



greenminds

greenminds case study

The Urban Beaver Story



Green Minds Model summary

The Green Minds Model aims to summarise the structure of the GM approach, to aid its transfer and replication to other urban areas and authorities.

Green Minds piloted new ways of implementing nature-based solutions within an urban environment. The project's central aim was to collaborate with stakeholders to recognise how humans, as part of nature, interact with nature in a complex system and to identify ways in which *systemic* change is brought about.

The model is presented as an integrated approach, where various nested elements are shown working together as a system. It reflects the particular challenges and scales of focus in urban areas - from individuals, to communities and neighbourhoods and at a citywide level. It focuses on particular leverage points for change (best practices) with regard to nature in cities, and is guided at its core by a set of underlying principles to inform practice.

At the centre of the model sits the system goal - *Urban Wilding. A set of guiding Principles have been created to inform the practice of Urban Wilding. These principles have emerged from our experiences designing and implementing Urban Wilding in Plymouth.

The eight Principles that have emerged from our programme of testing and development represent key leverage points to effect system change and to successfully integrate nature within urban place shaping. This includes exploring deeply held beliefs and values around our relationship to nature and to others, the creation of new organisational and digital infrastructures which empower citizens, and the development of new policy, planning and financial frameworks to support this.

Complex systems can behave differently at differing scales and so these are reflected too in the model to recognise the importance of understanding *who* needs to be engaged and *how*. This takes into account the need for multiple perspectives and the importance of equity (who participates), through an

inclusive process of engagement from individuals to groups and organisations, and at neighbourhood and citywide scales.

Finally, the model acknowledges the importance of an ongoing and iterative co-design process. This process recognises that resilience requires the ability to adapt as solutions emerge within a complex and constantly changing environment. It is delivered through a cyclical, action learning approach in which lessons learned influence the next cycle of implementation to ensure a progressive approach.

The model is brought to life through our suite of Insight Papers, Guides and Case Studies which aim to illustrate how the model was implemented and what we learnt.

Green Minds Urban Wilding Principles

The quality and quantity of nature has declined significantly in recent decades. Across the UK and Europe, nature recovery and restoration, rather than just preserving or conserving what remains, has become a high priority, as we have become more aware of society's dependence on nature[1].

We know that spaces that are more biodiverse can deliver multiple health and wellbeing benefits as well as other nature-based solutions such as improvements in water drainage, increased carbon sequestration, removal of air pollutants and increased pollination for food security[2]. 'Rewilding' has gained prominence as one approach to achieving such improvements in biodiversity, with a growing research body assessing its impact.

Urban (re)wilding, however, is still a new concept. We define Urban Wilding as 'any initiative, both human-aided and natural colonization, that aims to encourage biodiversity, ecosystem function and native species in urban settings'[3].

Urban Wilding is fundamentally different from wilding/rewilding/renaturing elsewhere. Cities and towns are dominated by human infrastructure and activity. Consequently, many natural ecosystem processes are significantly modified or constrained in urban areas. We rely upon ecosystem services for our health and wellbeing. Urban ecologies, which deliver these ecosystem services, are complex and poorly understood. However, we know that more biodiverse systems deliver more or better ecosystem services. We also know that we can mimic, or engineer, some specific ecosystem services such as storm water management. Whilst we don't know enough to design urban ecosystems to deliver all the services we need, we do know that more nature is good for people and urban living and that arranging it in certain ways can deliver certain specific benefits. We can't achieve this by doing nothing - positive interventions are required, which in turn demand enabling policy, community action and practical delivery mechanisms.

The Green Minds understanding of Urban Wilding recognises the need to shift from nature conservation to nature recovery - to focus on restoring much of what is rare or has gone and a recognition that we need to bring high quality Nature into places where people live.[4]

The Urban Wilding Principles below are designed as a set of prompts to help guide initiatives for nature to thrive in cities: to survive and reproduce, to expand, and to function as a system and so deliver more and better services to support urban environmental health, our economy, and human wellbeing.

*We have chosen to use the term 'wilding' instead of 'rewilding', as it better reflects the reality of nature in urban areas - to rewild implies a return to nature before urbanisation, which is not possible.

[1] Nature Recovery for Our Survival, Prosperity and Wellbeing: A Joint Statement by the Statutory Nature Conservation Bodies of the UK. jncc.gov.uk/our-role/the-uk/nature-recovery-joint-statement

[2] Dasgupta, P. (2021). The Economics of Biodiversity: the Dasgupta Review. London (HM Treasury); Maller, C. (2018) Healthy Urban Environments. Routledge

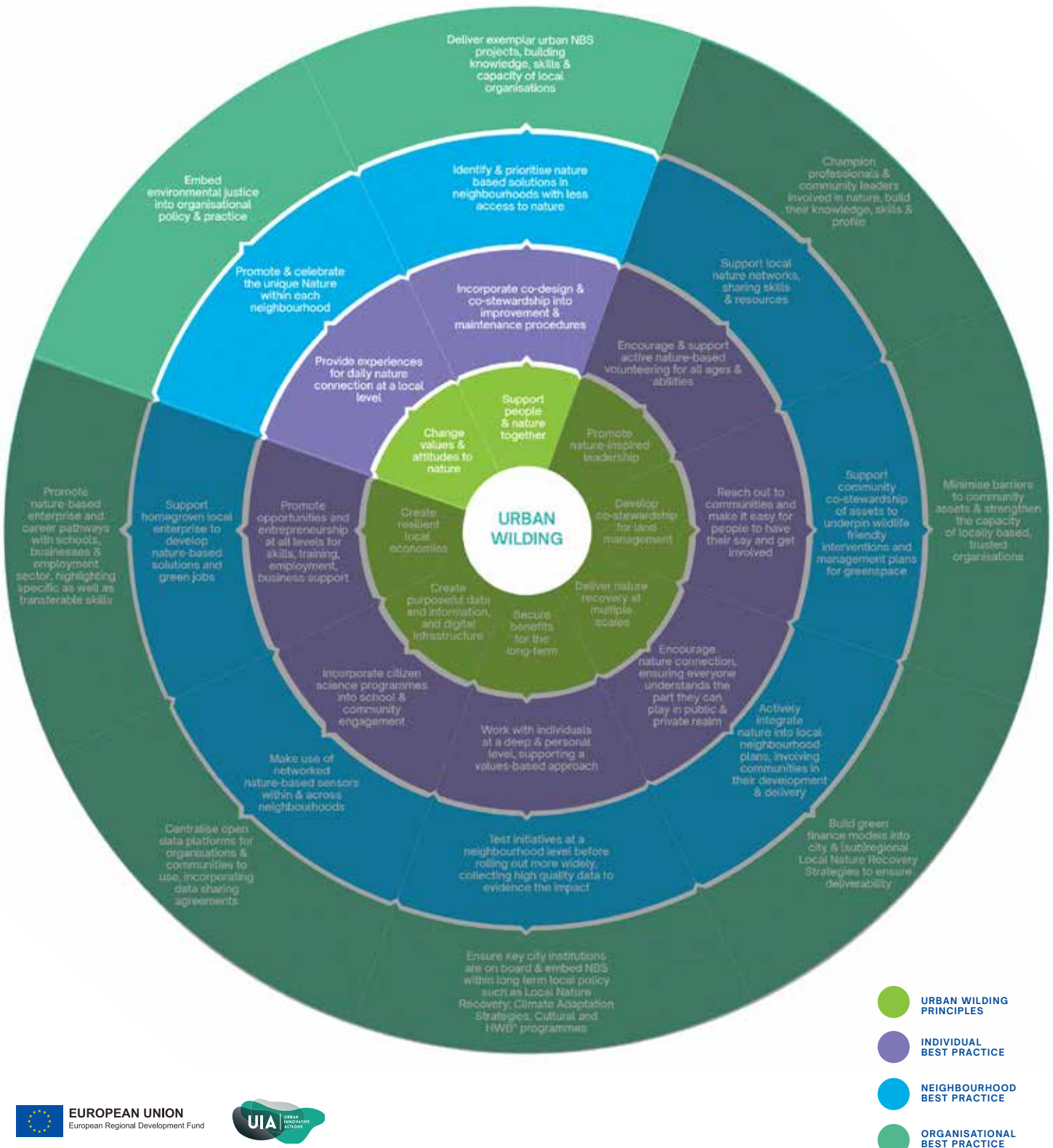
[3] Maller, C., Mumaw, L., & Cooke, B. (2019). Health and social benefits of living with 'wild' nature. Ch 9 in Rewilding. Pettorelli, N., Durant, S., and du Toit, J. (eds). Cambridge University Press

[4] Juniper, T. (2022) Tony Juniper: Green Paper - an opportunity for an integrated approach to Nature recovery - Natural England

greenmindsmodel

The model illustrates the three system levels at which the Urban Wilding principles are applied to drive action: the individual, with neighbourhoods, and within organisations.

Permeability, both within and between segments, reflects the need for adaptability through local learning gained through an action learning approach, in which lessons learned influence the next cycle of implementation.



Urban Wilding Principles

Support people and nature together

Promote a just transition to wilder cities through equitable access to nature, socially just policy and involvement in the co-creation and co-stewardship of nature-based solutions that are adapted to climate change, biodiverse and support nature connection.

Promote nature-inspired leadership

At all levels of management (individual, community/neighbourhood, city administration, business, etc) enable nature positive actions to enhance urban liveability through education, training, and policy.

Develop co-stewardship for land management

Democratise land management and ownership through the development of co-stewardship solutions with user communities, introducing inclusive and empowering processes for engagement, creating community assets, and utilising diverse governance structures.

Deliver nature recovery at multiple scales

Make the most of the local built environment and its scale, acknowledging that no space is too small to be valuable whilst at the same time recognizing that larger green spaces and high degrees of connectivity are key for nature recovery.

Secure benefits for the long-term

Develop integrated policy instruments that embed urban wilding in development practice, led by communities and advised and supported by public administrations to create resilient cities and a population connected to nature.

Create purposeful data and information supported by digital infrastructure

Develop new digital infrastructures to generate community-owned and insightful knowledge of urban nature to support nature connection, and nature-positive policy and practice.

Create resilient local economies

Promote and empower nature-related careers, cooperatives and social enterprise across all sectors, to create new jobs and new value in green and blue infrastructure.

Change values and attitudes to nature

Promote nature connection amongst citizens, to enhance individual and community wellbeing and to foster nature-positive choices.



What we set out to do

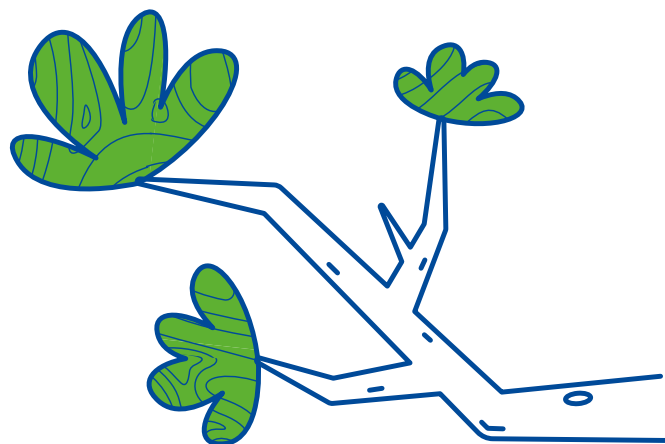
This case study describes the experiences of Britain's first urban European Beaver re-introduction as a natural flood management trial, part of the Green Minds project's urban wilding initiative.



Derriford Community Park is surrounded by housing and industry and forms an important open space within the city of Plymouth. It extends across two Valleys, Seaton and Bircham, each having a stream that together drain a catchment of about 4.5km². The catchments comprise hard surfaces, fields and steep valley woodland.

As in many parts of Plymouth, localised flooding often occurs during heavy rain storms, closing roads, and threatening property. New urban developments leading to even more sealed surfaces and surface water run-off have led to the creation of large engineered solutions, attenuation basins. They are costly and demand a lot of space. An alternative is needed. After much research, beavers were settled upon as a natural flood management measure.

Beavers are fascinating creatures with an important job to do. They are natural engineers who change their surroundings by felling trees, damming sections of river, slowing the flow of water during and after rainfall, helping to reduce flooding downstream. They also create wetland spaces, great for birds, fish, amphibians, and bugs to live and feed in.



LEFT: Beaver in Derriford Community Park.
Photo credit Chris Parkes Photographer Ltd.

Bringing beavers to Derriford

Plymouth City Council, which owns and runs Derriford Community Park, established a Project Board to oversee the beaver re-introduction. This comprised experts in beaver ecology, river ecology, hydrology, and beaver re-location.

This group advised on the needs of the beavers, the nature of possible interactions with the surrounding community and infrastructure, and how to mitigate potential problems, and the design of the beaver enclosure. They proved to be an invaluable sounding board, providing expert advice that enabled project managers to take some difficult decisions as the project unfolded.

The arrival

The first to arrive, in November 2020, was a male beaver closely followed by a female the following January – both from wild populations in Scotland.

RIGHT: beaver being released in Derriford Community Park.
Photo credit, Chris Parkes Photography Ltd

A 3.5 ha enclosure, which covers 600m of river in a wooded valley, had been prepared for them.

While setting this up, Plymouth City Council kept the welfare of the animals of paramount importance by working with partners including leading beaver experts at Devon Wildlife Trust, rewilding specialist Derek Gow, and Roisin Campbell-Palmer, the UK's top beaver ecologist, to ensure the beavers remained healthy and happy.



New engagement opportunities

The arrival of the beavers created many new opportunities for Plymouth City Council and its partners to engage with their communities about nature and nature based solutions for flood management and nature recovery.

New engagement

- **Wildlife tour:** The beavers give the wildlife tours new momentum. Open to the public, tours last about 1.5hrs and are an opportunity to communicate about urban nature, wilding, natural flood management etc.
- **BBC Winter Watch TV** magazine item, broadcast nationally, featured the beaver introduction in an urban environment. Engagement was online as it occurred during Covid lockdowns. Nicknamed 'the people's beaver' it generated a real buzz online, and expressions of pride from the residents of Plymouth.
- **Online engagement** was high, with the video of the beaver being released gaining over 126,000 views - the largest engagement of the year for Plymouth City Council communications.
- **A beaver naming competition** proved extremely popular. Targeting primary schools, an information pack and teacher lesson plan - featuring the beaver release video, and information on wilding and urban ecology - invited children to suggest names as the final part of the lesson. 50 schools submitted entries, the winners being selected by Street Services staff.
- **Farm visits for schools** benefited from the addition of beaver watching, which led into teaching on flood management, ecosystem functions etc.
- **Beaver volunteering:** A volunteer team was set up to monitor the beavers daily, noting their behaviour, checking the enclosure boundaries etc. offering more specialist volunteering opportunities.



Beaver cabin and eco-therapy

Green Minds provided funding for a ‘wildlife hide’ to observe the more reclusive birds and mammals in the park.

However, with the arrival of the beavers the park staff decided something more ambitious was needed to capitalise on the high level of interest in the beavers.

An eco-cabin was designed with glass walls overlooking the beaver pond to provide a sheltered and versatile viewing area and classroom for school group visits. This has proven immensely popular as an outside inside space – that is, a sheltered all weather activity space that feels part of the outside environment that surrounds it. This is achieved by its glass walls and log frame construction.

It has given rise to a whole new range of services which make use of the natural environment of the park and the opportunities it provides to connect people to nature.

For example, the experience of traumatic events in childhood can affect mental health and the ability to engage with education in

early life. Child and Adolescent Mental Health Services (CAMHS) in Plymouth have seen an increase in referrals, which has resulted in a long wait for children from the time of referral to the point at which services are delivered. A new programme was needed to work with children and young people in group settings.

The beaver cabin provides a safe and tranquil space for the delivery of therapeutic, nature-based activities that engage young people with nature in order to build good self-care practices that will foster healthy coping mechanisms for the rest of their lives.

‘Outside Within’ eco-therapy activities

A wide range of nature-based activities were run on a weekly basis for 6 sessions. The intervention was organised around a half term giving pupils the opportunity to apply what they have learnt in the first three sessions in an informal green space near their home.



A favourite moment on the Outside Within Programme was spending time around the campfire. ‘When he comes home he talks about lighting fires and sitting and having hot chocolate and marshmallows’.

ECO-THERAPY PARENT

LEFT: Inside the beaver cabin

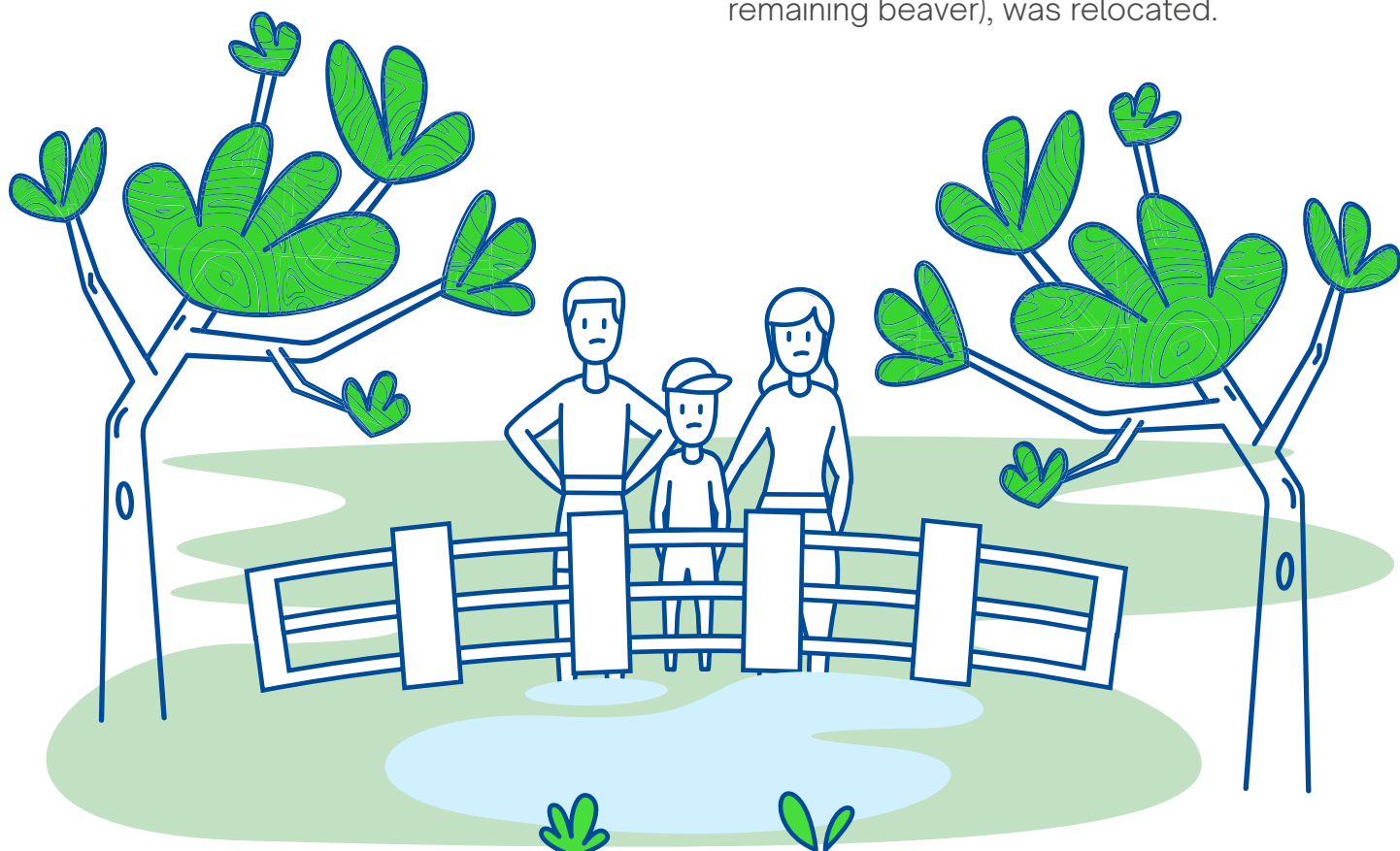
The escape

Extreme weather, of the type the beavers were brought in to help cope with, damaged the enclosure fencing in July 2021, and the beavers escaped.

Sadly, the female beaver, Beryl, was killed by a car. The public reaction was one of great sadness at the loss of an animal that the city had taken its heart.

Project Manager Jerry Griffiths recalled “It was at this time that the Project Board really proved its worth. We consulted the board over the possible motivations for the beaver escape – was it disturbance caused by nearby construction works, of nearby housing, or the pressure on food resources caused by the presence of deer in the enclosure, or just the opportunity presented by the damaged fence?”

A key question was “what do we do now?”. The board encouraged the continuation of the trial once design flaws in the enclosure were resolved. In the meantime, Brian (the remaining beaver), was relocated.



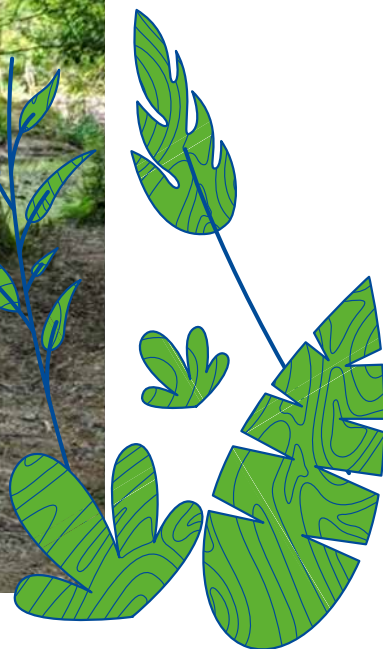
Natural flood management

Beavers help to provide natural flood management (NFM) by building dams that slow the flow of water downstream during heavy rainfall. It is stored temporarily in ponds behind the dams. This helps to prevent flooding further down the valley.

One beaver dam isn't enough and so a series of small-scale 'leaky dams' were constructed by the Farm team to perform the same task – about 120 are planned all together! They mimic the natural effects of fallen trees blocking streams, facilitating the natural build-up of debris between obstacles which slows water flow.

Hydrological monitoring by the University of Exeter has allowed the individual and collective impact of the dams to be evaluated by the University of Exeter using hydrological monitoring. This is important if NFM is to provide a credible alternative to more conventional engineered structures.

BELOW: leaky woody dams slowing the flow at Derriford Community Park



Monitoring impact

The water level at each of the 3 monitoring points was recorded continuously on a 15-minute timestep for over 300 storm events and converted to discharge volume data. "This was combined with the rainfall radar data and analysed to extract rainstorm events and their related flow response events.

Analysis showed that each dam had a measurable effect in its immediate vicinity, but many small leaky dams are needed to have a measurable impact at flood risk areas further down the Forder Valley. In promising results on Bircham Stream, we've seen statistically significant reductions in peak stormflow following the leaky dam installation that has occurred so far.

Key insights

1. Beavers are a charismatic species and have immense potential to enhance community engagement, and to stimulate development of new nature-based services and community pride
2. They offer a unique opportunity to generate engaging education materials and lessons regarding ecology, urban wilding, natural flood management etc. and a study site on their doorstep in the city
3. To fully capture this benefit, investment is needed in appropriate infrastructure – principally the beaver enclosure and the observation cabin
4. Monitoring is essential to be able to demonstrate the positive impact of natural flood management to decision makers
5. The huge public interest in the beavers brought a higher level of scrutiny than usual, so being able to call upon experts to advise and to defend decisions is invaluable
6. The urban context created unique problems - concern regarding beaver welfare, disturbance from dogs, construction and traffic noise, and more. This necessitated expert advice, and stronger fences needed to keep beavers in and people out recognising the higher risk of escape in urban areas.





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