AtkinsRéalis

FLOOD & COAST 2024

Thought Leadership

Magazine

Welcome

to the AtkinsRéalis thought leadership magazine, specially prepared for F&C24!

In response to what can only be described as a turbulent year for the flood and coast sector ,there's been unprecedented progress as we face up to the inevitable challenges associated with nature and climate change emergency.

At AtkinsRéalis, we're encouraged by a proactive move towards collaboration, with stakeholders of all kinds coming together to share knowledge and ideas to mobilise the innovation that's needed to stand up to the scale of our collective challenge.

This magazine showcases some of the exciting work we've been involved in recently. We've been at the frontline of nature's fightback against flood risk, finding innovative ways to retrofit nature back into the fabric of our towns and cities, and in Edinburgh we've shown how, by following the boundaries set by nature, rather than politics, we can implement a more effective approach to urban planning. We're utilising new technologies with the potential to revolutionise water quality information so we can respond appropriately, and we're shifting the focus of shoreline management so we can plan a future of ongoing adaptation for our coastal landscapes.

We've really opened clients' eyes to the potential multi-benefit outcomes from nature-based solutions, and our SuDS for Schools project has paved the way for snowballing social value across our communities. We've looked at how embedding a programmatic approach can streamline work, create economies of scale and lead to better outcomes, and how by learning lessons from the past, we can embed sustainable procurement practices.

Throughout these pieces, there's been a consistent theme of identifying and acting upon opportunities for improvement, efficiency, and multi-benefit outcomes. If we continue to collaborate and capitalise on all the opportunities available to us, I think we have a real chance of making meaningful progress towards the effective management of inevitable change.

Simon Leek

Client Director

Water Management Agencies

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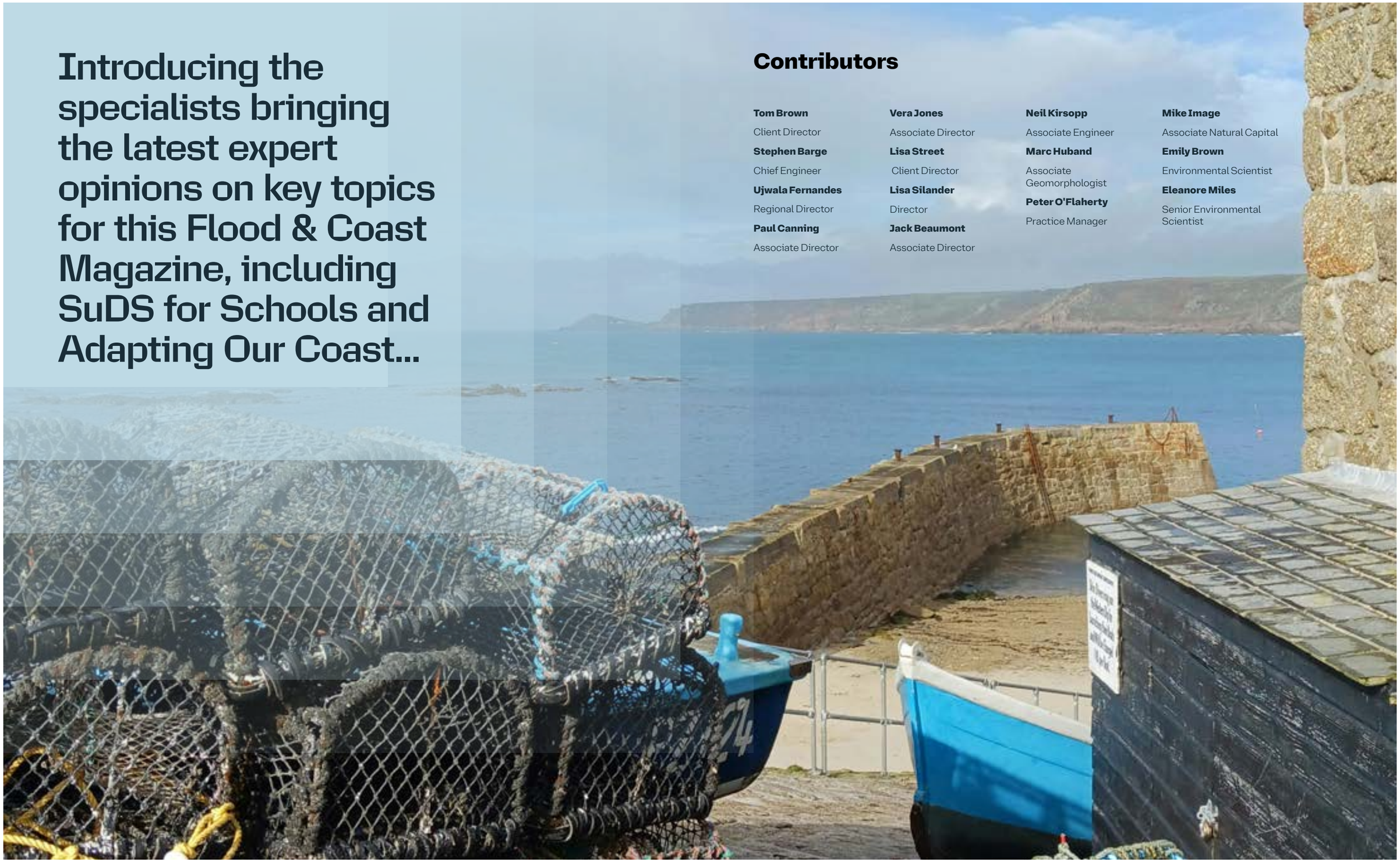


Edinburgh Green Blue Network

A blueprint for a better future

Stephen Barge, Chief Engineer

Ujwala Fernandes, Regional Director

As the climate crisis takes hold and biodiversity continues to decline, it's time for a re-think about how our towns and cities are developed in light of inevitable change.

Climate Ready Edinburgh was born out of a desire to develop a holistic, creative, innovative and collaborative approach to tackling the challenges associated with climate change and biodiversity loss. By implementing nature-based solutions and blue-green infrastructure,

it hopes to create beautiful places for people, nature and wildlife to thrive.

In order to realise this positive vision for the future, AtkinsRéalis is working with City of Edinburgh Council to bolster climate resilience through a range of nature-based interventions that will shape better placemaking and deliver a range of positive social, environmental and economic outcomes in parallel.

A multifunctional role

As part of its ongoing commitment to creating a Climate Ready Edinburgh, set out in its CityPlan 2030 and City Vision 2050, City of Edinburgh Council commissioned AtkinsRéalis to develop a Strategic Green-Blue Network Plan that would underpin future change and development across the city and respond holistically to climate change adaptation on a strategic level.

The aim was to create a framework that would sustainably manage water and flood risk and future-proof the city against the effects of climate change. Crucially, it would identify opportunities to integrate nature-based solutions, generating environmental, social and economic benefits at the same time.

Rather than considering individual aspects and functions of climate resilience, the Green-Blue network has a multifunctional role in managing the city's response to climate change. It looks at the whole catchment, and recognises the importance of a connected network where trees, soil, water and healthy ecosystems thrive, which in turn supports the health and wellbeing of residents.

Beyond city limits

Our innovative nature-led concept is a departure from traditional urban planning, shifting focus from arbitrary political boundaries, and instead, adopting a catchment-based approach to masterplanning. In Edinburgh, we looked at the whole catchment area (rather than the Council boundaries) to identify opportunities for nature-based solutions with the potential to generate positive environmental and social outcomes beyond flood resilience. By following the boundaries set by nature rather than those created by politics, we were able to address the issue holistically, tackling catchment challenges from all angles to find the most effective solutions, build resilience and maximise added benefit.

Drawing on the multidisciplinary expertise of the AtkinsRéalis team, we were able to consider a wide range of nature-based solutions across the catchment and gather local knowledge to develop integrated technical outputs with multi-benefit outcomes.

We did this by mapping and superimposing data into an integrated geospatial digital platform that identified key green-blue corridors to be safeguarded, as well as lost natural assets that would need to be reinstated.

It also flagged specific areas for conservation and protection that would benefit wildlife or people, and areas of opportunity where greater multifunctionality and quality could enhance potential benefits from the site. These benefits included capacity for carbon sequestration, combatting the effect of urban heat islands, recreation and community resources, improved wellbeing, active travel options, increased biodiversity and enhancing the natural beauty of the city.

Together is better

The Network's digital platform was developed to integrate and coordinate projects run by different stakeholders, maximising the potential for climate change mitigation and environmental benefits. This unique platform facilitates, for the first time, open and transparent information sharing and collaboration between stakeholders who might otherwise be in competition or have conflicting drivers. It enables the prioritisation and joint programming of works to reflect respective timescales and funding streams, but also allows them to work together towards the strategic identification and installation of green-blue solutions and collectively deliver multiple benefits to the city, its residents, businesses and wildlife.

Catchments have no politics and nature has no boundaries. Through the Green-Blue Network, City of Edinburgh Council and AtkinsRéalis are pioneering a new approach to masterplanning that puts aside political or organisational divisions and prioritises collaboration in order to achieve the very best for the future.

It is hoped the city's proactive approach to change will be used as a blueprint for other cities – and catchments – to follow suit, leading to a joined-up and more effective response to the risks of a changing climate. Cross-boundary collective action has the power to realise and maximise the social and environmental value inherent in nature-based solutions and support the UK's evolution into a climate-ready country.

IT'S TIME FOR A RE-THINK ABOUT HOW OUR TOWNS AND CITIES ARE DEVELOPED

Learning Lessons from the Past

Optimising procurement for the future

Tom Brown, Client Director

AtkinsRéalis worked with the Environment Agency's (EA) team as part of a market engagement exercise to help develop a strategy to procure the next phase of 'TEAM2100', which was set up to support flood risk management along the tidal Thames in London.

The current TEAM2100 10-year programme is now ending, necessitating the need to renew, reset and focus on the future.

We supported the EA team to collate and process existing knowledge to shape procurement for the next phase of work.

AtkinsRéalis, along with other project partners, reviewed previous projects and programmes and considered specific challenges.

We identified consistent themes and critical success factors that supported effective delivery, and here we explore how they can support a more effective approach to procurement for the future.

Challenges

The benefits that arise from working collaboratively are well known, particularly around aligning objectives, engendering better behaviours and overcoming challenges together.

But, procuring services for major infrastructure is complicated and time consuming. Each undertaking is unique and will have its own complex requirements and challenges. Procuring projects of this scale can take several years.

We have found that work programmes with a contractual requirement to monitor and measure collaboration and the promotion of improved behaviours generally do better than those that leave processes to trust and more casual arrangements. Adding this requirement to the contract ultimately protects relationships over longer work programmes, where inevitably personnel will change and there may be other obstructions and issues.

Critical success factors

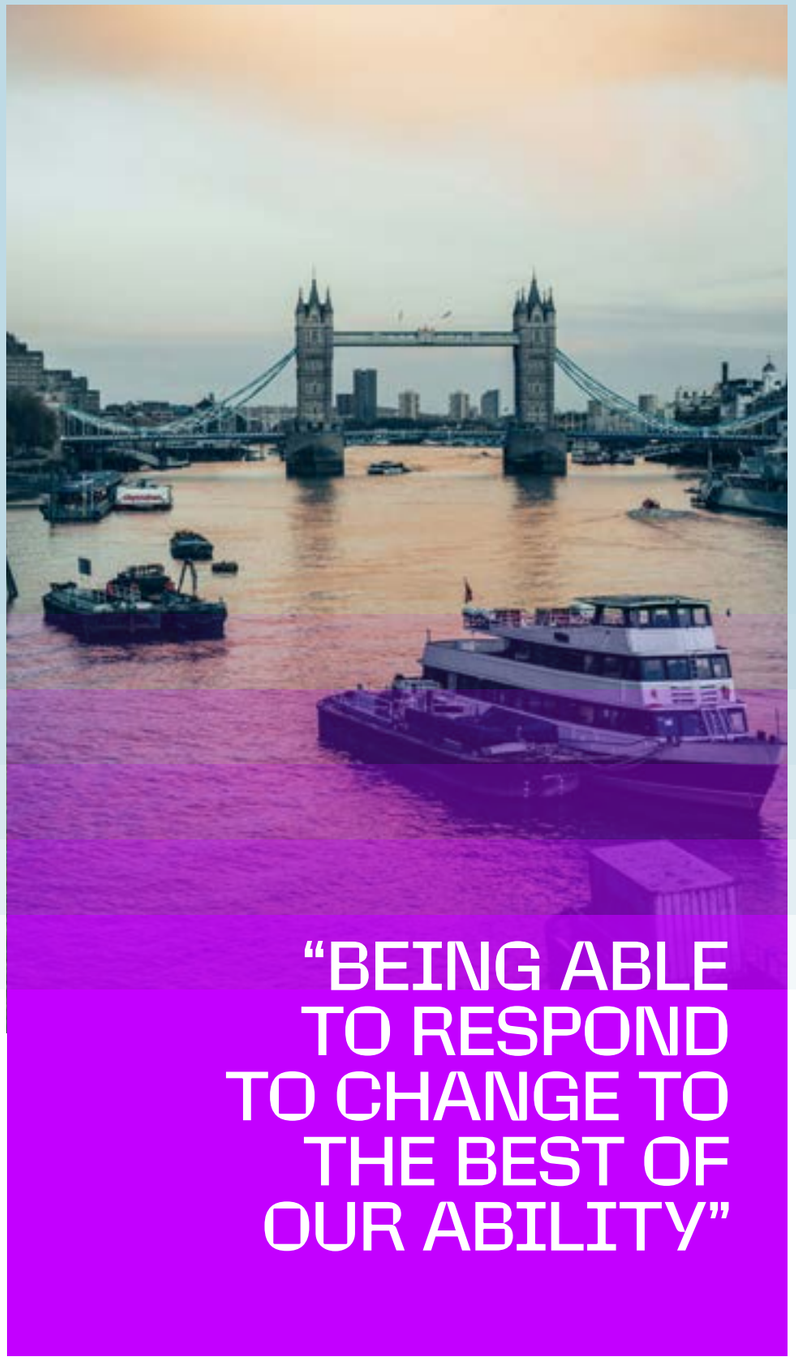
Six critical success factors were identified, that support the efficient delivery of major projects.

Sustainability

This work needs to be delivered sustainably and be carbon-efficient, while enhancing nature and engaging with communities to ensure the best outcome. This is fundamental for public opinion, but also helps monitor and reward progress, and creates tangible targets for the contract.

Innovation

The same is true for progression by innovation. This is a constant lesson learnt, as we strive for agility and cost-effectiveness in our delivery. It's important to include contract provisions that reward innovation as an effective way to improve, learn lessons, and share success.



"BEING ABLE TO RESPOND TO CHANGE TO THE BEST OF OUR ABILITY"

Access to good information

This is pivotal for making good, rapid decisions. Programmes that have a dedicated team to manage data effectively using the latest technology refer to "making better, swifter decisions", and "being able to respond to change to the best of our ability". This could be an Asset Management function that sits within the clients' assurance team, but also spans individual projects or frameworks.

Staff retention and succession

Planning is an important requirement, particularly on longer work programmes. It is easier to retain staff if they have a great working environment, as well as a clear career path.

Programmes with strong aligned leadership boards

This is important to the success of a programme, with project boards comprised of accountable leaders who are well informed, understand value and can challenge waste or poor behaviours, and perhaps most importantly, make changes when required.

Budget

If an organisation has a budget, it needs to be able to spend it. This means that work can start early in the programme and obtaining necessary consents, and agreement of stakeholders, is more readily available. Without this in place, momentum is lost; effort is put into programme development, compiling teams and developing governance, but no actual work is being done.

The future

The findings from the review highlighted elements of procurement and contracts that had a positive influence on the success of the programme, and identified features such as strong leadership, having a clear goal, and alignment across partners with the right behaviours that are willing to collaborate. There was also an evident need for transparent work programmes to enable suppliers to invest in people and systems in the interests of innovation.

We found that some of the issues were being addressed by other organisations delivering infrastructure, in particular, the work delivered via several frameworks and projects at Heathrow. In response, the EA team met with Heathrow to share experiences and lessons learnt.

> **The hope is that reflecting on and learning from past experience will help the sector move forward collaboratively in the most efficient, cost effective and successful way possible.**

Dark Arts and Red Herrings

Demystifying and implementing a programmatic approach

Lisa Street, Client Director

Lisa Silander, Director

Jack Beaumont, Associate Director

What is a programmatic approach?

While a 'programmatic approach' might be something that's talked-up in strategy meetings, when it comes to implementation, it often falls at the first hurdle. While there are pockets of good practice throughout the sector, a genuinely programmatic approach has not infiltrated business as usual.

As with many boardroom buzzwords, the term 'programmatic approach' is perceived as something of a dark art: it's widely misunderstood, and often misused.

A programmatic approach is the application of programme management.

Programme management is defined by the Association of Project Management as "...the coordinated management of projects and business-as-usual activities to achieve beneficial change'.

A programmatic approach goes further – it involves the use of data and information at a programmatic level to inform and drive optimal solutions and achieve comprehensive programme outcomes.

Why should we adopt a programmatic approach?

A programmatic approach starts left-of-centre to establish, first off, the intended outcomes of the programme as a whole, working back from there to define a comprehensive scope. This scope creates the clarity needed to assign projects and apportion appropriate funding.

By incorporating a group of related projects with common outcomes, a programmatic approach can streamline multiple aspects of a change initiative, bringing consistency – and clarity – to approach, data and reporting, creating certainty and minimising risk. It facilitates the sharing of resources and brings economies of scale that can create real value.

Importantly, it empowers the client thorough intelligent insight, identifying patterns and trends across the programme to improve performance and inform decision making. It enables us to learn and to apply that learning across the whole programme, so that we can avoid mistakes, create efficiencies and maximise output.

In contrast to a programmatic approach, in reality we often see programmes of work being defined by funding source. This is inefficient and can bypass important opportunities to streamline processes and create value for money. When it comes to defining and delivering programmes, funding can be a red herring. Just because projects are funded in the same way does not mean that it is efficient or beneficial to group them together.

By starting with the wrong premise, we have created – almost by accident – a sub-optimal way of working.

Instead of starting with funding, we should end with it. A programme should have aspirations to achieve bigger outcomes that simply meeting funding requirements. A programmatic approach creates the transparency needed to assign appropriate funding to different areas of work and provides the detail needed for robust reporting across a range of funding sources.

How can we implement a programmatic approach?

Once we understand how an outcomes-led programmatic approach can achieve beneficial change, it clearly trumps a funding-led approach – in theory. But in practice, the barriers to implementation can be prohibitive.

Transforming how we work is a massive shift that requires investment, training and engagement. Buying-in to a programmatic approach can require significant modifications to the operating model, as well as behavioural and organisational change. Amendments to job descriptions and management responsibilities all come with the risk of resistance, and it's no small task changing hearts and minds.

But working through these challenges to establish a fresh organisational mindset and new behaviours brings the beneficial change we're all looking for. In the long-term, a programmatic approach will bring clarity, standardisation and accountability – ultimately boosting organisational performance, creating value for money and generating savings that could fund aspirational work.

Consider these first steps towards a programmatic approach, and think about how you envisage it working in your organisation.

First steps towards a programmatic approach:

- Set out a vision and strategy for the programme,
- Confirm governance structure,
- Agree outcomes and establish benefits,
- Decide how outcomes and benefits will be measured,
- Undertake stakeholder mapping and analysis, and create communications plans,
- Identify risks, opportunities and threats,
- Assign funding and map it to outcomes,
- Allocate resources, define roles and responsibilities.

If you have any questions, or would like to explore how your organisation could implement a programmatic approach, contact:

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Adapting Our Coast

For a resilient future

Paul Canning, Associate Director

Facing up to change

We live in a rapidly changing world, with predictions of sea level rise and increased storminess forcing us to make unprecedented decisions and challenging us to think differently about how we manage our coasts.

The latest Intergovernmental Panel on Climate Change AR6 study includes predictions for the impact of marine ice sheet instability, adding to the magnitude and uncertainty of sea level rise. With some of the fastest eroding coastlines in Europe, it is no longer viable to prevent coastal change across the UK or protect all our coastal communities from flooding.

Planning for the future will require an acceptance that our approach to coastal management needs to change significantly, starting now.

We must shift our mindset to one of managed adaptation

– facilitating the evolution of coastal communities and supporting their transition towards a resilient and sustainable future.

Re-energising shoreline management planning

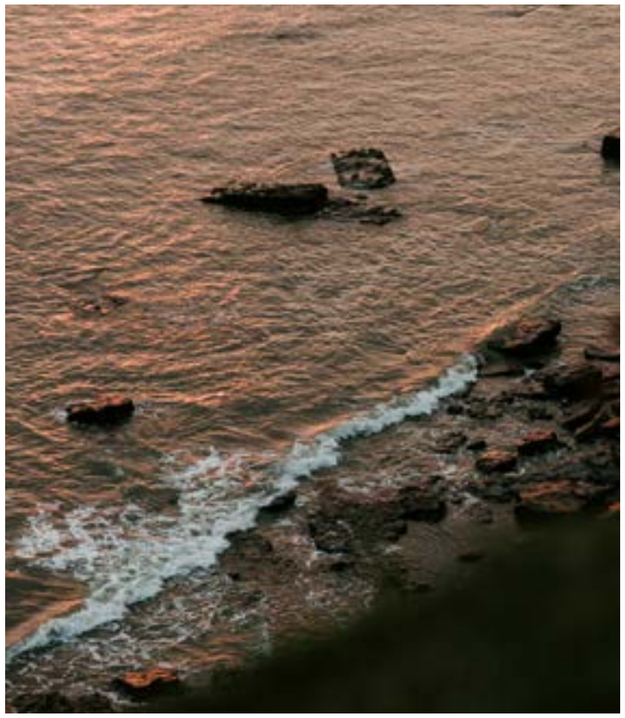
With traditional approaches slowly but surely losing effectiveness, the flood and coastal erosion risk management industry is starting to think more innovatively.

Together, we're coming up with new ideas for dynamic interventions that embrace the inevitability of change, and have the inherent flexibility to respond to ongoing coastal evolution.

Shoreline management plans have recently been modernised, with digitisation bringing greater accessibility and transparency – and they've gone a long way to setting out important policies for the next century. But, there are significant challenges around how we move from these policies to the implementation of detailed adaptation in a community context.

The Coastal Transition Accelerator Programme (CTAP) is exploring new ways of adapting to the effect of climate change on the coast. As part of the government's National Flood and Coastal Erosion Risk Management Strategy for England, CTAP will work with a number of coastal communities to explore possible interventions. Working in collaboration with local residents and businesses, it aims to prepare and plan for a new future, creating ongoing resilience rather than time-limited protection. Going forward, shoreline management interventions may well involve rolling back at-risk assets; but CTAP is proving that there's more to future shoreline management than running away from the problem.

As we look to a new era of shoreline management, we need to re-energise our interventions by considering the adaptation of coastal areas as an opportunity for positive change.



By being more thoughtful in our approach and looking out for possible opportunities, interventions can be seen as more than a reaction to a problem. They can be reframed as an active exploration of possibilities for adaptation and improvement.

Opportunities might include improving or replacing damaged infrastructure or buildings with removable, modular options, or repurposing land for different or flexible uses, such as temporary car parks and new habitats. By acting on these opportunities, there is huge potential to generate social and environmental value, improving an at-risk area as part of its inevitable transformation.

The reality of adapting our coast

Across the UK, AtkinsRéalis has been expanding what coastal adaptation looks like at a community level, addressing the unique challenges and responding to the distinct characteristics of each particular place. In south-west England, we have delivered a balanced approach in the Exe Estuary to enable sand dunes to evolve naturally but still shelter communities from storms. We have recreated new mosaics of habitats in the Tamar Estuary and Poole Harbour in complex designated environments. And at Bude we have delivered a step-change in the quality of coastal adaptation science and visualisation, to enable better informed engagement with the community. In Wales, we are considering how best to ensure that the community, businesses and transport links at Newgale can be sustainably adapted in the face of significant erosion pressure. In Scotland, we have been piloting the use of the new Coastal Change Adaptation Plan guidance at Ballantrae and Troon, to plan out a range of adaptive measures over the next century.

But while new, more complex and nuanced interventions may be forthcoming, progress can easily be stifled by funding models and planning frameworks designed for a different era. We urgently need a planning and legislative framework that facilitates appropriate interventions and recognises the added value such interventions can achieve.

With regulatory support and adequate investment, a sustainable future for shoreline management is possible. Its success relies upon adopting a bespoke approach for each individual area, and taking the time to identify and respond to challenges around flooding and erosion, as well as viable opportunities for positive change. By focusing on people and placemaking, and taking into account the unique natural, cultural and historical environment of an area – as well as listening to and acting upon feedback from affected communities – we can build the best possible future for our coastal communities.

SuDS for Schools

Building social value beyond the school gates

Stephen Barge, Chief Engineer

Neil Kirsopp, Associate Engineer

Re-thinking retrofitting

Increased rainfall combined with ageing assets across publicly-owned portfolios has created an ongoing stream of work for the UK water sector.

As they implement inevitable drainage system upgrades, replacements and retrofits over the coming years, water companies and councils are working together to come up with sustainable solutions that create added value. In parallel, as the climate crisis deepens and biodiversity continues to deteriorate, educators are keen to incorporate important sustainability topics into the curriculum to inspire environmentally and socially responsible citizens for the future.

AtkinsRéalis has been working with several UK water companies to retrofit green-blue infrastructure and Sustainable Drainage Systems (SuDS)

at schools across the country, through its trailblazing SuDS for Schools initiative. There are range of well-documented benefits of SuDS, including reduced flood risk, better water quality, richer biodiversity and increased amenity value. But SuDS for Schools seizes the added opportunity of working with schools to broaden the scope of retrofit projects and link them with education to generate a new dimension of social value benefits.

Enhancing education

Students and other school stakeholders are involved from day one, contributing to the design, supporting implementation and taking responsibility for maintenance of SuDS. Working with them, we create colourful, exciting and vibrant assets on the school grounds, that draw attention to and raise awareness of the critical role they play.

Close collaboration fosters a sense of ownership among the school community and supports a practical understanding of key messages around water conservation, climate management and sustainability.

As well as the assets themselves, SuDS for Schools projects incorporate significant non-drainage-related features to broaden impact and add value. Schools are usually enthusiastic about creating opportunities for sustainable teaching resources on school grounds, but often struggle to find the space or budget to achieve their ambitions.

To address this need and maximise engagement, outdoor learning spaces are incorporated into many of our SuDS for Schools designs as standard. Sustainably sourced and FSC accredited pre-fabricated outdoor classrooms or gazebos are constructed, creating a fun learning environment set among real nature and wildlife.

These spaces open up new and enriched opportunities for embedded outdoor learning, for example, exploring marshy wetland, identifying flora and fauna or pond dipping – activities usually reserved for off-site excursions or forest school sessions. On-site outdoor learning in close proximity to striking new SuDS features brings the curriculum to life, while educational resources with technical input from the client elevate young people's understanding of water and how it can affect our environment.

Ultimately, enhanced learning environments and engaging scientific learning experiences will raise the profile and increase the popularity of STEM subjects and inspire the next generation of scientists and engineers. Their role is pivotal in determining how we rise to the enduring challenge of our changing climate.

Maximising social value

A 2018 study of an early SuDS for Schools pilot suggested that the reach of one scheme through word of mouth and publicity could push 40,000 – which goes to show just how influential relatively small community-focused schemes can be.

While parents, siblings, extended families and friends are often reached through word of mouth – both from the pupils and through communications sent by the school, the school's sustainable activities create good news stories throughout the region, widely shared on social media and picked up readily by local news. These activities extend awareness of the issues beyond students, teachers and parents, to connect with the wider community, educating and empowering individuals to do their bit for sustainability, maximising social value.

There's huge legacy potential in initiatives such as SuDS for Schools across a broad range of areas, from enhanced educational opportunities for children to behavioural change across whole communities. Small-scale projects like these can have a meaningful and wide-ranging impact, creating a trickle-down effect from key school stakeholders to wider networks as key messages are shared over time.

Importantly, engaging consumers with sustainable projects that have a tangible positive effect on their family and community will encourage open-mindedness, change hearts and minds and nurture relationships between water companies and the community. It will create a new baseline for engagement, establishing buy-in and easing the delivery of other SuDS programmes in the local area.

It's clear that along with the straightforward benefits of SuDS for Schools, in terms of reduced flood risk and better surface water management, its impact reaches far and wide.

Sustainable solutions enhance biodiversity and create habitats, generating environmental value, while educational opportunities and community awareness bring significant social value.

Combined with similar initiatives across other publicly-owned facilities, the water industry has an unprecedented opportunity to bring about a sea change in public awareness around sustainability, and transform how whole communities think about and act upon water conservation in the long-term.

Nature's Fight Back

The reality of delivering nature-based solutions in urban areas

Peter O'Flaherty, Practice Manager

A natural disconnect

Natural watercourses have been instrumental in defining the locations of our cities. But increased flooding over time has led to an association with nuisance and risk, and ultimately a feeling that cities are incompatible with water.

Since the early 20th century, we've been busy engineering solutions to keep water away, beginning with the astonishingly innovative Victorian sewerage system, and progressing to technically impressive super sewers like Tideway in Greater London.

As a result, more and more interventions have been built, and our cities are swamped with constructed solutions to natural problems. But no matter how innovative, impressive or gargantuan these solutions are, it's clear this kind of approach alone simply isn't sustainable. As populations multiply and water use escalates, and as we see wetter and more intense weather, our infrastructure continues to be overwhelmed. As our world evolves, we are starting to see a problematic disconnect between constructed solutions and the way that nature works.

A challenging environment

Nature-based solutions are fast-becoming the go-to tactic for flood resilience, with their superior environmental credentials and multi-benefit outcomes clear wins in today's climate. But all too often this nature-focused approach is limited to rural areas, with the numerous and significant constraints of urban environments proving too powerful to permit similar progress in our towns and cities.

There's a prevailing reluctance to welcome nature-based solutions into the urban ecosystem, and for good reason. The risk of damage caused by potential flooding in urban areas is generally far greater than in the countryside – we just have to look to London, where the Thames Barrier protects £321bn worth of residential property, located precisely on the River Thames' natural floodplain.

Towns and cities are increasingly squeezed for land as population density increases and we strive to address an acute housing crisis. For nature-based solutions to work in urban areas, we would have to take something away from an established built environment – which seems wildly unrealistic. How would we decide what stays and what goes, how would we address inevitable logistical issues and underground pipework, and how would we bridge the financial chasm that would inevitably emerge?

In our cities, even the smallest plots of land are going for eye-watering prices as their rarity and value skyrockets. Any open space in the city is seen as a prime development (and revenue) opportunity – how would green-blue infrastructure match this potential return on investment?

Making nature add up

As nature-based solutions gain momentum and popularity, and as experience and expertise stacks up, there's a growing body of evidence to show not only that nature-based alternatives are effective, but that nature can indeed pay.

Plympton is an amalgamated suburb of Plymouth; a complex urban setting with numerous watercourses weaving their way through the settlement and managed intensively through hard engineered structures until it enters the River Plym.

The current setting and management of water in the community has reduced flow and damaged the ability of fish to pass through. Over time, the watercourses have become unrecognisable from their natural state and unable to stand up to heavy rainfall. Small, steep-sided concrete channels are frequently overwhelmed, flooding homes and industrial areas – some of which have been built right up to the banks.

Working with a team of specialist ecologists, AtkinsRéalis flood modellers created various scenarios to understand the impact of different nature-based interventions with the potential to restore degraded parts of the catchment to a more natural setting. They also showed how by doing so, quantifiable added value could be created, through increased flood storage, biodiversity net gain and amenity value.

AtkinsRéalis has been at the frontline of nature's fightback against flood risk and biodiversity loss for some time, harnessing the power of natural resources to stand up to nature's own challenges.

During this time, technologies have advanced, modelling has improved and economies of scale have thrust digital tools into the mainstream. These tools now have the power to demonstrate the effectiveness of a solution, and identify a range of potential multi-benefit outcomes. Crucially, the sector has developed tools and metrics to quantify economic viability and added value in new ways, incorporating environmental and social value into ROI calculations, demystifying nature-based solutions and generating robust evidence to build a business case that attracts investment.

While constraints inevitably do still exist, nature-based solutions are no longer a challenging idea in the urban context. The sector is stepping up to the challenge, thinking differently and finding innovative ways to retrofit nature back into the fabric of our towns and cities.

Making a Splash

New & innovative approaches to monitor bathing waters

Vera Jones, Associate Director

There are more than 600 designated bathing water bodies across the UK, and this includes coastal waters and inland sites.

Bathing waters are assessed on an annual basis by regulators, using standards that focus on microbiological quality. These standards have been derived from public health guidance, and relate to the potential public health risk of gastrointestinal illness arising from swimming in natural waters.

The rising popularity of "wild swimming", in combination with increased awareness of pollution from sewer overflows, means that there is an enormous amount of public attention on bathing waters.

Historically, information on bathing water quality has been provided on boards situated by the designated bathing water body, which are updated by the environmental regulators. However, this information is usually either generic, refers to the previous classification year, or is at least one week out of date. Modern technologies mean that we can now start moving towards providing more detailed and near real-time information to bathing water users.

So which new innovative technologies may help us better protect public health and the environment in bathing water sites? Let's look at two technologies, which may bring significant transformation to the sector.

Firstly, molecular biology techniques: primarily Polymerase Chain Reaction (PCR) applications. At the moment, culture-based techniques are used for bathing water quality monitoring (as prescribed by the Bathing Water Directive). These focus on two parameters which act as very useful indicators of sewage pollution or animal waste – E.coli and Intestinal Enterococci – but provide a limited window into the microbial pathogen picture in a particular location.

PCR would allow for testing of a much wider range of organisms, and would therefore provide a significantly more comprehensive picture of microbiological water quality.

Additionally, molecular biology techniques could explore new risks that we are becoming aware of; for example the risk of exposure to antimicrobial resistance (AMR). Research has shown that surfers are three times more likely to harbour antimicrobial-resistant E.coli[1] in their guts, highlighting the potential for exposure to AMR through the use of bathing waters.

The second promising technology in this field is artificial intelligence (AI). A number of AI trials are ongoing in the sector, such as a pilot project in Devon[2] that has combined datasets from local rivers, rainfall and soil with satellite images of local land use, in order to yield water pollution predictions. Wessex Water has also been developing an app for Warleigh Weir to provide information to bathing water users.[3] AI technology to predict bathing water quality is in its initial stages, but it provides a promising new avenue for research and development in this sector.

Technological innovation is great, but results also need to be presented in an easy-to-understand manner so that they are useful not just to the specialists, but to the wider public. A key element of either of the above technologies should be the clear presentation of results.

In an era of data openness, bathing water quality information must be transparent and presented in a manner which is accessible and informative to a broad audience, reaching different communities and social groups. This may be in the form of apps, online maps, phone alerts, but should also continue to include physical signage.

An amalgamation of the above innovative technologies – molecular biology and AI – could provide the ideal, unique combination of a comprehensive bathing water quality picture with near-real-time public information.

At the same time as exploring new technologies to monitor the bathing water environment, we all need to continue working towards reducing pollution to all of our water bodies at both the individual and community level.

Let's enjoy and appreciate our coastal and inland bathing waters, and the huge benefits they provide to our wellbeing; while also investing in innovation to better protect the environment and provide accurate and useful information on water quality to all.

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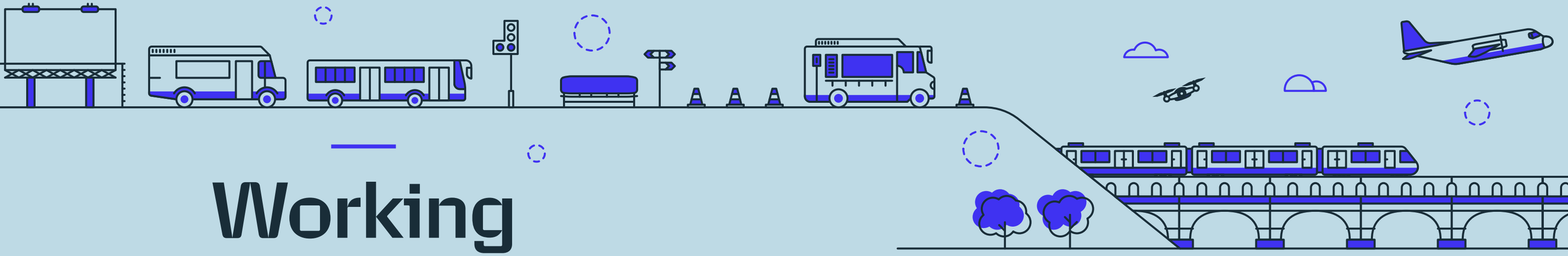

Working With Nature Everyday

Integrating nature based solutions into operational practices

Marc Huband, Associate Geomorphologist - **Mike Image**, Associate Natural Capital
Emily Brown, Environmental Scientist - **Eleanore Miles**, Senior Environmental Scientist

As engineers we are naturally drawn towards bold, large solutions - we are all guilty of promoting at least one vanity project in our careers! But as environmentalists we also know that whilst the natural world can be bold and spectacular, it is often more subtle in its approach. Nature is at its most powerful when working gradually to effect long-term change at large scale. If our projects are to truly embrace or mimic natural processes, they need to be less about obvious changes in isolated locations and more about small changes implemented over wider areas - working with nature every day.

Strategic investigations such as catchment scale Natural Flood Management (NFM) opportunity mapping clearly demonstrate the potential of working with nature every day. As an example, in the Tamar catchment we have shown that the more subtle but widespread soil recovery[1] measures (Figure 1) have potential to store substantially more flood water than more visible but discrete measures like woody barriers or flow pathway bunds (Figure 2).

Figure 1: Soil recovery measures have the potential to store a substantial volume of flood water

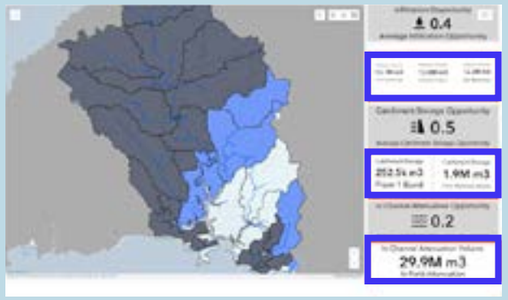

Figure 2 –The potential NFM measures have in the Tamar catchment to reduce runoff and slow the flow. The boxes highlighted in red show the total volume of storage attributed to each type of NFM measure.[2]

Implementing small changes over large areas comes with its own challenges. Landscape scale changes are more likely to directly disrupt existing land uses and land-managers need to be comfortable with this potential upheaval. Also, these changes are often operational in nature – they require a fresh perspective on how land could be managed on a day-to-day basis.

Funding systems are beginning to evolve to accommodate working with nature every day. This year the Environmental Land Management Scheme (ELMS) will offer a richer suite of actions with highly attractive payment rates which should inspire land managers to be bolder and more creative in how they manage land for the benefit of nature and society.[3]

Private and blended funding schemes are also developing, encouraging some landowners to take the plunge and manage land with a view to optimising all the ecosystem services it provides, rather than focussing primarily on food production.[4]

Farmer clusters and long-term Landscape Recovery programmes are being embraced by farmers across the country, which will help deliver outcomes at scale.[5]

However, integrating nature-based solutions into operational practices still faces many barriers.

There remains a huge disconnect between the ambitious goals set by policy and strategy and what regulation and funding allows practitioners to achieve on the ground. As an example, Common Law definitions of flood risk can make more progressive ways of working with nature to manage flood risk difficult to realise. So, there is still much to do by policy makers, planners and implementors alike before we can fully embrace working with nature every day. That aside, we should remain hopeful and be inspired by step changes in practices over recent decades in environmental management like renewable energy production and public acceptance of recycling.

References:

1. Soil recovery includes interventions such as arable reversion to grassland and soil decompaction which improve infiltration and retention of water in agricultural soils.
2. Data source: https://atkinsgeospatial.maps.arcgis.com/apps/MapSeries/index.html?appid=ed51f0997bee4576b83e851600bbddda
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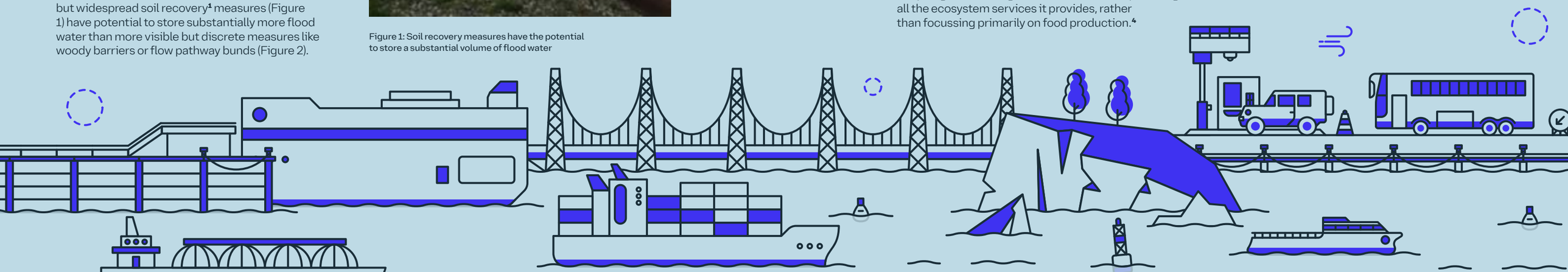

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