisky sector. The last part of this document provides more information about our methodology and future plans.

Conceptual background

In this work we frame sustainable management of nature in terms of Nature-Based Solutions (NbS). We do not expect private sector actors to always use this term, but we use it as a broader concept providing principles for how nature can be more sustainably managed with and for society. We first explain what we mean by NbS and the implications for changes need to who and how nature is managed; we then consider specifically how and why private sectors may be motivated to engage in NbS-related activities.

Nature-based Solutions

The concept of Nature-based Solutions (NbS) is premised on our understanding that healthy ecosystems enable a diverse range of services that humans depend on (Seddon et al., 2020). Nature is therefore presented as a remedy, rather than a hinderance for human activities (Sowińska-Świerkosz & García, 2022). The core idea embedded within the concept is therefore the ability to help address social challenges in parallel with the delivery of biodiversity objectives. Social challenges driving the delivery of NbS may include climate mitigation, climate adaptation, flood risk management, heat management, flood and drought (socio-ecological) resilience and human health and wellbeing, place regeneration and economic opportunities (Dumitru & Wendling, 2021).

NbS is a broad concept encompassing a broad range of perspectives and disciplines and can involve a range of different contextually dependent interventions (Welden, Chausson, & Melanidis, 2021). This has led to different understandings of NbS (Short, Clarke, Carnelli, Uttley, & Smith, 2019), particularly when considering similarities to other concepts such as blue-green infrastructure and ecosystem approach that also focus on recognising and enhancing human-nature connections (Nesshöver et al., 2017). We adopt the internationally-discussed and accepted definition by the International Union for Conservation of Nature (IUCN) of NbS as: "*actions to protect, sustainably manage, and restore1 natural or modified ecosystems, which address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits*." (IUCN, 2016).

To help reduce ambiguity the IUCN has developed standards for NbS made up of 8 criteria (see Appendix 1 below). NbS entails all sectors of society taking account of nature in their decisions, and acting to manage – or support others to do so – to ensure nature is managed to deliver a wide of variety of ecosystem goods and services, as well as to protect biodiversity. We recognise that many organisations may be engaged in activities related to NbS, without using that term. For the purposes of this document we use the term NbS but do not expect to always do so when engaging with private sector actors.

Private sector actors and Nature-based Solutions

Increasingly there is a focus in environmental sustainability literature on the need to engage private sector actors in undertaking action that creates positive socio-environmental outcomes, including ecosystem restoration (Panwar, Ober, & Pinkse, 2022). A key driver of this attention is the recognition that traditional funding pathways have been shown to be inadequate for achieving the scale of change needed to restore the health of a range of different ecosystems (Kedward, zu Ermgassen, Ryan-Collins, & Wunder, 2023). At the same time the relationship between corporations continues to be conceptualised (Kooijman, McQuaid, Rhodes, Collier, & Pilla, 2021), expanding the focus beyond a negative impacts lens (i.e. within the environmental sustainability literature) and from the perspective of corporate social responsibility (i.e. within the business management literature) to also recognise activities that are or could be undertaken by private sector actors to enhance ecosystems, i.e. by adopting an NbS approach.

This literature highlights that 'private sector' is a broad category that involves much heterogeneity with a diversity of motivations, needs and capacities and thus a diversity of potential roles for private sector actors in delivering NbS at scale. It also highlights that there is more than one pathway by which private sector actors could support or enable NbS. Much discussion about private sector actors is focused on finance (to invest for for-profit returns) (Berrou, Dessertine, & Migliorelli, 2019), but private sector actors may also provide funding in terms in return for provision of a good or service (such as flood risk reduction), for reputational benefits. They may also, potentially, get directly involved in the design and delivery of initiatives.

Understanding this diversity requires more attention. Firstly, any engagement in NbS requires attention to preceding internal and external factors likely shape an organisation's motivation and agency to initiate, engage in or support NbS. These shape the responses (or otherwise) a company may take to initiate, engage in or support NbS. Lastly, learning and updated ideas – which ideally is based in part on monitoring the consequences of the organisation's responses – will affect their future motivation to engage on this subject. Below we explain each of these factors in turn.

1. Motivation to act

Motivation to consider and work with nature involves an understanding of the links between local socio-ecological conditions and business objectives, their general trend and that these connections may be amenable to intervention and change (Hamann, Makaula, Ziervogel, Shearing, & Zhang, 2020). This also involves recognition (i.e. awareness) of nature as relevant to their business, NbS as possible, and relevant to how they could intervene and (re)allocate resources towards this. Thus motivation relates to both recognition and relevance. Where this does not occur, private sector actors are unlikely to engage in activities related to NbS (Wagner, 2022).

Risk perception may be critical to this process. It involves the identification of motivating factors for private sector actors to support ecosystem restoration to improve local socio-ecological conditions. Motivations for NbS action are often understood from a risk reduction perspective. The primary

focus is on risk in terms of operational reliance on ecosystems, however there are other types of risk that may also motivate private sector actors to engage (Pauw, 2015) (see Table 1 below).

A perception of **responsibility** involves private sector actors' views on who could and should intervene in changing local socio-ecological conditions through NbS. Such perceptions may be influenced by an awareness of the action/ inaction of other actors in a specific area or type of intervention (Hamann et al., 2020). Whilst within the business management literature there has been a strong focus on corporate social responsibility, albeit often such activities are not connected with core business activities (Moon & Parc, 2019). Environmental governance literature however also highlights the potential for blame shifting between actors that (re)frames responsibility for action elsewhere (Heinkelmann-Wild & Zangl, 2020). Such responses can be seen not only as a way of reducing risk and enhancing business resilience but also as opportunities to enhance business reputation and competitiveness through shared value creation which involves both business and social benefits in unison (Moon & Parc, 2019). Such action framings increase the potential relevance of NbS for private sector actors.

Table 1 Direct and Indirect business nature and climate related risk (adapted from Pauw (2015).

Direct or Indirect risk?	**Perceptions on the spatial dimensions of risk**	
	Local exposure	**Distant exposure**
Direct risk	**Temperature change:** impacts on physical assets, productivity (e.g crops) health (people and livestock)	-
Direct risk	**Water scarcity**: impacts on crops, productivity or health	-
Direct risk	**Extreme Weather:** business disruption; damage to physical assets; increasing operating/ production costs. It may also contribute to unsafe working conditions for workforce leading to accidents and absenteeism	-
Indirect risk	**Regulatory and legal risks**: e.g new land use or zoning regulations; water use efficiency standards	-
Indirect risk	**Impacts on local communities/ workforce:** Increased ecosystem disbenefits e.g. through increased vector borne disease	-
Indirect risk	**Rising insurance policies:** As insurance costs increase	-
Indirect risk	**Financial risk:** Access to capital may reduce as investors become more aware of nature-based/ climate risks and the need for remedial action	-
Indirect risk	**Political risk:** In combination with other sustainability challenges countries may face increased instability and conflict	-
Indirect risk	**Impact on markets:** Increasing price volatility (e.g. agricultural products) and changing demands and supply of certain goods (water purifiers, irrigation equipment)	

Indirect risk	**Reputational risk:** A company may receive negative media coverage, be subject to civil society advocacy efforts, or even lose its ability to operate in a given location if it is perceived to reduce environmental sustainability and not reduce local vulnerability
Indirect risk	**Increased competition for resources:** e.g. because of increasing uncertainty in production, interrupted transport (local), scarcity of some commodities
Indirect risk	**Disruption of supply chain:** Decreasing reliability of supplies (e.g. electricity, agricultural commodities)

2. Agency to Act

Organisations may be motivated to consider nature in their decision-making and resource allocation, but understanding if and how they respond to this requires attention to other factors.

Firstly, their **resources** i.e. "*all the durable factors, assets of capabilities the firm uses to produce its goods or services"* (Ghemawat & del Sol, 1998). This can include expertise, datasets, infrastructure and equipment, financial capital and more.

The type of resources that a private sector actor has access to and control over is important in influencing the type of contribution (and thus potential role) in relation to NbS. Smaller companies may tend to be more constrained in their available resources that can (re)directed towards NbS, although this will also depend on the financial profile of the company. Hamann et al. (2020) identified the perceived transferability of private sector actors' resources as a key factor influencing such decisions. Specifically, if private actors consider their resources as important for bringing about NbS, yet the type of resources available are not easily transferable to other NbS actors, then direct engagement is more likely (i.e. working in collaboration, including the sharing of knowledge and data, with others to design and deliver NbS). On the other hand, where an organisation lacks specific or tailored resources, this may be more likely to lead to indirect engagement through the contribution of more generic and flexible resources, such as funding.

Where private sector actors already have direct control over land and natural resources – where they have significant land-holdings – this is a resource especially relevant to understanding engagement in NbS. An organisation may choose to change management of its land in support of sustainability, perhaps contracting others to bring any new technical expertise needed to deliver this work.

Secondly, the idea of **accountability and external constraints** on a company is also important.

The concept of accountability directs attention to whom or what an individual actors is responsible, to whom they must report to (Joss, 2010). Many multi-national and smaller companies are accountable to shareholders, and/or to major investors; the priorities of these groups thus necessarily influence on an organisation's strategic direction. Different investors and shareholders are of course not a homogenous group – they may differ in their opinions; or require different approaches to persuading or reconsidering their priorities for a company. As with many concepts, accountability is a multi-layered concept, with individual accountabilities (e.g. to line managers) also potentially relevant, but in this study our focus is primarily on the organisation.

The wider institutional environment may also influence private sector actors. The environmental sustainability literature identifies several generic barriers to NbS implementation; for example an interplay between informal institutional (i.e. norms) and formal institutional arrangements (i.e laws, policies and standards) influencing the type of solution (i.e. nature-based or engineered) considered

relevant (Harries & Penning-Rowsell, 2011) and the involvement of different stakeholders in these processes (Raška et al., 2022). These are likely relevant to private sector actors. Additionally, any factors that reduce control or reduce uncertainty seem likely to inhibit activity.

A smaller body of work focused on private sector actor engagement in NbS has identified barriers, especially uncertainty about the effectiveness of NbS in terms of its costs and benefits (Kooijman et al., 2021). This relates to knowledge gaps (Small, Owen, & Paavola, 2022), and the desire for consistent and trusted measurements that enable monitoring and adaption to better understand and improve outcomes (Macellari, Gusmerotti, Frey, & Testa, 2018). It also relates to the types of business models adopted by private sector actors, with differing models entailing different underlying assumptions about how and for whom businesses should create, extract and deliver value (Burch & Di Bella, 2021).

Most studies of private sector actors derive from work in urban contexts (e.g. Dorst et al., 2022; Mell, Clement, & O'Sullivan, 2022) and on NbS for climate adaptation and mitigation (e.g. Seddon et al., 2020). Relatively less attention has been given to private sector engagement in delivering large scale NbS in rural contexts, e.g. for the management of water quality and flow (Souliotis & Voulvoulis, 2022), with the exception of land-managers in catchment-planning, or for NFM as part of flood risk management. This is a weakness as all sorts of private sector actors I thought needed to adopt pro-sustainability activities and strengthen positive connections between nature and society (Westman, Moores, & Burch, 2021). There is thus a clear need for more attention on private sector actor involvement especially in non-urban contexts.

3. Responses & involvement

The above mix of motivation and agency will shape the type of responses – if any – taken by an organisation. There is more than one way that an organisation may seek to create, promote or engage in NbS-related activities (Hamann et al., 2020). These include;

- Collecting or commissioning more information to exploring the links between local socio-ecological conditions and business operations and dependencies
- Planning and taking direct action (of varying scale) to strengthen a specific connection between a business and socio-ecological conditions e,g. using own staff and resources to plant upstream riparian woodland or commissioning a peatland restoration subcontractor to carry out specific works.
- Partnering with actors who have complementary interests or resources in order to jointly design and plan NbS – e.g. working together with an environmental NGO.
- Contributing (directly or indirectly) key financial or other resources that others need to carry out activities in support of NbS, e.g. a donation for specific works to a Rivers Trust.

Of course, where internal and external constraints preclude consideration of nature, no visible external involvement may be discerned. This highlights a need to understand internal strategic plans and processes, to understand any blocks to considering or acting for nature.

4. Organisational learning

Lastly, involvement in NbS-related activities will produce learning that affects future willingness to engage in related work. Organisational learning will occur whether purposively organised or not (Wang & Ahmed, 2003). Updated views may range from impressions of the workload entailed as well as the confidence in the ultimate consequences. Where formal evaluation occurs, case the metrics and processes used in evaluation will become important. Willingness to engage in future may also be affected by impressions of non-NbS actions and alternatives (e.g. confidence in 'hard' flood

defences instead of upstream catchment interventions) and any learning about examples in other companies or even other sectors.

Figure 1 summarises how these factors may interconnect in a decision-making cycle. Any conception of a decision-making cycle is a simplification yet useful heuristic. We will use the issues highlighted here to guide data collection in our study.

Figure 1 Our conceptual framework of key factors likely shaping private sector involvement in NbS-related activities.

Natural capital tools – a positive influence?

A natural capital approach has often been described as useful for supporting private sector decision making, particularly for navigating complex challenges and guiding engagement in socio-ecological systems (Bateman & Mace, 2020). Natural capital refers to the natural environment that underpins the flow of services and goods (ecosystem services) that are important for the economy and human wellbeing, thus depletion of natural capital is viewed as a threat for economic activity that is reliant on healthy ecosystem and the goods and services these provide (Barbier, 2019).

Business decision-making in relation to the environment is under-reported and poorly understood in environmental management literature, beyond a few high-profile success stories. It is therefore unclear to many what motivates and enables real-world businesses to engage in and support more sustainable landscape management (NbS). There are also very few reports of discussions about business views of tools and data sets not yet adopted.

Figure 1 highlights a number of factors likely to shape – or preclude - involvement in NbS, and hence where natural capital could be useful. Are there particular points in business decision-making cycle (e.g. prioritisation, planning) when it is most fruitful to introduce natural capital concepts or data in support of sustainability? Do any policy levers or influences affect these decisions? For those not yet familiar or working with Natural Capital, what is the salience of approaches such as the Natural Capital Protocol, or particular Natural Capital datasets? Is this affected or linked to specific rationales or motivations (reputational, risk management etc)?

Where businesses are not already working with natural capital, there are some resources that can be tested or explored, to see if and how this may change or unlock their involvement with nature. Firstly, the Natural Capital Protocol is a key resource, as a detailed framework or guide for helping companies think through the relevance of nature to their decision-making, that has been co-produced with business (Natural Capital Coalition, 2016). It is designed to "help generate trusted, credible, and actionable information that business managers need to inform decisions" as such it may be relevant to galvanising motivation to act but also potential enabling agency. In addition in Scotland there are a wide variety of tools aiming to help appraise natural capital, albeit many of these are aimed at land managers (Peskett, Waylen, & Metzger, 2023). There are also datasets relating to natural capital, some of which are publicly-accessible (Scottish Government, 2023) and but again may not all be easily use-able or relevant to specific companies.

Case study selection: The Scottish Whisky sector

The whisky sector within Scotland is considered important both culturally and economically and predominantly a rural-based sector (O'Connor, 2018; Spracklen, 2014). There are potentially multiple motivations for whisky businesses to support or engage in managing Scotland's nature more sustainability. This arises because whisky production is directly dependent on Scotland's natural resources both for production and reputationally.

- Whisky production requires access to large volumes of freshwater. Access to high quality water is a non-substitutable ingredient for whisky-making. Water is also used for cooling. The risk of droughts and water scarcity is predicted to increase in future, so creating a risk for whisky production. We therefore expect motivation to invest in water security, to ensure that production is not halted (Diageo, 2022; Visser-Quinn, Beevers, Lau, & Gosling, 2021).
- Too much water may be an issue for some distilleries or warehouses, if their infrastructure/premises is at risk of future flooding. This may motivate investment to slow the flow through interventions upstream in catchments. Therefore, whisky sector may be expected to have a particularly strong interest in mitigating all types of extremes in water flows.
- All whisky production uses barley. Barley production may be affected by climate change, or by degradation of agricultural soils.
- Some whiskies depend on peat extraction for their distinctive aroma. Across Scotland there is scrutiny of peat use in the malting process and a drive to demonstrate how whisky is restoring, not destroying this habitat.
- A connection with Scotland's landscape is part of Scotch whisky's unique selling point (USP). Therefore the branding and reputation of whisky is strongly dependent on the quality of Scotland's land and natural resources. For some consumers, green credentials may be especially important. The sector has begun to consider how to incorporate climate action into its business models (e.g. net zero whisky) with similar products recently entering the market (e.g. net zero gin).
- Whisky is a 'futures' industry – what is made now might not be sold until 2040 – so it may not be unusual to think far ahead in terms of operations, supply and demand. The Scotch Whisky Association's (SWA) – a representative organisation for many whisky companies - states it was the first sector to launch a sector-wide environmental strategy in 2009, and its latest sustainability strategy (SWA, 2021) sets a number of targets for reducing the sector's environmental footprint.

The SEPA's sectoral strategy for Scotch Whisky provides more information on some of the sector's dependencies on and impacts on the environment (SEPA, 2018). strategy describes a wide range of environmental impacts – and responses – that go beyond their local landscapes, in relation to the impact of bottling, packaging and transport, and energy use by distilleries. Such issues are important, but not typically framed in terms of NbS, so not the primary focus of this study. NbS perhaps also has a more positive focus in focusing on what can be done to support and enhance nature and the services it delivers, going beyond minimising harms and impacts.

In this study we expect to focus more on how companies may engage in managing nature and landscapes that are typically local to their operations. However, we recognise all these issues are interconnected, and that companies who are relatively 'pro-environmental' in one regard may affect their thinking about other environmental issues.

We understand some whisky companies are already engaged in or exploring NbS-related activities. These include Diageo in the Spey; Chivas Regal in Glenlivet and Suntory in Ardmore. Others such as Creag Dhu, have explicitly committed to net zero operations (Creag Dhu, 2023), but we do not expect all companies have yet made such commitments. Additionally, the whisky industry is comprised of multiple businesses, some of which are owned by large multinational parent companies, but others of which are small independent. Their range of resources and differing backgrounds may help to explain current differences in engagement with nature.

The sector thus offers diversity yet is also feasible to engage with. Exploring and comparing those who are and are not actively interested in NbS-like actions offers a rare opportunity to look beyond success stories to understand what may impede awareness and consideration of natural capital in business decision-making.

Catchment-based NbS

NbS takes many and varied forms, but one important collection of NbS relates to restoration of freshwater ecosystems and catchment management with the aim of working more holistically, inclusively and systemically (van Rees et al., 2021). Given the strong dependence of whisky on water, we expect water related NbS to be an especially relevant to the whisky sector, albeit it is not the only potential aspect of natural capital that is relevant.

Catchment-scale initiatives are sometimes already framed as or linked to NbS, though often there is a focus on natural flood management as a NbS (e.g. Brillinger, Henze, Albert, and Schwarze (2021); Raška et al. (2022) Turkelboom et al. (2021) or less directly-watery issues in the wider catchment such as peatland restoration for carbon sequestration. Considering the range of benefits linked to freshwater ecosystems shows catchment based NbS are relevant to many sectors and sections of society (e.g. Grizzetti, Lanzanova, Liquete, Reynaud, & Cardoso, 2016; Waylen, Marshall, Juarez-Bourke, & Blackstock, 2021); Downstream flood risk reduction (via restoration of upstream stream channels and catchment pathways, Protection of minimum flows /reduced drought risk, Erosion prevention, Pollution absorption, Drinking water quality, Water ecology, Protection and enhancement of endangered species and habitats (in-stream and riparian), Fisheries (financial and food, also recreation), In-stream and riparian Recreation (e.g. swimming, kayaking, walking), Education, and Aesthetic benefits.

Many of these services are relevant to other sectors of society. We expect that activity and impetus from other actors – such as catchment partnerships, local authorities or environmental charities or third sector organisations – may help to encourage or enable activity by whisky companies. Indeed, the sectoral strategy for whisky (SEPA, 2018) emphasises the importance of whisky companies acting

in partnership with others. Thus the activity of other organisations and the presence of any linking organisations such as catchment partnerships may help to explain where and how whisky companies engage in activities related to NbS.

Research Questions

This research aims to understand private sector involvement in NbS, and the role of natural capital data and concepts in doing so. We plan to answer the following questions;

1. How, when and why do whisky companies get involved in activities related to NbS?
2. Does – or could - Natural Capital framings, tools or data play a role in encouraging business involvement in NbS?

Methods

To understand perceptions and experiences, expectations and ideas, it is appropriate to use a qualitative approach (Ritchie & Lewis, 2003) that allows for perceptions to be explored in depth, and for patterns to be tested.

Sampling strategy

Within the qualitative paradigm, approaches to sampling do not aim for high absolute numbers of samples collected, such as individuals interviewed, but to sample a diversity that allows a full range to be understood confidently, and to understand patterns.

In terms of the diversity of whisky companies that we seek to sample, there are two key axes of variation that we will aim to include. Firstly, we aim to sample those that we know have been involved/ interested in NbS and also those that may not have considered/ or are not currently interested in such activities. Secondly, we aim to sample bigger companies (who may run numerous distilleries) as well as smaller companies. If possible, we will also seek to sample from companies who directly own land in parts of the catchment in which they work, versus those that do not. In total we do not expect to sample a large number of whisky companies – in principle 5-10 would be sufficient though we may be able to carry out more.

Although our primary unit of analysis is organisations, their operations are designed and carried out by individuals. We are especially interested to access individuals involved in strategic planning. We will conduct one or more interviews from each organisation. We will use a snowballing sampling strategy and advice from gatekeepers and sectoral contacts, and respond to possibilities of access.

Data sources

The primary research participants will be those involved in managing and shaping the strategy of whisky companies. We have compiled a set of potential contacts and starting points which are confidential to the study team. This may include more than one interviewee per company, where an initial point of contact deems this relevant. Where appropriate – e.g. where a company is part of a larger parent company, this may include or start from the owner. Starting points and number of interviews per company will also be determined by practicalities of access. Before carrying out interviews, and during interviews, we will also seek to supplement our interview data with any publicly available information on the respective whisky companies.

Additional interviews will also be conducted with the Scotch Whisky Association, for example their Policy lead on supply chain resilience and with SEPA staff related to Whisky sectoral plan lead. The

aim here would be to build relationships that help us better understand sectoral priorities, opportunities and challenges, and help foster eventual impact.

Interview topics

Semi structured interviews will be the primary source of data. Across all interviews we will aim to explore all the factors identified above, whilst being sensitive to other emergent themes. Headline interview topics (to be refined further into an interview guide) include;

- Potential business challenges, constraints and opportunities related to nature (NbS).
- Existing data, evidence, tools or other resources used in strategic planning
- Explore any existing use of NC framings, tools and data +/ Discuss potential of existing tools and data (especially Natural Capital Protocol, existing datasets).
- Discuss factors shaping (enabling or constraining) ability to consider NC in decision-making. [including any policy levers or drivers].
- For large businesses, aim to elicit examples of their distilleries that are and are not obvious pro-environmental, and discuss why this is so.

Ethics and GDPR

Personal data collection will not commence until the approval is received by the James Hutton Institute Ethics Committee, and subsequently from RESAS Social Approval. All data will be managed and processed in accordance with GDPR.

Analysis

Abductive Qualitative thematic analysis (Braun & Clarke, 2006) related to the themes used for interview will be supported by Nvivo 12. Where relevant this will be applied to interview transcripts and any contextual information on whisky companies. This will start as soon as data is collected to allow emergent themes to be tested and triangulated through further interviews.

The final phase (see Appendix 2) involves discussion with these and other stakeholders to consider generalisable implications. This also serves as a peer check on our preliminary analysis of results, further safeguarding quality of the analysis.

Key insights and outputs

In December 2025 data collection is due to be completed (milestone 4.2) and by September 2026 we will deliver our main report on private sector perceptions and experiences of NC and NBS (deliverable 4.2).

We will identify insights into key motivations, drivers and data that affect decision-making by whisky company actors in support of sustainability, with generalisable implications (recommendations) for future steps or changes that can encourage those and other business actors to embed sustainability considerations.

Where relevant we will engage with the Enterprise Agencies and SEPA Sectoral lead to help articulate specific recommendations for future strategic planning. There is also a future option to consider generalisability to other sectors. By March 2026 (end of project) we will deliver a briefing (deliverable 4.3) on issues shared across cases and places, with implications for mainstreaming sectoral involvement in managing nature. Please see Appendix 2 for more information on the future work plan of this project.

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Appendix 1 – IUCN Standard for Nature-based Solutions (IUCN, 2020)

NbS criterion	Overview
Criterion 1: NbS effectively address societal challenges	NbS is designed as a response to a societal challenge(s) that has been identified as a priority by those who are or will be directly affected by the challenge(s). NbS action is therefore primarily challenge driven.
Criterion 2: Design of NbS is informed by scale	NbS designs that recognise the complexity and uncertainty that occur in living dynamic land/seascapes. Scale applies not only to the biophysical or geographic perspective but also to the influence of economic systems, policy frameworks and the importance of cultural perspectives. NbS action therefore needs to be at a scale (cumulatively and/ or individually targeted) to increase the potential for positive change.
Criterion 3: NbS result in a net gain to biodiversity and ecosystem integrity	NbS design and implementation must avoid undermining the integrity of the system and instead, proactively seek to enhance the functionality and connectivity of the ecosystem and hence long-term resilience.
Criterion 4: NbS are economically viable	There must be strong consideration of economic aspects in the design of NbS to increase sustainability. This must consider long term gains as well as on going costs (e.g. monitoring and management) alongside more immediate outcomes.
Criterion 5: NbS are based on inclusive, transparent and empowering governance processes	NbS design must acknowledge, involve and respond to the concerns of a variety of stakeholders, especially rights holders. This can enhance the social 'license to operate', the legitimacy of benefit and cost sharing arrangements and reduce the likelihood of otherwise well-intended actions adversely impacting local communities and other affected stakeholders.
Criterion 6: NbS equitably balance trade-offs between achievement of their primary goal(s) and the continued provision of multiple benefits	NbS actors must acknowledge the trade offs involved as ecosystems provide a wealth of different benefits and not everyone values each of them in the same way. NbS design must follow a fair, transparent and inclusive process to balance and manage trade-offs them over both time and geographic space.
Criterion 7: NbS are managed adaptively, based on evidence	NbS actors must recognise the uncertainty that entails intervening in ecosystems. NbS implementation plans must include provisions to enable adaptive management to maintain the relevance of NbS to effectively develop and harness ecosystem resilience for human benefit.
Criterion 8: NbS are sustainable and mainstreamed within an appropriate jurisdictional context	NbS interventions need to be designed and managed with a view to long-term sustainability, taking into account of, working with and aligning to sectoral, national and other policy frameworks. Institutional opportunities need to be seized and barriers to embed NbS practice across contexts and scales overcome.

Appendix 2 - Timetable until March 2027

Organising research activities (Activity 1: Identifying NBS practices and private actor involvement)	
Feedback from Natural Capital Team and agree WP4 plan	July 2023
Milestone: Full research plan (M4.1)	Sept 2023
Initial literature review	October 2023
Interview Topic guide development	October 2023
JHI ethics approval	October 20203
RESAS ethics approval	October 20203
Identification of potential gatekeepers (key people to contact within each company)	November 2023
Undertaking research activities (Activity 2: Understanding private actor involvement in NC)	
Scoping interview with Scottish Whisky Association (background, on-boarding, key contacts)	October/ Nov 2023
Introduce research and invite potential participants from whisky companies for (ideally) face-to-face interviews (to support relationship building)	Nov/ Dec 2023
Undertake interviews with whisky company representatives	Jan 2024 – Dec 2024
Data analysis	April 2024 - June 2025
Milestone: Initial findings identified and written up (M4.2)	Dec 2025
Develop deliverable structure and content	Jan – May 2026
Expanded literature review (beyond whisky sector)	April 2026
Deliverable (D4.2): Report on private sector perceptions and experiences of NC and	Sept 2026
Testing and generalisation (Activity 3: Testing resonance of issues across cases and places)	
Engagement with key stakeholders to validate findings and explore resonance for private sector involvement more widely (i.e. with and beyond the whisky sector). We envisage a workshop and/or delphi-like process, but will design this after discussion of this work with key stakeholders (e.g. Scottish Whisky Association and Enterprise Agencies)	Sept 2026 – Dec 2026
Deliverable (D4.3): Briefing on main issues shared across cases and places, and implications for mainstreaming sectoral involvement	January 2027