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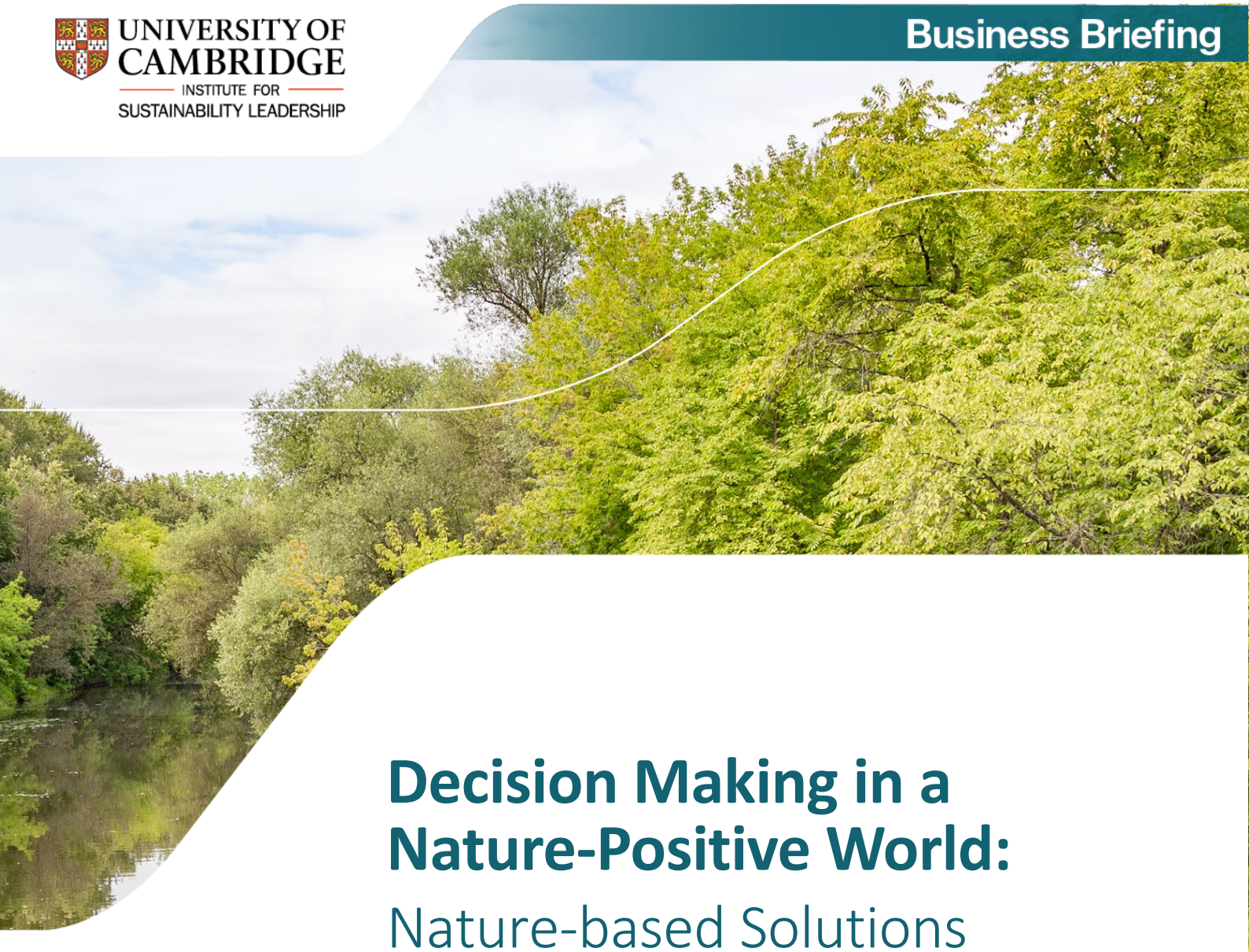

Decision Making in a Nature-Positive World:

Nature-based Solutions for the Water Sector

The University of Cambridge Institute for Sustainability Leadership

The University of Cambridge Institute for Sustainability Leadership (CISL) partners with business and governments to develop leadership and solutions for a sustainable economy. We aim to achieve net zero, protect and restore nature, and build inclusive and resilient societies. For over three decades, we have built the leadership capacity and capabilities of individuals and organisations and created industry-leading collaborations to catalyse change and accelerate the path to a sustainable economy. Our interdisciplinary research engagement builds the evidence base for practical action.

Authors

Dr Gemma Cranston, Polly Ghazi & Adrian Greet.

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About this brief

This business briefing highlights nature-based solutions (NbS) as an effective strategic approach for water and wastewater companies seeking to future-proof their businesses against the growing impacts of climate change and biodiversity loss. NbS work by protecting and restoring nature whilst providing a solution to a business and societal need. These emerging solutions can deliver real and tangible benefits to people, nature and the global climate, and have a crucial role in the business transformation needed to provide a nature positive world.

The brief first describes the regulatory, policy and operational imperatives that support the adoption of nature-based solutions at scale. It then highlights the business case for the sector and provides proven examples of cost-effective, nature-based measures and successful UK projects. Finally, it explores common challenges to adopting NbS and how co-benefits can be leveraged by working across sectors.

This is one of a series of sector specific business briefings that CISL has produced to support effective decision making in a nature-positive world. The other sectors covered include built environment and linear infrastructure, finance, and food and beverage.

What are Nature-based Solutions?

There are many definitions of NbS, but all focus on natural systems and ecosystems to address environmental and societal challenges. Typically, a range of partners, including ecosystem services providers (such as farmers) and buyers (such as water companies), adopt nature-based schemes at a water catchment or landscape scale.

CISL defines NbS as "ways of working with natural systems to strengthen them while solving broader problems such as climate change, health, social inclusion, and more." Nature-positive is the term used to describe a world where nature – species and ecosystems - is being restored and is regenerating rather than declining.

1. Context

The UK, and the world, face dual and intertwined climate and biodiversity crises. Water and wastewater companies are on the frontline of both challenges as they seek to deliver critical public services while navigating climate change impacts and stewarding the natural resources on which their business – and society – rely.

Nature-based solutions offer a way forward as these sectors seek to future proof their operations. First mover companies are collaborating with local authorities, food and beverage companies and farmers on landscape-based approaches that work with nature to address water quality and availability, biodiversity loss, and climate-related risks such as flooding.[i] The UK Government is playing its part with changes in regulation and policy designed to catalyse and scale progress.

Regulatory and policy drivers provide both incentives and deterrents.

Pressure is growing on UK water service suppliers to invest in NbS alongside traditional hard infrastructure. The Government's 25 Year Environment Plan (25YEP) lays out a roadmap and stringent targets to improve air and water quality and protect biodiversity. The Environment Act 2021 sets legal requirements for Biodiversity Net Gain. Water companies also have a role in delivering the improvements in water quality and flow needed to meet Water Framework Directive requirements. To achieve these, regulatory authorities are issuing River Basin Management Plans for each river basin district in England, Wales and Scotland.

Specific policy guidance for the water sector points directly to catchment-level nature-based solutions and the multiple benefits they can deliver. NbS adoption is encouraged, for example, in Defra's strategic direction statement to Ofwat, the Water Industry National Environment Programme (WINEP) guidance for 2025-2030, and the Environment Agency/Natural England Water Industry Strategic Environmental Requirements.

Ofwat has set a requirement for water companies in England and Wales to reduce river and stream pollution by one-third by 2025. The industry regulator is encouraging investment in nature-based climate solutions, such as peatland restoration and tree planting, over infrastructure measures – and incentivising such programs. From 2020-2025, Ofwat will provide £4.8bn to water companies through the National Environment Programme for Wales, and WINEP for England, to address pollution, biodiversity loss, drought and flooding.[ii] Under the Environment Act, companies with wastewater duties have also been directed to produce drainage and wastewater management plans (DWMPs) by 2023.

This new direction in Government policy reflects a growing understanding of the importance of tackling the biodiversity and climate challenges together, alongside a recognition that these can be effectively addressed at the catchment scale.

As a result, the industry is shifting its approach to operations and embracing more collaborative "landscape" or "catchment" solutions.

Hard engineering approaches remain the norm when upgrading water and sewerage networks. However, leading water and wastewater companies are adding nature-based solutions to their operational toolkit. In 2020, trade association Water UK launched a roadmap to achieve net zero water supply in 2030 that includes investment in landscape restoration.[iii] Joint commitments by 15 member companies include

restoring 20,000ha of peat/grassland and planting 11 million trees to abate greenhouse gas emissions, restore habitat and reduce flood risk.

The sector is also moving towards a more holistic approach. Instead of treating climate mitigation and biodiversity protection as separate challenges requiring different solutions, companies are adopting measures that deliver multiple environmental benefits at the landscape or catchment level in collaboration with other local stakeholders. Two examples (see box) are the successful partnerships across England and Wales to implement drainage and wastewater management plans and a catchment-based approach for river basins.

In short, water companies are learning that by adopting nature-based solutions and working with other stakeholders, they can address the climate and nature crises together. Early schemes show that harnessing nature can generate broad benefits – operational resilience, biodiversity and environmental and public health issues such as water quality and pollution prevention.

Collaborative Landscape and Catchment Solutions in Action

Regional drainage and wastewater management plans (DWMPs)[iv] seek to deliver collaborative and integrated long-term planning to ensure the sector's networks and systems are resilient to future pressures such as climate change and population growth. Wastewater companies are leading their development, working closely with stakeholders such as local authorities and environmental NGOs. Often, these roadmaps include NbS. For example, Northumbrian Water, the Environment Agency, 14 local flood authorities and local river and wildlife trusts are partnering on sustainable drainage projects that include natural flood management techniques.[v]

Catchment based approaches (CaBA), launched by Defra in 2013, integrate land and water management at river catchment scale to deliver environmental, social and economic benefits.[vi] CaBA partnerships are typically led by civil society organisations, which engage government agencies, local authorities, water companies and other businesses in programmes that improve water quality and biodiversity, reduce flood risk and enhance climate resilience. Local communities also enjoy health and wellbeing benefits as they take ownership of their local river environment. From the water sector's perspective, engaging in and financing CaBA enables deployment of sustainable, nature-based water and flood management projects that build operational resilience and help meet regulatory guidance.

2. The business case for Water sector Nature-based Solutions

The business case for operators and other stakeholders to adopt and collaborate on nature-based solutions for UK water catchments is strong and falls into three main areas.

Improving operational resilience

Water quality, availability and risk management are the main focus for water companies in maintaining and enhancing operational resilience. In each area, nature-based solutions offer a cost-effective alternative to the capital-intensive engineering measures that have traditionally been the default approach for water and wastewater companies. NbS schemes mimic natural processes to reduce runoff, slow water flow and hold water in landscapes. This prevents water and wastewater networks from inundation, protecting essential public services from supply interruptions and pollution incidents.

As rainfall intensifies in the UK, water and wastewater companies that adopt NbS will likely prolong the working life of water/wastewater infrastructure, saving on maintenance, repair, recovery and replacement costs, as well as the tertiary treatments that result from storm overflow events. NbS can also support drought-prone parts of the country by holding water in soils.

> *"In many cases, more ecosystem-friendly forms of water storage, such as natural wetlands, improvements in soil moisture and more efficient recharge of groundwater, could be more sustainable and cost-effective than traditional grey infrastructure."*
>
> UN World Water Development Report 2018: Nature-based Solutions for Water

Specifically, NbS use or mimic natural processes to enhance operational resilience and generate a range of positive outcomes, including:

- Enhancing water availability through measures that retain soil moisture and recharge groundwater
- Improving water quality through measures such as reviving wetlands and constructing riparian buffer strips
- Reducing flood risks through urban green roof programmes and floodplain restoration
- Improving water quality at abstraction points which protects continuous supply and reduces the cost and carbon intensity of water processing treatment
- In urban areas, reducing storm overflows and flooding while creating recreational opportunities through sustainable drainage systems (SuDs)

Often, these measures are not taken directly by water firms. Instead, land owners and managers – typically farmers, local authorities or private estates – implement agreed solutions, with water companies paying for the ecosystem services.

Early evidence suggests NbS measures can be cost-effective compared to traditional hard engineering solutions. For example, Anglian Water and Norfolk Rivers Trust have installed a low-cost wetland system alongside the River Ingol to help treat wastewater, avoiding costly and carbon-intensive nutrient stripping techniques.[vii]

Managing business risk

Water sector companies also face mounting, longer-term business risks due to the degradation of the natural resources they rely on to deliver public services. These include reputational risks associated with the intensifying impacts of human development, climate change and biodiversity loss, and risks from the industry's evolving regulatory environment.

For example, flooding incidents in the UK water network are becoming more frequent due to urbanisation, legacy land practices and changing rainfall patterns due to climate change. According to the MET Office, total UK rainfall from extremely wet days increased by around 17% from 2008 to 2017,[viii] a trend that is expected to continue.

Water quality is another area of growing risk. Water companies are held accountable directly and reputationally for providing clean water, and environmental pollution has risen over the past five years.[ix] Water companies face significant financial costs to meet increasingly tight Environment Agency wastewater effluent permits. Firms must invest in more resilient infrastructure to mitigate the rising potential for service outages, flooding or pollution events, damage to physical operations and the escalating financial, regulatory and reputational costs associated with all the above.

Nature-based solutions such as wetlands can offer firms better potential outcomes in terms of cost, biodiversity protection and public health than the default option of building or enhancing water treatment plants. They also prevent increases in carbon emissions associated with capital investments in new hard infrastructure. One company found that 85 per cent of the 270 wastewater network blockages across its network from 2012-2020 took place within days of a peak rain event, costing an average of £16,500 to clear. NbS measures can reduce and slow water flow (see page 8), in turn reducing the risk of such blockages caused by inundation and surface debris.

Wider business and environmental benefits

Investment in the same nature-based solutions – such as woodland or wetland creation – can create benefits for multiple parts of a water company's business and other sectors. These win-win outcomes include ground and surface water recharge, improved water quality and flood risk management, and contributions to corporate GHG emission reduction and biodiversity targets. In addition, the outcomes generated can also benefit other sectors such as agribusiness, housing developers, manufacturers and retailers. As a result, there are incentives for multi-sector stakeholders to come together to invest in NbS, reducing capital and operational expenditure and increasing the cost-benefit analysis of such investments. (See, for example, LENS case study, page 9).

Knock on environmental impacts that benefit nature and society include richer soils and regenerated landscapes and habitats that boost plant and wildlife diversity and enhance carbon sequestration. Positive effects on public health and wellbeing include reduced pollution and improved recreational opportunities, which can enhance corporate reputation and brand. For example, Eddington, a new university development in northwest Cambridge, is home to the UK's largest site-wide water recycling system. Residents benefit from a sustainable urban drainage system that collects rainwater in lakes, sustainable drainage, and on attractive blue and green roofs before treating and reusing it in buildings.

3. Nature-based Solutions in action

Interest is surging among the private sector, local authorities, farmers and other land owners to collaborate on solutions that respond to regulatory and policy drivers to combat biodiversity decline and climate change and address business risks and opportunities. The water sector is among those leading the charge.

Successful, scalable collaborative models are emerging to support sustainable agriculture and corporate adoption. Below, we highlight specific NbS measures relevant to water companies, drawn from projects that CISL is engaged in, followed by a case study of the LENS East of England project involving three water services firms. This showcases Landscape Enterprise Networks in action, a form of NbS called a promising model in the Government's 25YEP.

Examples of nature-based solutions and benefits for water companies and other stakeholders

Taking action through nature-based solutions provides direct benefits for the water sector, other sectors, and nature and for society. Below we link common, effective measures to the specific benefits they can generate for different stakeholder groups.

Nature-based solutions	Benefits for water companies	Co-benefits for nature, society and other sectors
Switch arable land to grassland with no fertilizer or pesticides	Costs are avoided by limiting: a) the risk of surface water runoff inundating water networks and other infrastructure; and b) the risk of contaminants polluting water supply. Grassland also stores carbon, supporting corporate climate targets.	Reduces flood risk and potential impacts on communities and agriculture. Reduces soil erosion and nutrient loss, which in turn supports healthy soil and crops, and habitat variety.
Plant cover crops on bare land in the autumn	Reduces risk of nitrate leaching into water sources. Improves soil fertility and structure, and protects soils from erosion during winter.	Improves soil fertility and structure, reduces nitrate leaching and protects soil erosion during winter.
Create or maintain floodplain meadows	Promotes flood management by retaining rainfall, reducing risk to water sector networks and other infrastructure.	Provides habitats for birds, wetland plants, amphibians, invertebrates and small mammals.
Create species-rich, semi-natural grassland through grazing, hay-cutting and pesticide avoidance	Contributes to water company flood management efforts and stores carbon. Recreational benefits can boost corporate reputation.	Stores carbon, protects against flooding and provides rich habitat for grasses, flowers and wildlife.
Plant new cross-slope hedgerows	Reduces flooding and water pollution risks.	Reduces soil erosion and runoff while providing habitat and pollen for many species. Stores carbon.
Plant new native woodland	Contributes to flood management. Supports corporate net zero carbon emission targets.	Slows surface water runoff and increases water take-up, leading to richer soil. Provides habitats and stores carbon.

Case Study: Water Companies Work with Nature through a New LENs in East Anglia

The LENs East of England project delivers nature-based solutions that engage private and public sectors and empowers farmers. Together with other emerging Landscape Enterprise Networks around the UK, it provides a scalable blueprint to help realise the Government's vision for sustainable land and water management.

The LENs approach overcomes common barriers to large-scale landscape improvements by enabling co-funding between public and private stakeholders and establishing effective governance to manage the process. Anglian Water, Affinity Water and Essex and Suffolk Water are among partners buying services from farmers to reduce diffuse pollution of waterways, including by nitrates.

Each demand organisation contributes part of the cost of a farm measure such as hedgerow planting but enjoys the full benefit of ecosystem services it delivers.

Farmers bid for funding for measures that would deliver revenue for their farms alongside benefits for water companies operating locally and for nature.

Proposals received:

- **84** proposals from **31** farmers valued at **£2.02** million covering **9,463** hectares
- **6** aggregated proposals submitted by supply aggregators across **4** trade areas

Proposals funded:

- **23** different measure types funded across **7,470** hectares
- **£1m** funding from **5** organisations
- **22,600** metres of linear measures funded, mostly hedgerows

Most popular measures:

(By number of farmers proposing and funding):

- Grain legumes added to arable rotations
- Cover crops introduced
- Reduced cultivation
- Farmer innovation (self-proposed measures)
- New hedges planted

Farmers began implementing measures from autumn 2021 to summer 2022 to fit their seasonal timetable. Payments are managed by grain processors, acting as supply aggregators, who hold the funds and log evidence of farm measures taken. Payments are released after demand partners review the evidence and either approve disbursement or challenge the work's quality or completeness, resulting in follow up with farmers.

By mid-2022, all 31 farmers from the first trading round had begun implementing capital or infield measures. The second round of trading was also underway, with a £2.5m budget, a 250% increase in scale, and planned contracts to be signed with 71 farmers.

4. Accelerating adoption of Nature-based Solutions

Water and wastewater companies, with other sectors reliant on natural resources, have a timely opportunity to solve strategic business and environmental challenges by embracing nature-based solutions at scale.

As described above, when firms put resources into an NbS project they are choosing to work with nature to address current or expected challenges to their business model and operations, such as flooding, drought, or the need to increase carbon sequestration. An NbS project might be an alternative to a conventional (possibly high carbon) approach to the challenge, or an investment in improving the business's resilience.

In CISL's experience, when organisations embark on this journey they typically face common internal and external challenges. While NbS can deliver clear benefits, it is still a relatively new approach, and corporate proponents often have to work hard to get the support to implement them. To help bridge this gap, CISL has published a detailed diagnostic tool to advance organisational understanding of NbS projects and accelerate corporate adoption and implementation. In conjunction with this brief, companies may find *Decision Making in a Nature Positive World: A Corporate Diagnostic Tool to Advance Organisational of Understanding of Nature-based Solutions Projects and Accelerate their Adoption* helpful in moving forward.

The tool, illustrated below, helps internal advocates navigate four common obstacles:

- **Dealing with the unknowns** that delay or obfuscate NbS decision-making processes
- **Making the financial case** for NbS benefits, especially when compared to a company's traditional solutions
- **Navigating external and reputational pressures** such as external stakeholders, regulatory compliance, supply and value chain actors, and possible NbS partners
- **Engaging and influencing colleagues** to convince them of the benefits of NbS and convert them from undecided to NbS supporters.

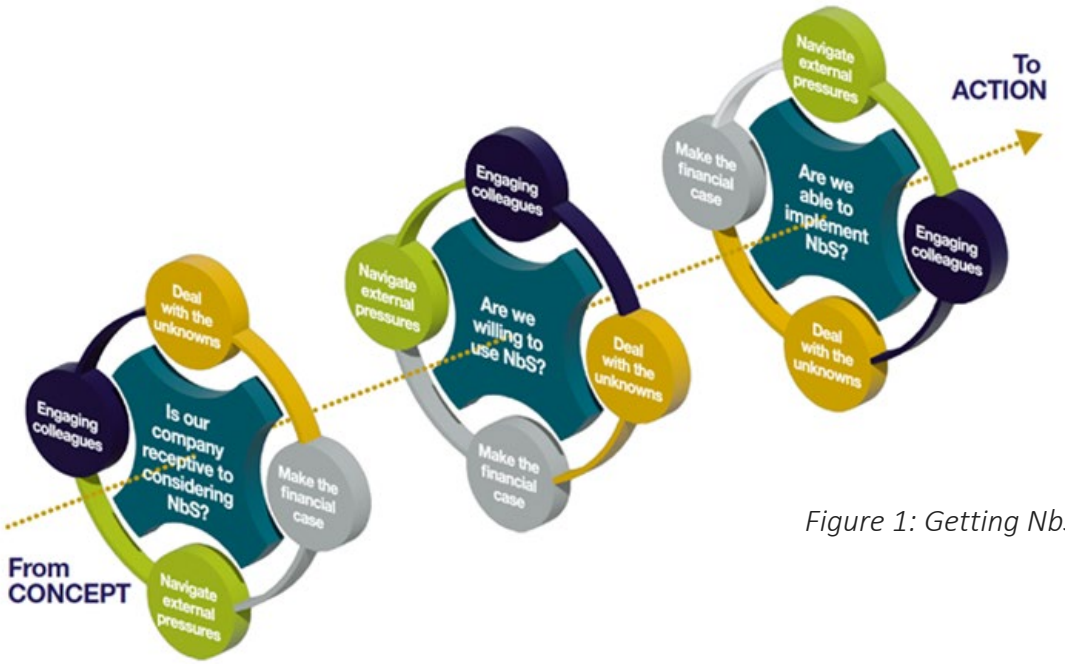

Figure 1: Getting NbS ready.[x]

Next steps

The time is ripe for UK sectors whose business models and success depend on nature to transform their strategic planning by embracing nature-based solutions at scale. Water and wastewater companies are among those that can benefit from prioritising NbS as they pursue more resilient and cost-effective operations in response to regulatory pressures, rising risks from climate change and nature degradation, and internal carbon targets.

This business briefing provides a snapshot of how NbS approaches work, the benefits already being generated by existing schemes, and the co-benefits that can be delivered beyond the water sector. Water companies across the UK have the opportunity to partner with other stakeholders in ways that harness these benefits collectively, reduce their costs and deliver on a range of outcomes that are broader than their own business objectives.

The Cambridge Institute for Sustainability Leadership (CISL) can assist water sector companies and other organisations in future proofing their businesses by harnessing the power of nature.

For more information on our work in this area, see here and contact business&nature@cisl.cam.ac.uk.

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