Nature-based Solutions for Asset Management

The Institute of Asset Management

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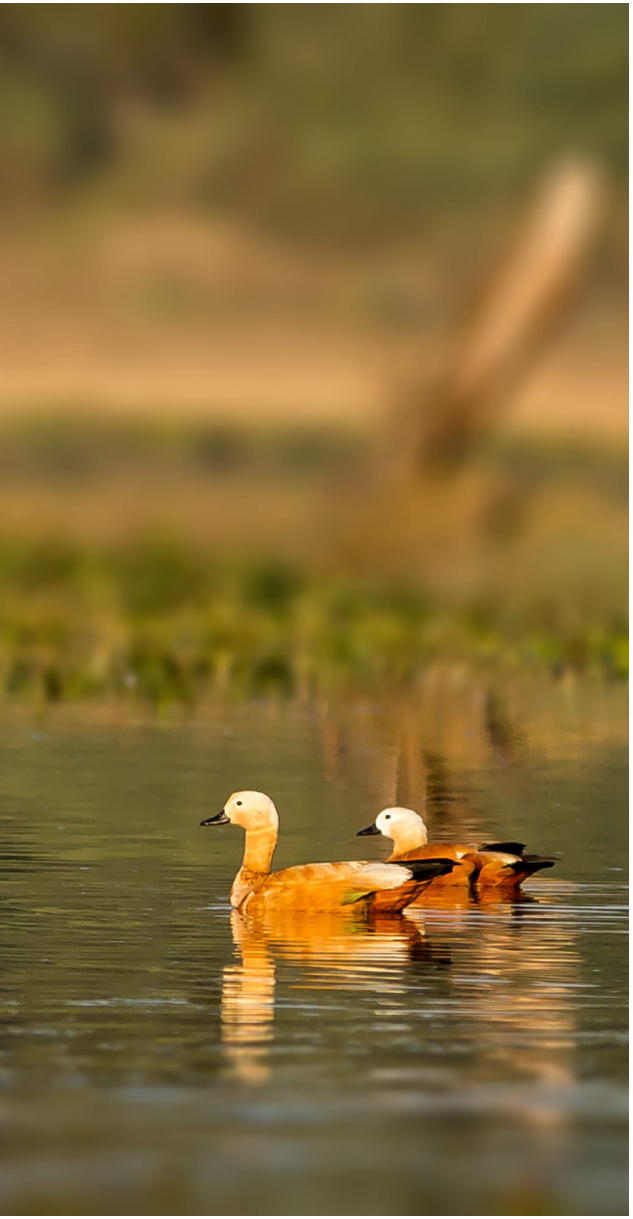


Executive Summary

Since the industrial revolution, built infrastructure has not been designed, let alone built, with the protection of our natural ecosystems as a leading focus. Wildlife and plant populations have significantly declined since the mid-1900s, and infrastructure contributes to this loss. Infrastructure managers are still not fully considering the damage to nature and wildlife when designing, operating, and managing their networks. Urgent change and action are needed from the asset management community to address past decisions and embrace Nature-based Solutions.

Asset managers need to plan and manage their networks with a future climate in mind, ensuring that daily asset management decision-making is passed through a lens of environmental protection and improvement. This must be achieved through collaboration with different parties, installing scientific knowledge about how to mitigate the effects of climate change, and staying ahead of regulatory and/or policy changes.

What do Nature-based Solutions create? They use the power of nature and healthy ecosystems to improve both our built environment and society. Directly, this contributes to limiting the harmful effects of climate change, supports the resilience of our infrastructure networks, and nurtures environmental biodiversity. The asset management community needs to fully understand and embrace these value points.

‘Infrastructure managers are still not fully considering the damage to nature and wildlife when designing, operating, and managing their networks.’

The asset community must lead in supporting the adoption of Nature-based Solutions in infrastructure. They support our society’s ability to meet international climate change targets, provide technological substitutes that save infrastructure planning costs, and create diverse shared community spaces.

1 Introduction

The Institute of Asset Management Climate Emergency Group commissioned this paper. This paper aims to provide practical information and stimulate the adoption of Nature-based Solutions within the asset management community. We have gathered a representative selection of case studies to showcase current solutions, tools, and methodologies as evidence to demonstrate:

i) why these measures make good business sense, and
ii) how they can be replicated and integrated into any asset management organization.

2 Background

What are Nature-based Solutions (NbS)?

According to the International Union for Conservation of Nature (IUCN), NbS leverage nature and the power of healthy ecosystems to protect people, optimize infrastructure and safeguard a stable and biodiverse future[1].

Global wildlife populations have dropped 69% since 1970, as stated in the WWF Living Planet Report 2022[2]. There is an urgent need for action from the asset management community to play a part in preventing irreversible damage through the goods and services we buy, resources and energy we consume, and the impact that the built environment has on society and the environment.

The Institute of Asset Management's (IAM) Climate Emergency (CE) group published its first white paper around the time of COP26 in October 2021, ICEP White Paper: Climate Emergency Action Planning v1 (theiam.org). In the absence of any structured guidance available at that time, the paper set out some fundamental questions for asset managers to pose when addressing climate change risk. This NbS paper builds on the ICEP White Paper, providing some practical examples of steps that contribute to addressing climate and natural emergencies.

If long-term climate adaptation and disaster risk reduction are to be successful, asset managers must bring scientific knowledge of potential future conditions into risk management, investment decision-making, and governance processes.

Enabling governance includes understanding that law and regulation will impact and steer corporate goals and drive the development of policies that will guide asset management decisions. The asset management community must commit to supporting this top-down systemic change to effectively respond to the increased frequency and severity of risks and hazards faced by humanity. Whether it is awareness or training in this area, asset management professionals play a crucial role in leading the uptake and alignment to tightening regulatory requirements.

In this paper, we present key arguments on why the asset management community must adopt an NbS approach, along with examples and case studies to inspire how NbS can be utilized within the operation and maintenance of infrastructure. Successfully implementing this approach into asset management best practice will significantly limit the effects of climate change, support environmental net gain and biodiversity, create more resilient infrastructure, and enable a built environment that benefits both people and nature.

3 Drivers: Why We Need to Adopt This Approach?

3.1 Climate Change

NbS should always be a primary consideration in our approach as asset managers. This is best exemplified by the following statement from 'The World Bank':

> *"Nature-based solutions are actions to protect, sustainably manage, or restore natural ecosystems that address societal challenges such as climate change, human health, food and water security, and disaster risk reduction effectively and adaptively, simultaneously providing human well-being and biodiversity benefits."*

The asset management community has a leading role in moving the infrastructure industry to manage the effects of climate change. NbS is one of the tools to achieve this. "Estimates suggest that nature-based solutions can provide 37% of the mitigation needed until 2030 to achieve the targets of the Paris Agreement".

3.2 Environmental Net Gain and Biodiversity

As well as helping to combat the effects of climate change, NbS can provide opportunities to support environmental and biodiversity net gain. Asset management organizations will increasingly be faced with meeting legal obligations. This could involve the organization's approach to managing and mitigating biodiversity risks, achieving no net loss, and providing net gain (when possible) of biodiversity values. For example, in England, the Environmental Act 2021 states that all planning permissions granted (with a few exemptions) have to deliver a minimum of a 10% biodiversity net gain from November 2023[3].

What is the definition of net gain? - Net gain is an approach to development that aims to leave the natural environment in a measurably better state than beforehand. This means protecting existing habitats and ensuring that lost or degraded environmental features are compensated for by restoring or creating environmental features that are of greater value to wildlife and people. Undertaking asset management activities does not, and should not, compromise natural systems. Within the IAM's Anatomy Subject Group 2 – Asset Management Decision-Making, asset managers need to better incorporate aims and planning to conserve and restore ecosystems.

3.3 Comply with International Guidance and Standards that Support Nature-based Solutions

Considerable international guidance is available for organizations wanting to commit to tackling climate change. Two such frameworks are the Taskforce on Nature-related Financial Disclosure (TNFD)[4] and the Taskforce on Climate-related Financial Disclosures (TCFD), which are frameworks for organizations to report on capital investment activities. In England, these became mandatory in 2023 and are being adopted in over 100 jurisdictions worldwide (e.g., USA, Canada, Germany, Japan & Philippines, amongst many others). The TCFD[5] requires organizations to disclose how they are managing the impacts of climate change risk on their business. Only businesses that pass the threshold (500+ employees and £500m turnover) are required to disclose information. However, it is advisable and strategic that all business sizes manage these risks effectively. In this way, businesses are encouraged to maintain a sustainable business model that considers how their premises, asset base, customers, supply chain, employees, and shareholders will be impacted by the effects of climate change.

TNFD[6] is the next step for businesses as they consider their impact on nature and the environment. It helps spotlight the measures being taken to adopt sustainable business models that consider, protect, and conserve nature, habitats, biodiversity, and the environment. One of the TNFD's objectives is to address the current threat of extinction that many animal species face. The

WWF Living Planet Report 2022 sets out the imperative for this. Similar reporting frameworks and guidelines include the Partnership for Carbon Accounting Financials (PCAF) and the Partnership for Biodiversity Accounting Financials (PBAF). Both address nature from a broader climate perspective. While the PCAF and PBAF are more aligned for financial institutions, awareness of these is recommended.

Another important standard is the IUCN's Global Standard for Nature-based Solutions, as adopted by the 98th meeting of the IUCN (International Union for Conservation of Nature and Natural Resources) Council in 2020[7]. It aims to equip users with a framework for designing and verifying NbS that yield the outcome desired in solving one or more societal challenges.

Similar to the IAM's Conceptual 10-Box Model and Asset Management best practice resources, the standard consists of 8 criteria and 28 sub-indicators. It focuses on an inside-out approach, starting with Criteria 1 – identifying the societal challenge that the NbS is a response to (see Figure 1 for visualization). Given the similarity of approach, asset management practitioners can overlay their asset management activities with sustainability standards such as the IUCN's Global Standard for

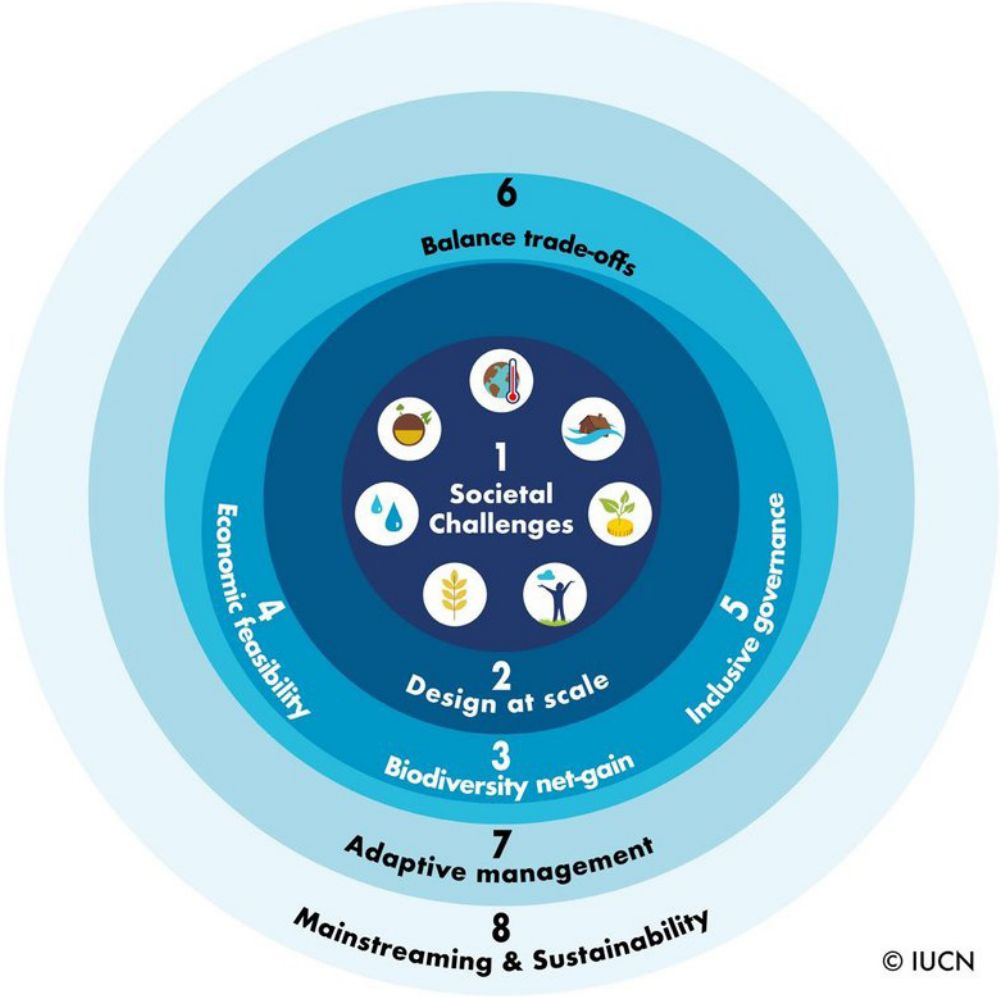


Figure 1: IUCN Global Standard for NbS 8 Criteria

NbS. The IAM's CE group is working on resources, with the ultimate aim being the development of a framework that equally supports people, plant, and profit.

3.4 Create More Resilient Infrastructure[8]

Historically, infrastructure has been designed and built based on historical climate data. The uncomfortable truth is that the past can't predict the future climate. The UN has established six principles for organizations to follow to consider climate resilience and potential vulnerabilities for infrastructure (see Figure 2). Having consulted with professionals in over a hundred countries, this guide to strategic management of critical infrastructure has been produced. Note - it recommends that solutions are environmentally integrated. The introduction states:

> *"The interconnected Principles for Resilient Infrastructure provide normative goals and desirable outcomes for systemic resilience of infrastructure, to meet the targets of the Sustainable Development Goals (SDGs) and the Sendai Framework for Disaster Risk Reduction (2015-2030). The key actions and governance guidelines for resilient infrastructure communicate the collaborative activities by which infrastructure will become more resilient, together with the mechanisms for improvement and monitoring infrastructure at national scale that will deliver net resilience gain and improved provision of critical services".*

There are several valuable linkages to the IAM's asset management resources. Firstly, it strongly links to several elements of the IAM 10-box Conceptual Model and complements designing, building, and managing more resilient infrastructure. Secondly, the Environmentally Integrated Principle (P3) identifies the importance for asset managers to work proactively and provide solutions that integrate with the natural environment (biological and physical).

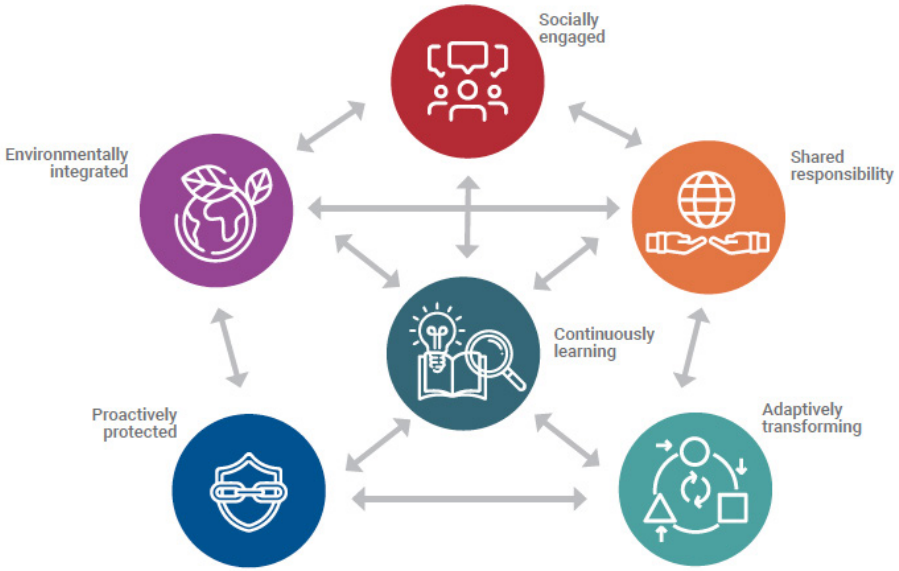


Figure 2: Extract from the UN's Principles for Resilient Infrastructure

Such opportunities of working with the natural environment include examples such as planting trees to reduce the speed of water flow and protect critical infrastructure. Utilizing the natural environment to enhance grey infrastructure must add value to natural ecosystems, not harm them, and be aligned with asset management realizing value. The key actions this principle highlights are:

- **Minimize environmental impact** – minimize the harmful effects of infrastructure projects and operations on ecosystems to minimize impact on the natural environment
- **Use environmental solutions** – incorporate environmental solutions to provide the best suitable mix of grey, green and blue infrastructure
- **Integrate ecosystem information** – integrate ecosystem information into decision-making processes to avoid hazards from the natural environment
- **Maintain the natural environment** – proactively maintain the natural environment around infrastructure locations to reduce exposure to vulnerabilities
- **Use local, sustainable resources** – use local and sustainable resources to avoid the risks of single-sourcing, distant, non-renewable, or non-circular resources

Therefore, by adopting NbS and working in harmony with the environment, an asset management organization is expected to be consistent with the UN principles for climate-resilient infrastructure.

3.5 Create a Built Environment that Benefits both People & Nature

In 2021, the UK Construction Innovation Hub published a paper titled – 'Our Vision for the Built Environment'[9]. It describes an approach and ambition for a built environment whose explicit purpose is to enable people and nature to flourish together. The Institute of Asset Management contributed to this collaborative project. Figure 3 provides a visualization of the desired outcome of this paper.

The report provides some key insights that could be usefully adopted for all aspects of asset management, from strategic planning and decision making to life cycle management of assets and asset systems. It states:

> *"It is only when we shift our focus from creating the built environment to the outcomes enabled by it that people and nature can thrive together for the generations to come"*

This paper recognizes the role that nature and the environment have in delivering sustainable outcomes and values a system-of-system approach, recognizing interdependencies that must be balanced. Momentum is also being recognized at a UK governmental level, evidenced by the Infrastructure & Projects Authority's recent

Figure 3: Integrated Natural and Built Systems. Source: Our Vision for the Built Environment Paper

release of their Transforming Infrastructure: Roadmap to 2030[10] policy paper. Asset management creates a vital opportunity to support infrastructure managers in maximizing the value of assets over their life cycle through a lens that benefits people and nature.

3.6 Food Security & Pollinator Strategy

The numbers of bees and other crucial pollinators are in steep decline. This is due to a rapid loss of good-quality habitats that are becoming smaller, more fragmented, and polluted with pesticides. This isn't just a throw-away comment to 'save the bees!'. Pollinators, for example, have a direct connection to agricultural output and, therefore, sizeable economic consequences if this trend continues.

From formal landscape designs and planning, to unused areas of land in construction, asset management organizations can conserve and protect pollinators and thus play a part in stabilizing population numbers. A crucial activity includes raising awareness of NbS at the simplest level, making more complex NbS systems possible.

An example of a simple implementation can be seen in Figure 4. Other significant examples of integrating this approach include recent work by Network Rail[11] and the state of Germany within the EU Pollinators Initiative[12].

Figure 4: 'Please excuse the weeds' indicates purpose, not neglect.

The best outcome would be a national green network – where all ecosystems are able to transmit and share nutrients, habitats, and resources as a whole interconnected network. Especially in urban areas, this places a duty on the heads of the asset management community to collaborate between parties to create this new ecosystem capability.

Figure 5 shows an example of how simple planters (or window boxes) can contribute by sustaining pollinators. Although small, these examples can easily be scaled to larger construction sites or built into or around new or existing asset networks, for example, growth of wild flowers around an energy distribution center.

3.7 Support Net Zero Objectives & Implement Carbon Sequestration Activities

Many organizations now have net-zero targets or plan to become carbon neutral. Carbon sequestration measures are often part of a carbon offsetting or carbon reduction plan, and there

Figure 5: Planters at Construction Site Offices – Sir Robert McAlpine

are several certified carbon codes that can help address this opportunity. These include codes for woodland[13], peat restoration,[14] and hedgerows[15]. New habitats such as saltmarsh[16] and kelp for marine sites are also being considered for new carbon code standards.

Using NbS to sequester carbon and a carbon reduction plan can be aligned with the IAM 10-box Conceptual Model. Within the Strategy & Planning area, an asset management organization could include their carbon reduction plan in the Strategic Asset Management Plan (SAMP), or a carbon sequestration site could be tied into key strategic priorities in an Asset Management Plan (AMP).

4 Section Summary

This initial section has highlighted a number of reasons why the asset management community must adopt a NbS approach. The different categories above show that this is more nuanced than creating 'green infrastructure'. This term is often seen as too complex, raises questions about where to start, or is sometimes used as a top-level vision, but no plans exist to back it up. The case studies provided in the next section will demonstrate how it can be done, focusing on two key pillars:

- Using NbS will replace technological substitutes and might help to save costs when planning infrastructure

- NbS can create shared spaces that different members and businesses within a community could benefit together (i.e., recreation activities, ecotourism, etc.), thus increasing the overall resilience of a community.

5 How Can We Adopt This Approach?

The case studies and examples of how to implement NbS below have been grouped into specific deliverables for clarity and idea inspiration. The asset management community can utilize this inspiration and potentially connect or partner with specialists to develop the know-how to execute similar solutions. NbS can become an influential and unique service offering in organizations' Asset Management toolkits.

Case Study 1: Mott MacDonald Interactive NbS tool

Mott MacDonald launched their interactive nature-based tool in 2022. It provides example case studies from across the globe ranging from peatland restoration in Indonesia, sustainable urban drainage in Philadelphia, USA, sustainable land management in Malawi, and natural flood management in Leeds, England. It shows that NbS can produce economic, environmental, and social benefits. For more information, see the Interactive NbS tool.

5.1 Natural Flood Management

Implementing woody dams and wetland areas can attenuate flood waters and reduce the impact of flooding in downstream communities. Slowing down flood waters in river systems and coastal regions can help create capacity and alleviate potential flooding that causes disruption and, in extreme cases, loss of lives and critical infrastructure. As is commonly known, it is predicted that overtopping of flood defenses is increasingly more likely with increased extreme weather events and rainfall due to climate change. Identifying mitigations to this risk and creating nature-based safe routes for flood water at times of critical stress are becoming even more important. The best-case scenario is to help manage potential sudden increases in water volume through solutions diverting flood waters to areas with the least detrimental effect.

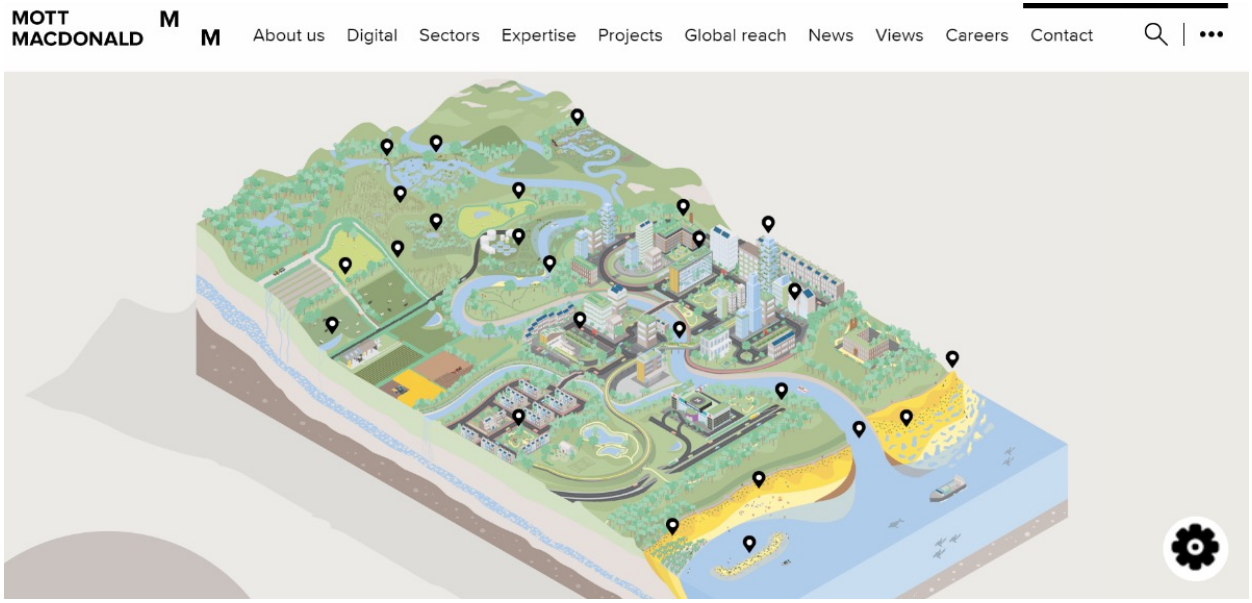
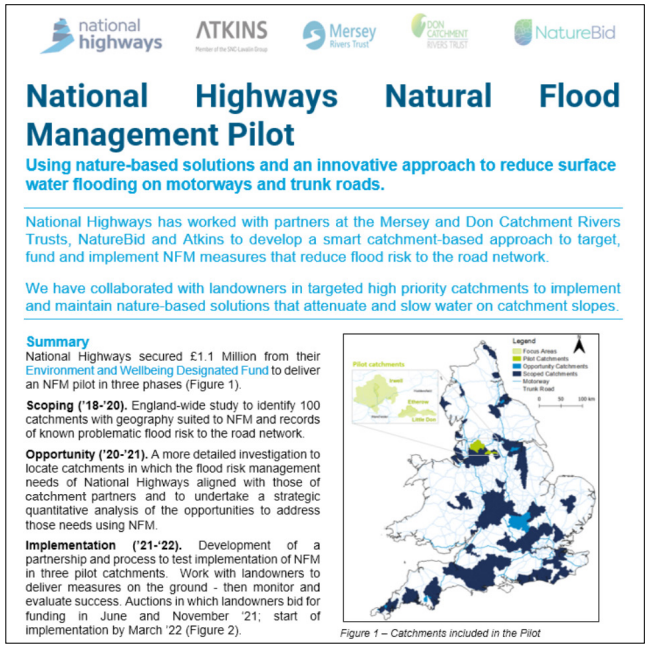


Figure 6: Interactive Nature-Based Solution Tool

Case Study 2: National Highways (England) Natural Flood Management Pilot

This case study is an excellent example of a partnership for a multi-body collaboration approach to managing flood water. The two study areas comprise the Mersey and Don catchments and more information can be found at Taking a natural approach to flood management on the road network - GOV.UK (www.gov.uk).



national highways ATKINS Mersey Rivers Trust DON CATCHMENT RIVERS TRUST NatureBid

National Highways Natural Flood Management Pilot

Using nature-based solutions and an innovative approach to reduce surface water flooding on motorways and trunk roads.

National Highways has worked with partners at the Mersey and Don Catchment Rivers Trusts, NatureBid and Atkins to develop a smart catchment-based approach to target, fund and implement NFM measures that reduce flood risk to the road network.

We have collaborated with landowners in targeted high priority catchments to implement and maintain nature-based solutions that attenuate and slow water on catchment slopes.

Summary

National Highways secured £1.1 Million from their Environment and Wellbeing Designated Fund to deliver an NFM pilot in three phases (Figure 1).

Scoping ('18-'20). England-wide study to identify 100 catchments with geography suited to NFM and records of known problematic flood risk to the road network.

Opportunity ('20-'21). A more detailed investigation to locate catchments in which the flood risk management needs of National Highways aligned with those of catchment partners and to undertake a strategic quantitative analysis of the opportunities to address those needs using NFM.

Implementation ('21-'22). Development of a partnership and process to test implementation of NFM in three pilot catchments. Work with landowners to deliver measures on the ground - then monitor and evaluate success. Auctions in which landowners bid for funding in June and November '21; start of implementation by March '22 (Figure 2).

Figure 1 – Catchments included in the Pilot

Figure 7: National Highways Natural Flood Management Pilot

5.2 Sustainable Drainage Systems

Sustainable Drainage Systems, also known as SuDS, support the creation of green (land) and blue (water) corridors to the spaces where we live, work, and play. SuDS is not a new approach to managing flood water attenuation, and it facilitates biodiversity and environmentally friendly solutions. More information and descriptions of recognized techniques can be found on the UK Local Government Association website.

5.3 Natural Cooling

Scientific research has demonstrated that communities and businesses can benefit from the positive cooling effects of trees, plants, and green roofs. There is clear evidence that the shade vegetation provides can reduce temperatures by 12°C. Particularly during summer or in equatorial countries, there's a huge opportunity to reduce the reliance on air-conditioning units or installations. This would reduce any negative impacts these units have, including high energy/electricity requirements, leaking of hydrofluorocarbons, refrigerants (gases with powerful planet-warming properties), and even the materials used to make them. Other methods include planting green roofs and reflective paint that when combined, make living standards in extreme heat more bearable and further remove the need for air-conditioning.

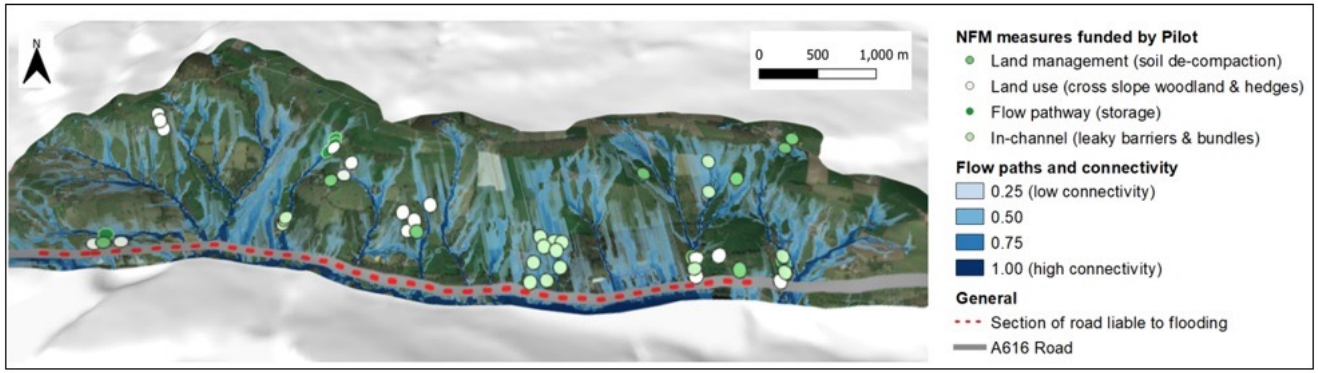


Figure 8: Extract from National Highways Study

Case Study 3: Street Trees & Canopies

In Manchester, UK, a study[17] showed that street trees reduced surface temperatures by up to 12°C, and concrete surfaces that were permanently shaded were cooled by 20°C. A similar study was also conducted in Switzerland and found similar benefits across roughly 300 European Cities[18].

Case Study 4: Light Reflecting Methods

The use of light-reflecting paint can reduce building temperatures by around 3°C. In New York City, the Cool Roofs campaign[19] was launched in 2009. This involved 900,000 sq. meters of roofs in the city covered in the reflective coating, resulting in savings of 4000 tco2e per annum. In 2021 a similar green roof city campaign[20] was launched to increase habitat and biodiversity.

4.4 Green Bridges

Within the transport sector, there are a number of examples where green bridges have been designed, constructed, and incorporated into highway schemes. For instance, on the A470 Porthmadog Bypass in North Wales, UK, a bridge for bats was constructed to save the *lesser horseshoe bats* that were otherwise at risk of being killed by road vehicles.

4.5 Green Buildings and Walls

Incorporating green roofs and walls into buildings and office infrastructure can help improve biodiversity and reduce energy costs.

Case Study 5: Eden Green Building

The Eden Building[21] in Manchester, UK, currently backed by the English Cities Fund, is one such example project. It will support 350,000 plants and, numerous bird nesting boxes and bug hotels on the outside of the building. It will be all-electric, with PV panels generating on-site energy and harvesting rainwater to look after the plants.

4.6 Indoor Gardening and Well-being

Being innovative about using both indoor and outdoor spaces for the benefit of employees and local communities is somewhat undervalued. Some businesses include office communal planting and gardening areas for employees, improving their well-being and allowing them to share the produce grown amongst themselves or with local communities. A major internal organizational benefit is that this provides evidence to support CSR (Corporate Social Responsibility) reporting and ESG (Environmental, Social and Governance) activities, demonstrating sustainability credentials. In addition, on construction sites, where working teams often have living quarters, creating a garden and space to grow produce has proven to foster positive benefits other than just producing food. This includes supporting mental well-being, improving team culture and cohesion, social interaction, and physical activity. NbS such as this can also contribute as evidence to the BREEAM award (formerly CEEQUAL), a civil engineering award scheme that assesses and rewards sustainable solutions. This provides a valuable opportunity for the asset management community to merge with sustainability methodologies, such as IUCN's Global Standard for Nature-based Solutions. For more information, see BREEAM/ CEEQUAL Infrastructure.

Figure 9: Eden Building Manchester Featuring Green Walls and Energy Saving Features

4.7 Water Security and Storage

NbS can provide a unique and robust defense against the long-term impacts of climate change in the water sector. New solutions in NbS must be explored, particularly given that water is one of the most valuable assets on earth and is not infinite. With an ever-growing population and, therefore, higher demand for water, especially in cities, asset management organizations must adopt a new approach to treating and reusing water in our built environment.

Case Study 6: NbS of Water Storage in Thessaloniki

One partnership working on shaping cities and using NbS for water reuse is between AFRY's Sustainability team and FieldFactors. They are working on a modular and nature-based system to make a water-neutral and climate-positive project site in Thessaloniki, Greece. It uses a unique family of products for rainwater treatment, control, and monitoring and can be deployed in public spaces, sports facilities, or even real estate[22]. In Thessaloniki, this collaboration is utilizing this system along with storing rainwater run-off in an underground aquifer rather than digging or building storage tanks.

4.8 Buffer Zones

Given the majority of the world's capital cities are located in coastal areas, infrastructure and the populations within them are particularly vulnerable to the effects of climate change. From increased extreme weather events, rise in sea levels, and eroding coastlines, the impact of climate change is, and will continue to be, costly and damaging. Establishing buffer zones around city locations and critical weakness points can help reduce the impact of these climate change effects. Using NbS such as salt marsh, sand dunes, underwater kelp forests, and mangrove forests can all help absorb coastal wind and wave energy and protect communities.

Implementing green infrastructure projects is shifting asset management practice to a more systems-based perspective and requiring partnerships with a broader range of stakeholders. The prominent role of end users (residents and taxpayers, for example) can be seen in the case studies below.

Case Study 7: The Medmerry Project

Near Portsmouth in the United Kingdom, the Medmerry Project looked at the management and realignment of coastal protection infrastructure. It combined using natural coastal vegetation as physical protection with the realignment of engineered infrastructure to retreat and move the coastline inland. It was formed by a collaboration of engineers and local stakeholders' knowledge and experience, including 360 residents or property owners, many of them coastal farmers. The result is that the NbS solution lets the sea waters further inland yet reduces the risks of flooding neighboring towns, while the surrendered land is increasingly becoming a biodiversity habitat for many species.

Case Study 8: City of Surrey's (British Columbia, Canada) Mud Bay Park

(Coastal Flood Adaptation Strategy | City of Surrey)

In 2016, the city of Surrey (Canada) embarked on a journey to develop a Coastal Flood Adaptation Strategy (CFAS) to help the city prepare for a changing climate and increase the resilience of its coastal communities. This involved a community-driven planning approach directly engaging residents, stakeholders, local community members, environmental organizations, business groups, and farmers, amongst others, to identify short, medium, and long-term adaptations.

Case Study 9: Grindstone Creek project in Hamilton-Burlington cities (Ontario, Canada). Grindstone Creek Update – MNAI | Municipal Natural Assets Initiative

The MNAI (Municipal Natural Assets Initiative) Grindstone Creek Watershed project is the first of its kind in Ontario. The project was announced in March 2020 by Greenbelt Foundation & MNAI in partnership with the Cities of Hamilton and Burlington, Conservation Halton, and Royal Botanical Gardens. It generated a natural assets inventory (see Figure 10).

"With a much clearer understanding now of what natural assets exist in the Grindstone Creek watershed, what condition the natural assets are in and what risks they face, the project team also completed very real and pertinent models and scenarios such as what might happen to the forests and wetlands if climate change increased the frequency and severity of flooding."

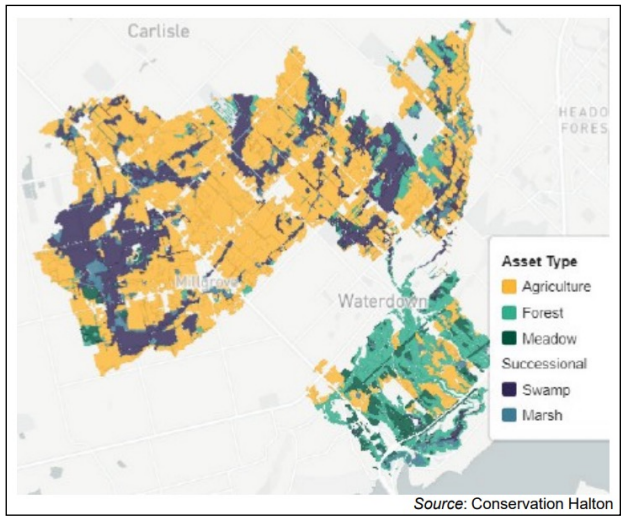


Figure 10: Grindstone Watershed – Natural Assets Inventory

Case Study 10: River Eden Restoration Partnership Project, Environment Agency, Network Rail and Natural England

This River Eden UK restoration case study demonstrates the benefits of a partnership approach. This £200k project, called the Thrimby Phase 1 project, is funded by the Environment Agency and Network Rail. It involves cutting a meandering or 'wiggling' river channel, increasing its length, benefiting wildlife and nature, and redirecting the flow of water away from Network Rail assets, thus reducing the vulnerability to flood risk. This natural engineering solution is far less costly than shoring up the exposed or vulnerable railway assets, which would be the more common solution to select.

Figure 11: River Eden Restoration Partnership Project

6 Conclusion

This paper has provided a detailed introduction to specific tools, methodologies, and case studies, demonstrating that NbS must form an integral part of our approach to tackling climate change and environmental protection. There is still much to learn about how to fully adopt NbS. The listed case studies in this paper provide a guide to help develop this into an industry-standard approach incorporated into asset management best practices. Stand-out themes in this paper include collaboration and diverse partnerships. Asset management methodologies will evolve using existing knowledge and expertise, benefiting from studies like the IUCN's report on how NbS can be utilized for climate change mitigation[23]. Global infrastructure can then be managed through a combined asset management and NbS lens. By adopting such approaches, asset management organizations can become more climate resilient and play a part in protecting natural ecosystems.

Lessons and conclusions to take away from the paper:

- The Asset Management community is encouraged to think bigger picture when using or implementing industry-standard methodologies and processes by combining an additional lens of NbS
- Whether it is reporting or proving evidence of activities that protect nature – it is inevitable that this will soon become a mandatory and/or legal requirement for infrastructure organizations
- Willingness to try NbS will help uncover unknown possibilities of how they can replace technological substitutes and might help to save costs when planning and maintaining infrastructure
- NbS can create shared spaces that different members and organizations within a community can benefit together (i.e., recreation activities, ecotourism, etc.), thus increasing the overall resilience of a community through multi-modal asset management outcomes
- Provides new value dimensions when speaking with clients, organizations and discussing solution outputs
- Infrastructure is responsible for roughly 79% of all greenhouse gas emissions – it defines our climate and must be addressed through sustainable asset management practices. As an asset management community, we must act. UNOPS *Infrastructure for Climate Action* report link.

The IAM's Climate Emergency Group is committed to providing information and compelling case studies to encourage and inform asset management communities. In doing so, asset management organizations can be more confident in building resilience to climate change in a way that is sustainable and equally supports society and wildlife. If you are aware of any case studies that can be used to further our understating of what's possible, please send these to the IAM Office office@theIAM.org for the attention of the Climate Emergency Group.

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8 References

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6 Taskforce on Nature-related Financial Disclosures | About
7 IUCN Global Standard for Nature-based Solutions
8 Principles for Resilient Infrastructure Final July 2022.pdf
9 Our Vision for the Built Environment
10 Infrastructure & Projects Authority - Transforming Infrastructure Performance: Roadmap to 2030
11 The railway and our pollinators – Network Rail
12 EU Pollinators Initiative - Germany
13 Home - UK Woodland Carbon Code
14 Peatland Carbon Code - CarbonStore (carbonstoreuk.com)
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23 IUCN NbS for Climate Change Mitigation

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