

The Environment

December 2022/January 2023

CIWEM

THE MAGAZINE FOR THE CHARTERED INSTITUTION OF WATER AND ENVIRONMENTAL MANAGEMENT



FUNGI

WHAT ARE THEY GOOD FOR?

06 INTERVIEW
Meet the Seed Detective

08 NATURE
Boost your mood

10 CARBON
Making it count

20 SUDS AND
THE CITY

34 CIWEM NEWS
Saving our Soils

'UNDERSTANDING NATURE'S BENEFITS MAKES A STRONGER BUSINESS CASE'



What are the challenges – and how do we unlock opportunities – for nature-based solutions? **Bruce Horton** and **Chris Digman** report

Nature-based solutions (NBS) are used increasingly to address societal challenges in a sustainable way while delivering multiple benefits.

NBS include a range of techniques and approaches such as blue-green infrastructure (BGI), natural flood management and sustainable drainage systems (SuDS). Solutions include conserving and increasing tree cover, renaturing water bodies, creating areas for temporary flooding along rivers, restoring wetlands, increasing connections between green spaces, installing rain gardens on streets and building green walls and roofs in cities.

While not a silver bullet, NBS can help to tackle the climate crisis, ecosystem collapse, population pressures and economic insecurity. But it surprises people that – given NBS's perceived advantages over traditional, hard-

engineered approaches – we don't use them more widely.

There are challenges to identify, design, deliver and pay for NBS. To overcome these challenges and deliver on a bigger scale, we must understand the challenges' nature and extent.

Pressures on time and land can favour unsustainable solutions – additional treatment, large storage tanks – that are energy-intensive and emit greenhouse gases

ESTABLISH THE BENEFITS

It can be difficult to articulate with certainty the benefits of NBS. We must understand and clarify the benefits if we're going to include NBS in business cases and support decision making. Even where we understand the benefits

of NBS, it can be difficult to quantify or value them on the same terms as the financial costs. That can make it difficult to determine how much to invest or to compare schemes' approaches.

NBS deliver multiple benefits. That's their key attraction. Planting more trees can boost carbon storage and air quality, manage water, regulate erosion, control temperatures and support biodiversity and recreation. Restoring wetlands benefits both carbon storage and flood management.

Tools such as CIRIA's Benefit Estimation Tool (BEST) make it easier to calculate the benefits to make a business case for NBS. BEST makes it easier for decision makers to articulate, estimate and value the benefits that NBS offer. BEST will soon be available in an online, spatial version.

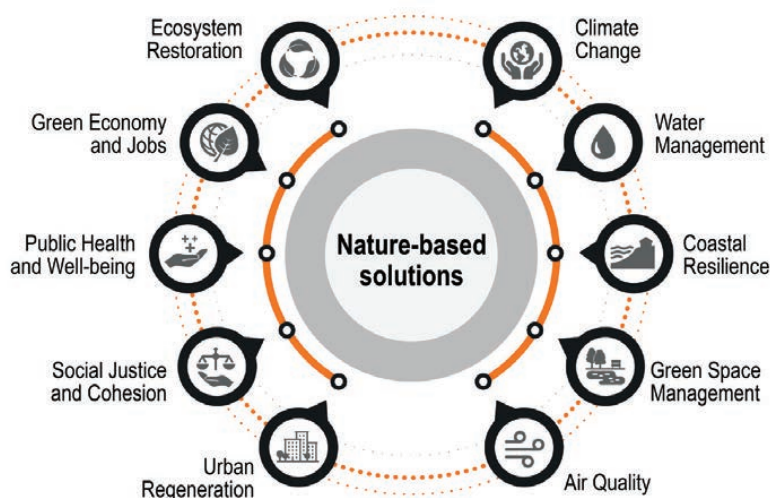
Water companies, local authorities and others use tools like BEST to determine the benefits of BGI and to present the business case to boards, regulators and others.

BUILD THE FRAMEWORKS

People can be averse to change. We associate change with risk. Water is heavily regulated – it's critical to public health and environmental stewardship. Perceived risk can make or break choices between traditional infrastructure and innovative, sustainable solutions. Why change if something works; why risk penalties by trying something new?

Regulatory bodies can build the framework to influence change. This must be flexible to produce more environmentally friendly, sustainable options, while understanding that outcomes and opportunities to implement can be uncertain.

NBS to manage water on a large scale in urban areas bring more benefit but can cost more. We need to be creative, connecting systems to tap diverse



SMITIC

funding pots. This is an opportunity to create new funding streams – and new ways to deliver these solutions.

It takes time to unite diverse organisations, each of which is facing its own competing priorities, in order to find planned, adaptive solutions to funding gaps. Doing so goes beyond obvious water infrastructure funding, exploring complementary areas such as transportation, housing, health and green spaces.

NBS can require multiple partners to align and may be more difficult to fund. Projects with multiple objectives, that provide multiple benefits, must involve a range of organisations, each with its own objectives, drivers, constraints and funding regimes.

They may be resource-constrained; they may need regulatory approval and agreement, navigating strict financial accounting rules, to channel revenue from customers’ bills into NBS projects. We must understand what rules apply to which organisations and identify what needs to evolve.

Collaboration can navigate these funding challenges. Organisations can come together to agree a vision, set objectives, articulate and measure the benefits and deliver in partnership.

In Hull and the East Riding of

Even where we understand NBS’s benefits, it can be tricky to quantify or value them on the same terms as the financial costs. That can make it difficult to determine how much to invest or to compare schemes’ approaches

Yorkshire, partners Yorkshire Water, Hull City Council, East Riding of Yorkshire Council, the Environment Agency and the University of Hull are working to deliver the Living with Water programme.

This will ultimately build flood resilience, develop innovative water-management systems and highlight why the region is a great place to live, work and visit. The partners are working to deliver numerous SuDS projects aimed at reducing flood risk.



Above and below: Clifton Integrated Constructed Wetlands is Yorkshire’s first nature-based wastewater-treatment system



UNDERSTAND NBS OUTCOMES

Natural systems can be poorly understood and their outcomes uncertain. Nature is complex – people and organisations want certainty. We need to understand how natural systems work, evolve and interact.

It can be easier for people and organisations to favour options that align with the status quo – where action A delivers outcome B – over NBS.

The challenge is how we perceive and manage these solutions. You wouldn’t ask your dentist to fix your washing machine. A lone civil engineer can’t design, manage and maintain a SuDS scheme or constructed wetland.

Effective NBS that deliver broad, deep benefits demand expertise and input from different specialists: landscape architects, ecologists, hydrologists and many others. You might feel you know

where you are with concrete and steel, but NBS offer flexibility and resilience. You can adapt, reconfigure and add to NBS over time, to suit changing requirements. Clifton Integrated Constructed Wetlands – Yorkshire’s first nature-based wastewater treatment system – demonstrates how focusing on outcomes delivers successful NBS (see *box overleaf*).

WORK TOGETHER

Delivering NBS is rarely straightforward. Schemes that integrate a range of organisations, people, communities and the environment will always take time and effort to deliver.

NBS also tend to be land-intensive. This can be a challenge in urban areas, with scarce land and several competing development pressures often

CLIFTON INTEGRATED CONSTRUCTED WETLANDS

BASED IN A SMALL village in South Yorkshire, this site has been transformed into an integrated constructed wetland to meet new water-quality objectives and manage the quantities of nutrients that re-enter the environment.

Stantec, Yorkshire Water and partners created a nature-based solution that uses clay in five ponds and more than 24,000 plants to remove phosphorus from treated wastewater then return the water to the environment. This zero-chemical, low-carbon NBS simulates physical, chemical and biological treatment

processes to remove phosphorus in a sustainable way.

We estimate that this nature-based water-treatment method cuts embodied carbon emissions by 50 per cent and operational carbon emissions by 80 per cent compared to engineered water-treatment methods.

Clifton Integrated Constructed Wetlands scooped two prizes – wastewater innovation project and natural-capital initiative of the year – at the 2022 Water Industry Awards. It won the innovation award and was named overall winner at the CIRIA BIG Biodiversity Challenge Awards. ◉



creating difficult trade-offs that must be considered and managed.

The UK government's recent Storm Overflows Discharge Reduction Plan "sets stringent new targets to protect people and the environment". It "will require water companies to deliver the largest infrastructure programme in water-company history".

There are pressures on time and land with which to contend. Those pressures can favour unsustainable solutions – additional treatment, large storage tanks – that are energy-intensive and emit greenhouse gases. There's a growing consensus that sustainable approaches – such as SuDS alone – can't meet our requirements, at least in the short term. The pace of change is therefore critical.

Operating and maintaining NBS schemes is another challenge. Who – local authority, developer, management company, water company, third sector or residents' association – provides the expertise, funds and resources to keep above-ground natural systems looking good and working well? All the partners are under pressure.

It takes early, continuing engagement to deliver successful nature-based solutions. Recent evidence on SuDS from Wales showed that residents can be worried about loss of car parking and the schemes' local impacts. Partners can overcome concerns, holding considered consultation and sharing learning from nearby schemes.

Schemes can have positive effects, boosting community use and appreciation of green spaces, prompting neighbouring streets to ask for SuDS.

Across society, regulators, policy organisations and governments must work together to give NBS the time it takes to deliver the outcomes we want. This means looking longer term, to understand and promote the project's whole-life costs and benefits.

Effective NBS demand expertise and input from different specialists; landscape architects, ecologists, hydrologists and others

Long-term operation and maintenance means agreeing clear responsibilities from the outset, with formal long-term management agreements if need be. Maintaining NBS ensures that their function and the benefits endure.

It's also critical to capture the flow of benefits over time and create mechanisms to secure future revenues to deliver these benefits. As NBS become mainstream, we must press government bodies and regulators to support and fund more, thriving schemes.

FUTURE PRIORITIES

There's clearly a lot to do and a long way to go to overcome the challenges, realise the opportunities and scale up NBS. A

few immediate priorities will help to smooth the path.

First, private, public and third-sector organisations must work together to seek out opportunities to incorporate NBS in optioneering, project design and implementation. This is happening already, but we need a more joined-up, systems-based and strategic approach, with central organisation and oversight.

Second, regulators must be more flexible and joined-up to support proposals that have less-certain outcomes – that may even occasionally fail – but are more resilient to the challenges we face. This may require collaborative frameworks to underpin long-term planning and create incentives for schemes and projects whose benefits take time to realise or that accrue beyond existing planning periods.

Finally, we must understand and assess the multiple benefits that NBS offer. Setting these out can identify future revenue streams. That will enable us to create markets for benefits, connecting buyers and sellers to deliver these opportunities.

Addressing these priorities will help to turn challenges into opportunities. It will help us to realise NBS's benefits and to make these schemes more widespread. ◉

Bruce Horton is technical director and Chris Digman executive technical director at Stantec