



Belmont Forum – UKRI ‘Unlocking the Benefits of Urban Green and Blue Spaces’

Scoping Workshops Report

9th, 14th and 16th June 2022
Held virtually on Zoom

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Executive Summary

The concept of an 'Unlocking the Benefits of Urban Green and Blue Spaces' Collaborative Research Action (CRA) was presented to the Belmont plenary in 2019 and 2021.

In 2022 the Belmont Forum partners agreed to consult with their relevant research communities to gain insights on high priority research challenges via international scoping workshops to further develop the scope of any potential funding programme.

106 expert participants from Australia, China, France, Japan, Chinese Taipei, Turkey and the UK drawn from the environmental, arts and humanities, biological, engineering and physical, and social science domains collectively drafted priority research challenges and questions which could potentially form the basis of a CRA.

These research questions covered the topics of: Co-production; Culture; Inclusion; Sustainability; Policy; Trade-offs; Biodiversity; Scale; Co-benefits; Connectivity; and Monitoring, quality and technology.

In addition, participants also made suggestions on the most effective delivery mechanisms of any CRA in this research space. These covered the topics of: Type and duration of funding; Eligibility for funding; and other key points of relevance.

Belmont Forum partners will convene to discuss the scoping workshop outputs, with a view to presenting a fully scoped call document to the Belmont Forum plenary in October 2022.

Background

The Belmont Forum is a partnership of funding organisations, international science councils, and regional consortia committed to the advancement of international, transdisciplinary research providing knowledge for understanding, mitigating and adapting to global environmental change. It accomplishes its work through Collaborative Research Actions (CRAs) for global environmental change issues that require global coordination to achieve science goals; create synergy; and avoid duplication.

The idea of an 'Unlocking the Benefits of Urban Green and Blue Spaces' Collaborative Research Action (CRA) was originally presented to the Belmont plenary in 2019 but was subsequently paused. It was presented again at the November 2021 Belmont plenary, and in March 2022 partners met to undertake discussions on taking it forwards.

Partners agreed to consult with their relevant research communities to gain insights on high priority research challenges via a series of three international scoping workshops in June 2022 to further develop the scope of a potential funding programme.

This series of three workshops brought together representatives of the international research community and the program officers of Belmont Forum partners, with the aim to set out priority research questions/topics and the societal and global challenges within which they sit, where international collaboration will add substantial value and generate significant advances. The main goal was to identify options for a potential Belmont Forum CRA on "Unlocking the Benefits of Urban Green and Blue Spaces".

Science Background

More than 55% of the world's population live in urban areas, and in many countries the figure is much higher, for example in the UK 83% of people live in urban areas. Although the majority of us live in urban areas, environmental research in our towns and cities has tended to focus on solving specific problems, such as improving air quality or cleaning up contaminated land, rather than looking holistically at how to maximise the multi-benefits open spaces in urban areas provide. Green and blue open spaces, such as parks, rivers, lakes, and grass verges, provide essential ecosystem services in our towns and cities, including mitigating flood risk, improving air and water quality, reducing temperature, and providing a haven for wildlife. The aesthetic, cultural and recreational attributes of blue and green spaces also contribute positively to the health and wellbeing of urban populations.

Urban environments face different challenges in different areas across the Global North and Global South, as well as through their differing stages of urban development. Through these scoping workshops, the aim was to identify the research priorities needed to understand how green and blue spaces in these different urban areas could or should function. There was particular interest in their ability to deliver multi-functional benefits, as well as how they can increase resilience to large scale challenges both on a national and global level. In any research programme funded we would expect that outputs would lead to decision makers using new understanding, as well as existing knowledge, to determine how to sustainably manage them in an equitable way to maximise the environmental, social, cultural and health benefits they provide in order to meet the challenge of making cities inclusive, safe, resilient and sustainable.

Urban landscapes are shaped by a combination of geography, climate, economy, history and culture. A Belmont Forum collaboration will enable a comparative analysis of green and blue urban spaces in different parts of the world that have each been developed in a unique way, providing both whole systems understanding of the functioning of these spaces and the ecosystem services they provide, and knowledge of how local context influences these functions.

The Scoping Process

Workshop Participation

To allow for maximum inclusion and participation, the scoping workshops were held virtually on the Zoom platform between 9–16 June 2022 across three different time zones:

- 9 June 2022, British Summer Time (10:00 – 14:00)
- 14 June 2022, China Standard Time (13:00 – 17:00)
- 16 June 2022, Eastern Time (10:00 – 14:00)

Attendees were selected to ensure diverse representation from the environmental, biological, arts and humanities, engineering and physical, and social science domains.

In total, 106 experts including academic researchers at various career stages, policymakers and other stakeholders participated, with representation from Australia, China, France, Japan, Chinese Taipei, Turkey and the UK.

Preparatory Work

All participants were asked to complete a research priorities gathering exercise prior to the workshop. They were asked to identify their top two priorities which best answered the following question:

Thinking about the end benefit and multi-functional benefits which an urban green or blue space can provide, what are the current gaps and priorities in research needed to enable their creation, maintenance and sustainability.

The data was collected via the online [Well Sorted Tool](#) platform, which provides clustered outputs based on participant input. Participants were then asked to arrange the submitted priorities into groups which would form the basis of discussions during the workshops

A list of all of the research priorities which were submitted are in Annex A

Workshop Introduction

The agenda for the workshops can be seen under Annex B.

Wendy Matcham from UKRI-NERC gave an introductory presentation to the workshop, and Dr Nicole Arbour gave an overview of the Belmont Forum. Michelle Manning from UKRI-NERC introduced session 1. The presentations given at the workshops can be seen under Annex C.

The structure of the workshops was split across two breakout sessions:

- Session 1 to identify priority interdisciplinary research challenges that the Belmont Forum funders need to address in order to unlock the multi-functional benefits of urban green and blue spaces in different countries and contexts, in relation to resilience and adaptation to change, as well as the delivery of ecosystem services.
- Session 2 to highlight the most appropriate funding approaches and delivery mechanisms that would address those research challenges

Session 1: Exploring the key research challenges

The Well Sorted Tool outputs were clustered into 3 or 4 groups (depending upon the date of the workshop and the research priorities which had been submitted at the time of the workshop), and participants were asked to place themselves in the breakout group which they felt was most appropriate for their expertise.

Each group was tasked with collectively designing and writing research challenges or questions which encapsulated the priorities of their group, and which could only be fully addressed with an interdisciplinary collaborative approach and would benefit from a comparative international component.

Groups were asked to go beyond what's been researched before and to bear in mind:

- Interdisciplinarity – need a holistic, systems science view in order to address urban challenges
- Focus on multi-functional benefits
- International comparators – working through the Belmont Forum allows us to look at and learn from different global urban environments
- Resilience – in relation to environmental and social change (e.g. climate change, land use change, urbanisation)
- Priorities could be aimed at research gaps to address existing green and blue spaces as well as the creation of new spaces

Participants were then asked to place themselves into a different breakout room with a different group of research priorities, in order to bring their expertise and thoughts from a different perspective into the research challenges or questions.

Online padlets were set up to record the outputs, and the data can be seen under Annex D.

Session 1 Results Summaries

The groups of research priorities, and hence the breakout rooms fell into the following topics:

9th June workshop

- culture, communication, inclusion, behaviour, learning, justice, equity
- trade-offs, location, resources, land management, financing, soils, value, biodiversity
- scale, connectivity, accessibility, sustainability, maintenance, quality, monitoring, smart-tech

14th June workshop

- financing, valuation, land ownership, land management

- scale, location, accessibility, planning, connectivity, maintenance, quality, trade-offs, biodiversity, resilience, vegetation, smart-tech
- participatory approaches, inclusion, culture, behaviour, communication, equity, justice, collaboration

16th June

- financing, valuation, land ownership, land management, maintenance
- scale, location, accessibility, planning, connectivity, trade-offs
- heat, quality, vegetation, engineering, monitoring, biodiversity, smart-tech
- participatory approaches, inclusion, culture, behaviour, communication, equity, justice, collaboration

Session 1: Research questions summaries

Over the course of the three workshops many research challenges, questions and gaps were identified. Analyses of the information captured via the padlets has highlighted a number of common key research questions and themes under the topics:

Co-production

- How can we use co-production practises to design urban blue-green spaces that deliver multiple benefits for diverse communities?
- How might these practices need to differ in different global contexts?
- How can the involvement of multiple stakeholders be maintained throughout the entire life of blue green spaces?

Culture

- How can the tacit knowledge of local communities be harnessed to ensure the development of future blue green spaces are context sensitive?
- What motivates people in different countries and cultures to value and engage with green and blue spaces? Do some communities inherit values which prevent them from engaging?
- What can we learn from non-users (people who don't want to engage with) of urban green blue spaces?
- How do different demographic groups experience physical, social and cultural barriers in accessing blue and green spaces? Does this change with scale and locality?

Inclusion

- How can green and blue spaces help to promote more just transitions?
- Do urban blue green spaces benefit all equally?
- How can we value the benefits of accessing and using green and blue spaces from an individual, community and societal level to be inclusive?

Sustainability

- How can we design green and blue spaces with long term resilience and sustainability in mind?
- How can we ensure long term stewardship (management, monitoring and maintenance) of blue green spaces through stakeholder and community ownership? How does this vary in different countries and contexts?
- What are the skills and training required to ensure long term stewardship of green infrastructure? How can these translate into job opportunities?
- What finance models will maximise the long-term benefits of urban blue green spaces?

- How do we ensure blue green spaces are resilient to climate change and can be used to mitigate its effects in the long term?

Policy

- How can green and blue infrastructure be better mainstreamed into urban planning systems in different countries? What are the most effective design options within different contexts?
- How do the legal systems in different countries support or challenge the allocation of funds for investment in blue and green spaces?
- What are the barriers to moving towards more strategic green infrastructure planning approaches?
- What can we learn from the processes of translating evidence into policy and practice in different international urban contexts?

Trade Offs

- What are the potential benefits, dis-benefits and trade-offs of green and blue spaces in urban areas, and how do we balance them between different stakeholder views and values in the creation, use and maintenance of blue/green spaces in cities?
- What can blue green spaces not deliver, and how can we manage expectations?
- How can we make decisions about trade-offs more transparent?

Biodiversity

- How does biodiversity in green and blue spaces vary across countries? How does this impact how people value and use these spaces?
- Does brownfield rewilding and grey infrastructure have a place alongside blue/green spaces and how do we manage this to encourage biodiversity rich urban areas?
- What are the benefits of native vs non-native plants within blue green spaces?
- How do we ensure that biodiversity and climate change are prioritised by policy makers?
- How do we strike a balance between protecting biodiversity and connecting people with nature?

Scale

- How can we link understanding of green-blue space multiple benefits at local, city, national and global scale?
- How we can expand urban blue & green infrastructure for climate change mitigation and adaptation from the scale of individual cities to globally effective long-term climate measures?
- How do we integrate urban green blue spaces in cities at different stages of urbanisation?

Co-Benefits

- How do we understand, quantify, evaluate and optimise the co-benefits and multi functionality of blue green spaces across multiple scales?
- How can we link the co-benefits of blue green spaces to policy/decision making?

Connectivity

- How do we measure the benefits of connectivity between local interventions to assess cumulative effects city-wide?
- How should we connect and manage networks of blue and green spaces to enable multiple benefits?

Monitoring, Quality & Technology

- How do we define, measure and maintain the quality of urban green and blue spaces?
- How do we best gather the data/evidence of the effectiveness of green and blue spaces in relation to the ecosystems services that they provide (e.g. flood mitigation and pollution mediation), in order to influence design and implementation of interventions?
- How can we increase data collection capacity to support scaling and modelling of urban blue green spaces?
- How do we exploit the full potential of Digital Twins across different timescales to optimise the planning, delivery and monitoring of green and blue infrastructure?
- How can we make use of low-cost smart sensing technology in urban areas to address urban structural and biophysical complexity?
- How do we use living labs/observatories to study international comparisons?

Session 2: Identifying effective delivery mechanisms

The second session split participants into breakout groups and asked for their views on the most appropriate delivery mechanisms that would address the challenges identified in Session 1. Participants were encouraged to include any aspects of delivery.

Outputs were recorded in padlet and a full summary of these can be seen under Annex E.

Session 2 Summaries

A number of key points and suggestions emerged across the three workshops for Belmont Forum partners to consider on the most appropriate delivery mechanisms of any potential investment programme. These recommendations will be taken into account when devising any resulting CRA, but will ultimately be subject to the constraints of budgets, timetables and strategic priorities of the individual Belmont Forum partners funders involved.

Type and Duration of Funding

It was clear that one size doesn't fit all and that a programme offering a mix of proof of concept, intermediate and long- term grants would be most beneficial. Two stage applications have the added benefit of helping to manage community expectations and allowing for the co-creation of high-quality proposals.

International interdisciplinary projects require a long lead time to get established and reach a common understanding (at least 6 months) which should be built into the project duration.

Dedicated funding for community building events/seminars/sandpits which support networking amongst researchers and practitioners as well as proposal development was identified as a key element. The funding of a programme integrator/translator would also help to overcome language barriers and help foster international collaborations.

Suggestions included:

- Proof of concept projects
- Intermediate scale projects (£50-200k)
- Large projects (3+ years)
- Networking funding
- Sandpit style events

- 3+2 model i.e. 3 years project funding plus opportunity for 2 years of follow on funding
- Catalyst awards
- Seminar programme
- Two stage application process (expression of interest and then grant applications)
- Calls with longer timelines
- Calls with long lead in times for projects to establish themselves

Eligibility for funding

Equity and inclusivity featured high in the suggestions, with a desire to be inclusive of LMIC researchers, research career stages, and all potential stakeholders, with funding calls sensitive to cultural insights and acknowledging the diversity of team members and equity in funding for overseas and UK institutions.

Funding should be made available to stakeholders so that research is embedded into the community, as well as for enabling researchers to work with end users to translate findings into policy.

Suggestions included:

- Funding for different kinds of organisations (e.g. local community groups, civil society groups, NGOs, LMIC researchers, policy makers, developers, local governments)
- Funding for LMIC researchers
- Funding for ECRs
- Funding for PhDs and doctoral training programmes

Other Key Points

Suggestions included:

- Funding for programme integrator and translator across the programme
- Prioritise riskier, less traditional intersectional research questions
- Some way to prioritise SDGs and resilience to climate change
- Reviewers should be well-briefed on how to review inter/transdisciplinary proposals
- The administrative burden incurred preparing an application should be relative to the amount of funding available.

Next steps

Dan Knight from UKRI-NERC presented the next steps, and the presentation can be seen in Annex C.

The padlets remained open for participants to add to up until 5th July 2022.

NERC drafted this scoping report, which will be shared with Belmont Forum partners to be disseminated as they choose, and also uploaded to the UKRI website.

A follow up Belmont Forum funders meeting is planned for late July 2022 where partners will discuss the workshop outputs. This will recognise the fact that any programme of work will likely need to prioritise the research challenges highlighted within this scoping report amongst the Belmont Forum funding partners, to work within the strategic priorities and boundaries of the organisations involved.

A fully scoped call document paper will be presented to the Belmont Forum plenary meeting in October 2022.

Any potential investment programme could potentially be launched in Spring 2023, with projects potentially starting in December 2023.

Appendix A

Well Sorted Platform Research Priorities as submitted by workshop participants (In no particular order)

| Number | Title | Description |
|--------|---|---|
| 1 | Land ownership and Urban, Blue & Green Spaces | We need better understanding of land ownership patterns in urban areas to facilitate biodiverse spaces, which can also be enjoyed by people (and, perhaps, more controversially, their pets). |
| 2 | Financing Urban, Blue & Green Spaces | How can ongoing management of blue and green spaces be financed? Are there alternatives to privatisation (often used to reduce public expenditure) and how can community management be combined with consistent funding and resources. |
| 3 | Ecosystem multifunctionality | How to capture both ecosystem services and disservices and the underpinning functions; need to consider biodiversity both above and below ground (soil) |
| 4 | The importance of scale and context | Thinking about ecosystem services and disservices at multiple scales from a local "patch" of green/blue space right through to regional/national/global. Are there common patterns seen globally or does local context override everything? |
| 5 | Dealing with conflicting stakeholder priorities | How best to identify all the key stakeholders and then how to ensure these stakeholders inputs/views are considered in a way that addresses possible conflicts and maximizes the synergies and benefits? |
| 6 | Finding optimal locations for blue/green spaces | To what extent are B/G interventions located in convenient but non-optimal locations? Can we do more through science and stakeholder engagement to inform optimal locations for B/G interventions? |
| 7 | green space in megacity regions | Urban populations in rapidly urbanizing countries often lack easy access to green space, as the sheer size of cities, combined with busy lives, and on occasion poor transport systems means parks, and other green spaces are sparse. |
| 8 | Urban development and green and blue space | Urban development either encroaches on existing green and blue space, such as fields and floodplains or in seeking to maximize profit does not include it. Developers and municipal authorities need to value such places above residence, retail etc. |
| 9 | Reduce trade-offs and promote synergies | Urban green & blue spaces can be multifunctional, but can also cause unexpected and pernicious outcomes. Understanding potential trade-offs and exploring how to promote synergies in different contexts are crucial for promoting urban green & blue spaces. |
| 10 | Justice in urban green and blue spaces | To understand the issues of social and environmental justice related to urban green and blue spaces, and to explore approaches to address the justice issues through urban green and blue spaces. |
| 11 | Improved provision in nearby nature spaces | Increased attention to improving green spaces near to people's homes, even the most mundane, in areas with indices of multiple deprivation and in consultation with the community to ensure they meet local need and address barriers to access |
| 12 | Inspire interest in young peoples | Self-exposure to nature in youth is one of the strongest predictors of adult environmental citizenship, and therefore activities should focus on improving experiences in green |

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| | | spaces in youth, notably addressing a decline in independent unstructured play |
| 13 | Arts, History & Heritage | There is a gap that surrounds how arts, history and cultural heritage is able to make legible the informal and vernacular dimensions of blue green spaces - sustaining these dimensions reinforces community agency through which resilience can be built. |
| 14 | Translating Knowledge between Disciplines | Research should explore the existing environmentalisms within expressive culture -the knowledge of green blue places is inherent to this culture - this research would recognise that issues remain with translating traditional ecological knowledge. |
| 15 | Designing for multiple benefits in context | Design process necessitates prioritising among potential benefits that are subject to trade-off. We lack understanding of trade-offs and their link to different designs of green-blue spaces. We need to understand how to identify priorities in context. |
| 16 | Valuation of Blue and Green Spaces | Use of land for sustainable green and blue spaces is dependent on an economic case. Improved valuation models are needed that articulate distribution of benefits leading to new funding models for creation and maintenance. |
| 17 | Value mapping | Recognition of the value of green and blue spaces in cities has grown but is still poorly mapped and understood. How do people value GI? How can GI planning be mainstreamed into urban planning and residents' ownership increased? |
| 18 | Biodiversity mapping | Compared to climate change mitigation/adaptation, biodiversity is not as high on the agenda. We need a better understanding of the state of biodiversity in cities, using digital tools, based on sound methodology, to develop a GI factor for biodiversity. |
| 19 | Historical Memory | understanding genealogical and historical references that connect people to place |
| 20 | Decolonising green space | thinking though communities excluded from urban spaces by proximity issues, race-class-gender barriers |
| 21 | Financing GI/Green-blue space | Creating knowledge of workable/scalable financing models for GI/GS/BS planning and management looks to address issues of provision, equity, quality/quantity and functionality to support more effective urban planning. All to deliver co-benefits to all. |
| 22 | Strategic/Localised approaches to GI intervention | Creation of effective structural and institutional mechanisms to support investment in GI that breaks down disciplinary/governance silos to support strategic objective setting, city-level planning, and localised delivery. Responsive of governance context. |
| 23 | Drivers of changes in urban green and blue spaces | To understand drivers of the change of urban green and blue spaces can help understand the processes of changing land uses and spaces in urban regions. The knowledge can thus help enhance the maintenance of green and blue spaces as well as sustainability. |
| 24 | Costs and benefits of urban green and blue spaces | To understand the costs and benefits of urban green and blue spaces, including economic, social, environmental dimensions, helps make policies to optimize urban spaces. |
| 25 | Diversity in green and blue spaces and people | What types or characteristics of green and blue spaces deliver particular benefits and to whom? Green and blue space variables: Biodiversity, structure, colour, vegetation community. Human variability: Socio-cultural factors, values informing perceptions |
| 26 | The role of scale in multifunctionality | Should we aim for multifunctionality or prioritise particular functions or uses to optimise benefits in particular spaces? |

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| | | How important is scale? See city of Lyon greenspace strategy where spaces are prioritised: nature/recreational/flowering |
| 27 | Co-creating urban green and blue spaces | na |
| 28 | Supporting international transdisciplinary research | na |
| 29 | Participatory Approaches | There is a need to work with communities in non-extractive ways to understand what they want to see the green or blue spaces deliver for social benefits. |
| 30 | Valuing Green and Blue Space | More and more private sector investors are willing to invest in green and blue spaces that provide solutions and co-benefits, but the value of these are not articulated appropriately and they sit in city 'books' as negative assets. |
| 31 | Engineering design | we currently don't have the same level of engineering confidence in our blue/green infrastructure as we do for grey (e.g. pipes). Seasons, species change, climate etc. all change blue/green performance. We need better understanding for end-user confidence. |
| 32 | Service delivery models | Who and how they pay for blue/green infrastructure is a major barrier to uptake. We need to better understand the value, beneficiaries and how to capture that to deliver different types of service delivery model for blue/green spaces. |
| 33 | Urban green infrastructure quality (green & blue) | Biodiversity helps explain how urban GI provides multiple health and wellbeing benefits for urban dwellers but we lack understanding of which GI attributes underpin benefits/harms, how they interact & at what scale. This is important for decision-making. |
| 34 | Weak mechanisms for prioritising urban GI | Scientific knowledge is one component of support for decision-making. However, even current knowledge is not halting declines in urban GI and biodiversity. Functionality is inadequately considered in development processes, skills and maintenance regimes. |
| 35 | Stewardship | A fuller understanding of the short (1-2 years); medium (2-5 years); and long (5+ years) term skills and capabilities required for communities and local authorities to maintain urban green spaces in a way that provides multiple benefits. |
| 36 | Just transitions | Understanding how green- and blue spaces can rehabilitate and revitalise the lived environment in towns and cities that have been host to carbon-intensive industries, in a way that can support a just transition for places and for people. |
| 37 | Heterogeneity of the urban green infrastructure | Urban areas are mosaics of complex natural and human-made patterns and processes that vary across megacities in different climate zones. The dynamic heterogeneity and multi-functionality of urban green infrastructure is overlooked by research. |
| 38 | Urban green ecosystem services and disservices | Urban trees ecosystem services (ES) and disservices (EDS) depend on the built environment characteristics and the surrounding natural environmental conditions. Research is needed on the ES/EDS comparative assessment within and between megacities. |
| 39 | Distribution | Further multi and interdisciplinary understanding of where and what size (lots of small or one large?) common green and blue spaces are beneficial for the wellbeing of individuals, communities, and urban biodiversity. |
| 40 | Methogology | How do we define, measure and express the value of access to urban green and blue spaces? |

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| 41 | Lack of integrated social-ecological understanding | Understanding who is most vulnerable, where they live, and whether they have equal access to benefits of urban green or blue space is a critical starting point for prioritizing their creation in planning and policy at several levels of governance. |
| 42 | Better understanding on multi-functional benefits | We need more tools to better understand the multi-functional benefits provided by urban green and blue space, and their synergies and trade-offs. |
| 43 | Urban green-blue corridors | Urban waterways (both rivers and canals) carry corridors of green-blue space into dense urban areas. They offer multiple potential benefits (to local communities; to urban planning; climate adaptation) yet are often still neglected and avoided. |
| 44 | Cross-disciplinary working | Unlocking multiple benefits of GBI demands a place-making approach that rejects "silo thinking" and promotes genuine, cross-disciplinary collaboration between sciences, social sciences, arts & humanities. Too often one field leads and "bolts on" others. |
| 45 | Nocturnal Spaces | Urban green and blue spaces often have nocturnal lives/functions - official and unofficial - which are neglected... how do we create spaces for both day and night? |
| 46 | Species living together | Urban spaces are often shared with other animals. How do we create spaces where all beings can not only survive, but thrive? |
| 47 | Truly participatory research design | We need to think about how research agendas are shaped, and how individuals and communities (particularly those who have longstanding or complex relations to the urban green or blue spaces in question) can be involved in research design. |
| 48 | Social and Cultural Values | A strong research focus on the social, cultural, spiritual, religious, relational values that people associate with urban green and blue spaces, and how these impact engagement with, care and responsibility for, and commitment to these spaces. |
| 49 | future proofing for climate change | Are the current parks and spaces resilient to future change (e.g. are most in places that will experience climate change the most?) And are the current portfolio suitable for tomorrow's world? |
| 50 | environmental connections | can environmental spaces be used to better educate the public (e.g. hazard, such as flooding - and people's own neural networks "if that field floods I best move my valuables") and facilitate data capture (E.g. oral traditions, ecology bloom timings..) |
| 51 | Monitoring water quality and flow behaviour | Greater monitoring of water quality and quantity will improve our understanding of how blue-green interventions both reduce flood risk and improve water quality so their design can be improved to optimise these functions and reduce costs. |
| 52 | Optimising behaviour over compliance | Blue-green infrastructure (particularly SuDS) are designed to comply with legislation rather than optimise their function in either reducing flood risk or improving water quality. The benefits could be increased with better exemplars and changes to rules. |
| 53 | Co-designing urban green and blue space | We know that cities need more green and blue spaces, but how do we implement them so that they are welcomed, accepted or understood by urban communities. Further research is required on how to engage with communities to implement NBS in cities. |
| 54 | Time based strategies for implementation | Development of toolkits and time-based strategies to implement more and better green and blue spaces in different cities depending on their unique social, economic and environmental priorities. |

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| 55 | Economic valuation of many ecosystem services | Research often focuses on just a few benefits provided by urban green space, but we must consider many - even all - the ecosystem services provided by these spaces in large-scale studies, then determine their economic value based on these services. |
| 56 | Engagement and education of multiple stakeholders | To engage different stakeholders with projects creating or maintaining urban green space, rather than educating them on findings of studies on inherent value of urban green space, we should actively involve them in this research from an early stage. |
| 57 | Co-benefits of green and blue spaces | Often we only know about some benefits of the green and blue spaces, but we need to look at the wider benefits - e.g. air pollution reduction, carbon sequestration, noise reduction. Health and well-being benefits need to be combined with these benefits. |
| 58 | Un-intended consequences of green and blue space | Do we know about the Un-intended consequences of green and blue space? Are there any? What kind of consequences are there, if any? Environmental, social and economic? |
| 59 | Living Without 'Nature': Living in Nature | Popular media discourse in the UK routinely maintains a historic division between Nature (capital N) and civilisation. Urban green and blue spaces offer opportunities to radically reshape city-dwellers' understanding of their embeddedness in nature. |
| 60 | Living With the Past: In/tangible Heritage | Many modern cities have roots lying in prehistory; this tangible heritage reminds us that we conceptualise urban and green/blue spaces in ways equally ancient. Preservation and understanding of these legacies is vital for imagining possible futures. |
| 61 | Human Interaction / Behaviour | A more comprehensive understanding is required of how human behaviour influences urban green and blue space. It is important to comprehend how we can use human behaviour to our benefit when creating and maintaining these spaces. |
| 62 | Modelling Techniques | No modelling technique is perfect but it is important to ensure that the most appropriate techniques are used to promote and understand these spaces. To sell their benefits we need to ensure our methodology is rigorous and reproducible. |
| 63 | Equitable health and wellbeing | The Covid-19 pandemic showed how important access to local green and blue spaces is, especially for mental health. This has focused the attention of governments. Yet the accessibility of such spaces is inequitable, especially socio-economically. |
| 64 | Maintenance of quality in times of low budgets | Green and blue spaces can be expensive to maintain yet allowing them to be wilder and less intensively managed, while good for biodiversity, can deter some users through safety concerns. Wilder is good but not the same as neglecting spaces. |
| 65 | Fisheries | What are the current and projected sizes of fish stocks and their associated ecosystem services. |
| 66 | Natural capital | We know that land based uses impact on blue space for animals and recreational use, how can these 'source' habitats be protected with financial tools |
| 67 | Communicate Urban Green & Blue Spaces significance | People are not aware of the significance of Urban Green and Blue Spaces, and struggle to relate their values to their own lives. I propose raising awareness of the values of these spaces among different communities by co-curating care-practices with them. |
| 68 | Building a transdisciplinary language | In the spirit of the Belmont Forum, it is important to start any project on this topic by building a common language that not only comprises experts in different disciplines, but also |

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| | | different kinds of stakeholders, including industries and communities. |
| 69 | Outdoor Learning Opportunities | Outdoor learning opportunities are often overlooked in urban blue-green spaces. This is the case for educators, parents and young people. More multi-disciplinary research is needed to understand learning affordances of blue-green spaces. |
| 70 | Intergenerational Engagement | A key learning insight from countries (like those in Scandinavia) is there intergenerational knowledge, understanding and care for the environment. Further multi-disciplinary research is needed to map cultural narratives and potentialities. |
| 71 | community engaged feedback | How to work with communities to explore the potential of green or blue spaces, this can be done through creative methodologies. |
| 72 | Costing and sustainability | How do we make sure that green or blue spaces are managed well, allow for new forms of community engagement, and respond to changing needs. |
| 73 | Urban soil functioning & value | Being able to evaluate the current multi-functionality and ecosystem service delivery of soils in urban areas, and the broader value to society of urban soils is critical for their incorporation in planning, design, conservation and construction |
| 74 | Urban space in regional/national/global systems | Being able to contextualise the delivery of multiple functions by urban blue/green spaces within regional/national/international scales is important for strategically directing their creation and forming a business/policy case |
| 75 | Governance | When dealing with multi-benefit outcomes it is not always easy to get buy in in a way that ensures appropriate governance and sustainability |
| 76 | Integrated capitals | To aid businesses and investment what are the full range in benefits and how can we act as guardians to protect them. |
| 77 | Biodiversity | How is biodiversity related to health/well-being? Actual or perceived biodiversity? How do we measure biodiversity in the context of well-being - species richness or something else? How do we balance biodiversity with other quality factors such as safety? |
| 78 | Equitable access and provision | Understanding who is excluded from accessing open space and why? Lack of provision, access or quality? Or perceptions that it's not for them? Or lack of connection with nature? Cultural differences in what a space should be? |
| 79 | Diversity | Who accesses and uses currently available urban green & blue spaces and how? Who is marginalised or excluded and why? How can access to such spaces be more inclusive? How might collaborative design facilitate equity of access? |
| 80 | Future spaces | How can future spaces be designed to more attentively include more than human benefits, and to develop/build attentive inter relationships across species? What might ecocentric future spaces look like? How can we better take care of them? |
| 81 | Upscaling impact from site to (sub)catchment scale | Upscaling site measures to (sub)catchment scale is not straightforward yet crucial so as to understand cumulative effect and prioritise efforts |
| 82 | Low-cost monitoring, evaluation & maintenance | We don't know longer term effectiveness, or LT maintenance |
| 83 | Green prescribing for cancer survivors | Cancer survivors have poorer health outcome when they live in rural area than urban areas. Could structured green and |

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| | | blue prescribing in rural areas improve health outcomes among this population? |
| 84 | Urban blue spaces | What blue urban spaces can be created/adapted to improve health and well-being |
| 85 | Design is transdisciplinary & collaborative | This complex challenge needs a research approach that goes beyond disciplinary boundaries. Design, a holistic, human-centred, collaborative approach to wicked problems is valuable to facilitate trans-disciplinary research and a meaningful collaboration. |
| 86 | Place-based to re-focus on people & local context | The creation, maintenance and sustainability of urban green and blue spaces relies on people's involvement, especially the users of the spaces, the communities, and those who deliver nature-based provisions to use these spaces for these multi-benefits |
| 87 | Health and well-being design features of GI | There is increasing evidence regarding the health and wellbeing benefits of GI but studies up until now have primarily focused on absence/presence or quantity of GI rather than quality and design features. This is needed to maximise the benefits of GI |
| 88 | Synergies & trade-offs between GI benefits | BGI offers many health, social and environmental benefits, many of these are synergistic but there are also trade-offs. More understanding on this is needed in order to maximise the benefits from BGI and optimise land-use |
| 89 | Diversity v homogeneity for multi-functionality | Is variation of process (infiltration, evaporation, water storage..) and form (ponds, gardens, green roofs) in urban spaces as an important factor as scale and connectivity to deliver multi-functional benefit? |
| 90 | models for delivery | What is gained and lost through multidimensional collaboration for delivery across sectors versus top-down, government led urban planning. What are the knowledge and evidence needs for these models? Are our current systems supportive of these? |
| 91 | Prioritising and communicating UGBS benefits | Urban blue-green spaces serve multiple needs (ecological, leisure, cultural) and are valued differently by different communities. Research needs to consider how the needs of human and non-human species can best be balanced in urban environments. |
| 92 | Effective decision-making to maximise UGBS benefit | Funding, management and policymaking are fragmented and there is a mismatch between needs and resources. Research needs to consider what approaches to management and funding are most effective in driving sensitive, sustainable long-term care & investment. |
| 93 | Wellbeing and futures | Multi-functional benefits are often aimed at promoting community wellbeing. However, the community is often treated as homogeneous. A more differentiated perspective is needed. A more systematic perspective is also required of future community benefits. |
| 94 | knowledge and stakeholders | More needs to be known about how different stakeholder groups understand the benefits of green and blue spaces and how they use that knowledge to enable innovative urban developments or to continue with business-as-usual practices. |
| 95 | Quantitative estimation | To enable, wherever possible, quantitative estimation of the benefits or proposed green infrastructure at planning in order to: maximise those benefits through optimisation of proposed schemes; and increase the resilience of those schemes, which are grant |
| 96 | EDI | To prioritise Natural Capital investment where it will deliver the greatest benefits to those who need them most. In the case of air quality, less privileged communities are hit |

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| | | disproportionately hard by the impacts of air pollution: they tend to live in |
| 97 | Dr | Tree planting in urban and suburban areas: the need to connect researchers, conservation groups, policymakers and the third sector. |
| 98 | N/A | Cultural engagement with ecological issues: there needs to be a shift in mindset (greater valuing of urban green spaces and waters) as well as a shift in behaviour. |
| 99 | Pollution | a) Identify and share how people mitigate the effects of pollution when seeking out wellbeing in blue and green spaces; b) identify and share how blue and green spaces can help communities address pollution |
| 100 | Damage | Analyse how damaged blue and green spaces can be repaired (rather than further damaged) through people's engagement with them during recreation. |
| 101 | Sound & vision | Using CCTV with audio in green spaces with AI analysis of sounds to identify species, nature trends & identifying noises of distress which launch drones to investigate. Addressing fear of crime, environmental monitoring, air quality & informing management |
| 102 | Blurring the grey/green lines | Engaging residents to green & clean any & all public spaces; creating cool, green corridors encouraging active travel & more outdoor activities, such as wild swimming and gardening (allotments). Use abandoned high street shops/spaces to promote this work. |
| 103 | Professional collaboration for blue-green spaces | Multiple professionals want more and better blue-green spaces. We need to understand how professionals currently shape blue green spaces they create, and whether/how mutual understanding and closer collaboration would yield more or different benefits. |
| 104 | Community contributions for blue-green benefits | Many benefits flow from private blue-green spaces; communities also manage some public spaces; & their engagement can press for more. How can such community contributions be supported and enhanced to deliver more and better benefits? |
| 105 | Cultural Mediation of Benefits | Equity dimension - so are these benefits universal - or culturally/experience mediated? If so, what does that mean for benefits equity across populations and places, maintenance and sustainability? |
| 106 | Biodiversity Relationship | How the biodiversity value of a green/blue space relates to the health and wellbeing benefits derived from that space? Does greater diversity result to increased wellbeing benefits? |
| 107 | Shaded ventilated relief from extreme heat waves | Poorly designed buildings overheat more than the relief provided by shade trees. During extreme events electricity networks can become overwhelmed such that even reasonable-standard buildings can become oppressively hot indoors. How hot are UK dwellings? |
| 108 | Quenching relief of swimming during extreme heat | Public lidos, beaches, and inland river swimming areas provide immediate relief from heat waves by rapidly quenching over heated public. Can water quality be managed to ensure the risk of infection is not greater than the benefit of cool-relief swims? |
| 109 | Pervasive Technology to promote Urban Green | There is a need to empower technologists and engineers to come up with smart solutions to utilise smart tech for social prescribing and to promote wellbeing in open spaces |
| 110 | Better Pervasive Sensing Technology | Sensing Technologies can help measure the environmental impact on well-being and the health benefit of being outdoor |
| 111 | co-creation | Decisions to create urban green or blue spaces are often taken by city planning officers with little or no consultation from |

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| | | potential users. For these spaces to fulfil their multiple benefits, co-creation is required not just consultation of a plan. |
| 112 | trade-offs | the trade-offs between the multiple benefits of urban green/blue spaces and the multiple disadvantages of them are not sufficiently considered in the planning stage. For example, an urban green space can lead to increased emissions in a part of town. |
| 113 | Accessible routes to/from high-quality spaces | Without routes that are accessible, and without spaces that are high-quality and attractive (e.g., aesthetically, educationally, socially) to both humans and more-than-humans, urban green and blue spaces will not be sustainable. |
| 114 | Resource for knowledgeable maintenance staff | Providing adequate, annual resource (e.g., financial) to create and sustain staff positions in order to adequately maintain urban green and blue spaces. These staff should have practical knowledge of the multi-functional benefits. |
| 115 | Upscaling | How do the multi-functional benefits upscale to beyond the individual feature scale to the city or catchment scale. |
| 116 | Trade-offs | Are their synergies and trade-offs in the provision of different benefits and ecosystem services. |
| 117 | How people access & use urban green & blue spaces | How people's relationships with the urban green and blue space reflect their social relationships. |
| 118 | Differences between urban and rural spaces | How are urban green & blue spaces different from rural green & blue spaces. How do people take care of green & blue spaces in cities and natural environment. |
| 119 | Equality for Access | Access is both a physical and social construct. We need to understand how to increase accessibility and useability, particularly for groups experiencing the greatest barriers. |
| 120 | Green characteristics | Much research has looked at green/blue spaces as a whole, without looking at the specific features of the spaces which enable use and facilitate benefits to both humans and the environment. This would have direct design implications. |
| 121 | Shift perceptions of beneficial blue/green spaces | Pre-existing attitudes and perceptions on the part of managers, policymakers, and the general public are a key barrier to progress. How do we communicate the purpose and value of enhancements effectively to win broad support for improvements? |
| 122 | Identifying multi-win solutions | Interventions to increase the benefits of blue-green spaces need to be designed to deliver multiple benefits, but we rarely measure multiple benefits at the same time and in a robust way (BACI). Empirical multi-disciplinary studies are needed. |
| 123 | Brownfield sites. | So-called brownfield sites are often oases of biological diversity and green space for many of our most deprived urban communities. Yet they are vulnerable to development, have at best unclear access, and no systems for maintenance or local involvement. |
| 124 | Biological, social and cultural diversity | Urban authorities have historically managed green and blue spaces in ways that limit both human and non-human diversity. Can a greater variety of habitats also allow for diverse social and cultural practices to co-exist in green space? |
| 125 | Observation-based urban BGI effectiveness | Are Blue-Green Infrastructure (BGI) interventions really reducing flood risk and water pollution? There is a serious gap in direct observations (with data-driven modelling) of the magnitude of reduction of flood risk and water pollution by urban BGI |
| 126 | Evaluating NbS/NFM research tools in BGI engineering | New observation-based approaches developed for quantifying the effectiveness of Nature-based Solutions to flood |

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| | | hydrograph attenuation could be utilised to inform the engineering design of urban Blue-Green Infrastructure |
| 127 | Interdisciplinary research | Interdisciplinary research is improving but it is still a work in progress. There are still many disciplines that do not see the immense benefit that collaborative work can bring to a successful output and more importantly to improve resilience. |
| 128 | Better communication | Improved communication of the benefits of blue/green spaces both in research but also to end-users. This will enable a more open discussion on how to better implement these spaces. |
| 129 | Ecosystem function and ecosystem service value | Measures for economic, ecosystem function and ecosystem service value of species and plant forms in urban areas, eg trees versus shrubs versus herbaceous annuals and perennials. Need country and UK specific values rather than general from such as USA. |
| 130 | Convincing the developers & landscape designers | Landscape designers, architects, planners and politicians do not appear to use ecology or science effectively. We need more convincing and easy to use information, metrics and models to ensure that best environmental practice is enforced in urban areas. |
| 131 | Integration with existing built fabric | There is a lack of evidence for synergistic methods that facilitate urban greening with the values and benefits provided by the existing (historic/heritage) built environment. |
| 132 | Understanding sociocultural barriers to uptake | There is a need to better understand perspectives and values associated with the built environment as barriers to the uptake and implementation of urban green and blue spaces. |
| 133 | Green space financing | The process of enhancing and expanding green spaces faces challenges linked to accessing funding. Blended finance approaches where multiple beneficiaries are engaged to leverage in funding from multiple sources is one model to explore in more detail. |
| 134 | Moving from reactive to strategic approaches | Strategic green space planning is an important element of achieving multifunctional benefits. However, action can often be piecemeal and reactive. Understanding the barriers and solutions to strategic green space planning would be valuable. |
| 135 | Mitigating contamination in low-income communities | Those with the lowest incomes have often had to settle in the least hospitable land. Traces of former contamination and floods are some of the challenges that the urban poor face. Green spaces can mitigate these effects, for example by phytoremediation. |
| 136 | Public green space by collective design | Urban spaces are enhanced by involving green and blue space, and even more so if this has been collectively designed by residents. This is particularly important in deprived urban areas, as it strengthens human networks while engaging them with ecology. |
| 137 | Urban vegetation and urban heat islands | Understanding how different types of vegetation provide evaporative cooling in cities, and how resilient this mechanism is under a changing climate |
| 138 | Functioning of urban vegetation and climate change | Urban vegetation lives in a challenging environment due to limited resources (e.g. water) and extraordinary environmental conditions (high night light and low humidity). How is climate change going to impact urban vegetation in the future? |
| 139 | Quantifying socio-environmental impacts | A holistic understanding of the impacts of urban green or blue spaces on social and environmental domains is needed to optimise their design, placement and sustainability. This is particularly true at the city scale. |
| 140 | Social engagement with blue-green infrastructure | Blue-green infrastructure can be designed to maximise social engagement, providing benefits beyond the purely environmental. More research is needed in combination with |

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| | | architects and city planners to assess these impacts and optimise benefits. |
| 141 | Long-term monitoring of biodiversity | Long-term monitoring of UGBS post-creation (i.e. 10 years +) is essential to be able to quantify their benefits. This is especially true for biodiversity which is too often ignored due to a lack of resource. |
| 142 | UGBS quality and links to health and well-being | The association between the environmental quality of UGBS (in particular biodiversity) and human health and well-being remains under-investigated |
| 143 | Values of input, process and outcomes indicators | Analysis and assessment of nature-based solutions (NBS) guidance frameworks and their handling of various kinds of social, economic, cultural and environmental variables. Cross-sectional comparison on international basis; city-specific values analyses. |
| 144 | Use of nature-based solutions in weak market areas | Evaluation of use of urban ecosystem restoration measures to enable and modify development of unviable land and, conversely, impacts of policy and planning constraints to their uptake. |
| 145 | Equity and inequity | We need to understand better how to capitalise on the potential for urban GBS to mitigate inequalities (e.g. the 'equigenesis' hypothesis) while also protecting against the potential for urban GBS policy/intervention to widen inequalities. |
| 146 | Evidence to promote investment | There seems a disconnect between increasing evidence on multiple values - including economic - of urban GBS while funding is decreasing. How do multiple values turn into real funding for infrastructure and social interventions? |
| 147 | Public understanding and education | The benefits of green and blue space are not necessarily understood locally by people/children. Maintaining such spaces would benefit from public understanding of links with ecological and climate crises as well as health and well-being. |
| 148 | Barriers and challenges for disadvantaged groups | People (including children and young people) who have the most to gain from green/blue spaces are often those least likely to access them. Understanding all forms of barriers to access would help with future creation and maintenance of spaces. |
| 149 | Participatory approaches | Citizen engagement and participatory approaches to identifying priorities and needs for research. Better distribution of financing, specifically on developing countries' sciences production, capacity building, technology transfer |
| 150 | Creative thinking | Creative thinking and innovative solutions. |
| 151 | Inequities in urban green space provision | The COVID-19 crisis highlighted the inequities in green space provision. Which communities are poorly served and why? What obstacles prevent some communities from accessing urban green spaces and using them more? How can inequities be resolved? |
| 152 | Combining green & social infrastructures | There has been a shift towards seeing urban green spaces as green 'infrastructure' that provides ecological services. But how does this fit with the role of parks and green spaces as recreational sites and sociable places - i.e. as social infrastructures? |
| 153 | Effective and efficient green wall systems | Develop and evaluate technology for the large-scale introduction of green wall infrastructure in dense urban settings. This requires novel planting systems that are both technologically effective and economically efficient. |
| 154 | Can green walls mitigate lack of urban green space | Integrate applications with multiple forms of built environment infrastructure within a smart-city, net-zero and climate-resilient framework, including buildings energy efficiency, ambient |

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| | | temperature, urban air quality, acoustic noise reduction & health |
| 155 | Metrics for blue/green economy for sustainability | Research investigating the role of blue/green economy in urban spaces, such as spatial land cover on storm runoff and flooding by developing and applying landscape metrics, environmental indicators |
| 156 | How urban blue spaces can improve wellbeing | Research on the effects of blue space delivered through virtual reality and impact on people wellbeing, use of canals to mitigate flood risks and to provide greener transport options and increase wellbeing |
| 157 | Palette of interventions for the urban environment | Successful integration in the built environment as part of a palette of interventions for professionals. From the small scale of a single building to the larger scale, providing a protocol for the integration of urban green & blue spaces in master planning |
| 158 | Benefits for users | Engagement of users in the appreciation of urban green or blue spaces aiming to provide a mechanism for the quantification of such benefits for people using these spaces, based on their experience and interaction with their environment. |
| 159 | Delivering high quality without gentrification | Often green infrastructure is seen as a 'nice to have' in new and existing places. The seems to result in a two-tier system, where the higher quality is seen in more affluent places, or places become more affluent. Research is needed to mitigate this. |
| 160 | Understanding the preferences of non-users | Some groups, e.g. young people, have a potential to benefit from green spaces, but underestimate the benefits. There is need for research that provides more specific design responses for groups that are not currently represented in green space users. |
| 161 | Green care and urban planning | Access to green and blue infrastructure is recognised as an important element for green care strategies, leading to health improvements. The integration of these strategies in urban planning is however still in its infancy. |
| 162 | Green and blue infrastructure and rewilding | There can be tension between an enriched biodiversity in and people's access to parks. A new model of park that combines both is still to be conceived. |
| 163 | Medieval Animals Heritage in East Kent | Participatory research on the needs of our present communities and for the inheritance of future generations, as well as for the wider living world, as Green/blue heritage sites empower people by helping to develop a deeper sense of being and of place. |
| 164 | Climate Emergency: Deep Education/Community Action | How to mobilise existing educational institutions and communities towards a more direct, active and multimodal engagement with environmental sustainability: various interdisciplinary approaches e.g. diversifying and embedding sustainability |
| 165 | Land management techniques | Lack of adequate green spaces is often due to rapid urbanization, marketization of real estate and weak planning institutions especially in the global South. What land management tools are available then to retrofit cities with adequate green spaces? |
| 166 | Upscaling rainwater retention and recharge | Replicable initiatives that promote rainwater retention and groundwater recharge are often promoted and implemented at individual or village unit levels. Can a multi-scale initiative that works together as a whole system be promoted in urban environments? |
| 167 | Natural and cultural heritage values | explore cultural, ecological and environmental values of green and blue spaces in the cities and why these should be seen as heritage and therefore protected. |

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| 168 | Arts research for spatial and qualitative access | Adopt innovative and creative approaches offered by arts practice research to advocate the creation maintenance and sustainability of green and blue urban space and influence positive policies in this direction. |
| 169 | Reduce the Urban Heat Island(UHI) through NBS | Green infrastructure (GI) and nature-based solutions (NBS) are central concepts to addressing many of the environmental challenges witnessed by modern cities including urban heat island effect. NBS is a concept able to accommodate ecosystem-base approach |
| 170 | Water management and sustainable drainage system | Rainwater harvesting and urban trees were identified as top NBS in terms of their applicability to address both urban warming and water management challenges |

Appendix B

Agenda

| | |
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| 5 minutes | Welcome by NERC and opening of the meeting |
| 10 minutes | Workshop housekeeping |
| 10 minutes | Introduction, objectives and expected outcomes of the scoping workshop |
| 15 minutes | About the Belmont Forum and the Belmont Challenge |
| 20 minutes | Introduction to session 1 <ul style="list-style-type: none">• Outputs from the 'Well Sorted Tool' exercise• 10 minutes reading time |
| 50 minutes | Session 1 (part one) Explore the key research challenges <ul style="list-style-type: none">• drafting the research challenges and questions which need to be answered through interdisciplinary international collaboration in order to address the challenges |
| 40 minutes | Break |
| 40 minutes | Session 1 (part two) Explore the key research challenges <ul style="list-style-type: none">• drafting the research challenges and questions which need to be answered through interdisciplinary international collaboration in order to address the challenges |
| 10 minutes | Break |
| 5 minutes | Introduction to session 2 |
| 20 minutes | Session 2 Identify effective delivery mechanisms <ul style="list-style-type: none">• what mechanisms would best deliver the desired outcomes? |
| 10 minutes | Next steps |
| 5 minutes | Wrap up and closing of the meeting |

Appendix C

Workshop Presentations

i. Introduction, objectives and expected outcomes of the scoping workshop



Urban Green and Blue Spaces

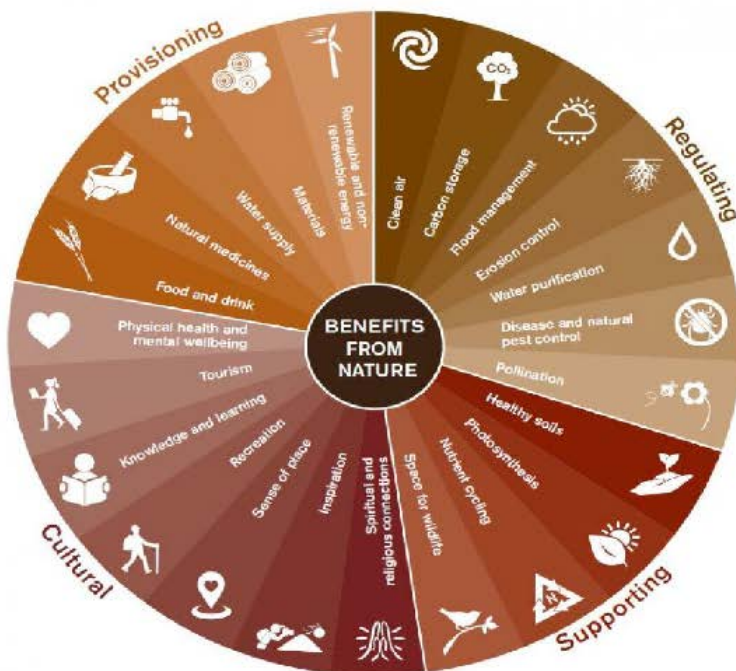
Wendy Matcham, Head of Resilient Environment, NERC
June 2022

Background

- ▶ Idea developed pre-pandemic
- ▶ Presented at the Belmont plenary in 2019
- ▶ Paused for various reasons
- ▶ Presented at Belmont plenary again in October 2021
- ▶ Initial funders meeting in February 2022

Concept

- ▶ More than 55% of the world's population live in urban areas
- ▶ Benefits of blue and green spaces within urban environments
- ▶ Multidisciplinary - environmental, social, cultural, physical and biological sciences
- ▶ International comparisons - what are the benefits of these spaces in different countries and contexts



Potential topics of interest

Water

- ▶ Water flow regulation, management, storage, flood control, SUDS

Air Quality

- ▶ Improving quality, reducing pollution, regulation by urban trees/forests, temperature regulation, carbon sequestration

Public Health and wellbeing

- ▶ Multifunctional spaces, access to local communities, reducing pollution, leisure, tourism, social cohesion, contributing to good mental health and wellbeing

Continued...

Green and blue ecosystems

- ▶ Habitat protection, biodiversity, pollination, healthy soils

Sustainable urban regeneration

- ▶ Food provision, nature based education, heritage, culture

Adapting to change

- ▶ Climate change, land use change, repurposing derelict land

Measurements and observations

- ▶ Size, scale proportion, use, linkage and sharing of data, novel sensing tools

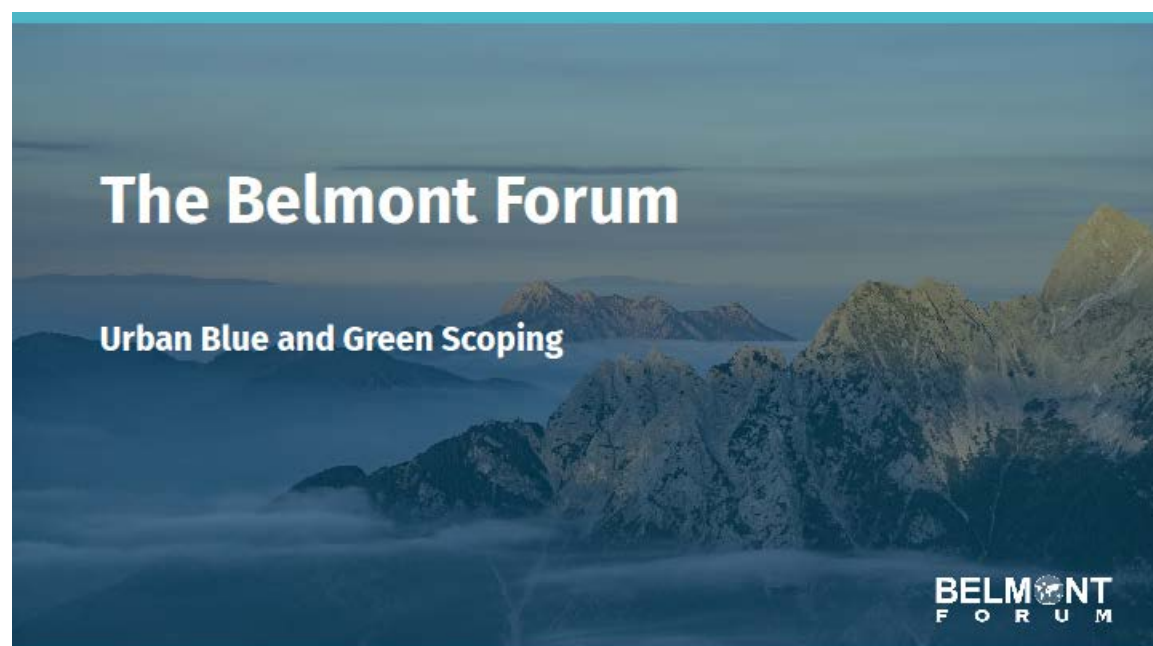
Aims of the workshop

- ▶ Provide insight into high level research challenges/questions
- ▶ Confirm whether we should be focusing on how these spaces can adapt to changing climate and become more resilient to further global challenges/unpredictability (climate change, expanding or shrinking cities, regeneration etc.)
- ▶ Provide insight into the importance of learning from different countries/different urban contexts
- ▶ Gather thoughts around the type of funding mechanisms that might be appropriate for a programme of work (small or large grants, etc.)

Points to note

- ▶ There is currently no allocated budget for this work
- ▶ At the moment all Belmont Forum Partners have been included and invited to be involved in the workshops (no formal partners at this point)
- ▶ Important not to duplicate work already being done through other avenues

ii. About the Belmont Forum and the Belmont Challenge



The Belmont Challenge

Support international transdisciplinary research providing knowledge for understanding, mitigating and adapting to global environmental change.

- **A transdisciplinary approach enabling inputs and scoping across scientific and non-scientific stakeholder communities and, facilitating a systemic way of addressing a challenge.**
- Collaboration across scientific disciplines, especially those between natural, human and social sciences, and between geographical areas
- Special emphasis on enhancing scientific capacity and excellency in developing countries
- Improved and flexible mechanisms for major transnational funding that overcome current constraints to cross-border support while respecting national requirements and statutes.

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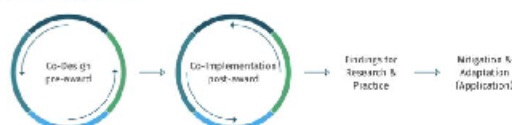
Belmont Forum Collaborative Research Actions (CRAs)

Guided by the **Belmont Challenge** to understand, mitigate and adapt to global environmental change

Mission: Accelerate delivery of the environmental research needed to remove critical barriers to sustainability by aligning & mobilizing international resources

Collaborative Research Actions (CRAs): address societally relevant challenges through transdisciplinary research approaches

BELMONT FORUM MODEL:



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The <https://belmontforum.org/cras>

| Year | CRA ID | CRA Title |
|------|----------------------|---|
| 2022 | SSCP 2022 | Systems of Sustainable Consumption and Production |
| 2022 | Migration 2022 | Integrated Approaches to Human Migration / Mobility in an Era of Rapid Global Change |
| 2020 | Pathways 2020 | Transdisciplinary Research for Pathways to Sustainability |
| 2020 | Soils 2020 | Towards Sustainability of Soils and Groundwater for Society |
| 2019 | CEH 2019 | Climate, Environment and Health |
| 2019 | DR 2019 | Disaster Risk, Reduction and Resilience |
| 2019 | Arctic II 2019 | Resilience in Rapidly Changing Arctic Systems |
| 2018 | Oceans 2018 | Transdisciplinary Research for Ocean Sustainability |
| 2018 | Sci 2018 | Science-driven e-Infrastructure Innovation (Sci) for the Enhancement of Transnational, Interdisciplinary and Transdisciplinary Data Use in Environmental Change |
| 2017 | Biodiversity I 2017 | Scenarios of Biodiversity and Ecosystem Services II |
| 2016 | T2S 2016 | Transformations 2 Sustainability |
| 2016 | Mexus 2016 | Food-Water-Energy Nexus / Sustainable Urbanisation Global Initiative (SUGI) |
| 2015 | Climate 2015 | Climate Predictability and Inter-Regional Linkages |
| 2015 | Mountains 2015 | Mountains as Sentinels of Change |
| 2014 | Arctic I 2014 | Arctic Observing and Research for Sustainability |
| 2014 | Biodiversity II 2014 | Scenarios of Biodiversity and Ecosystem Services |
| 2013 | Food 2013 | Food Security and Land Use Change |
| 2012 | Coastal 2012 | Coastal Vulnerability |
| 2012 | Freshwater 2012 | Freshwater Security |

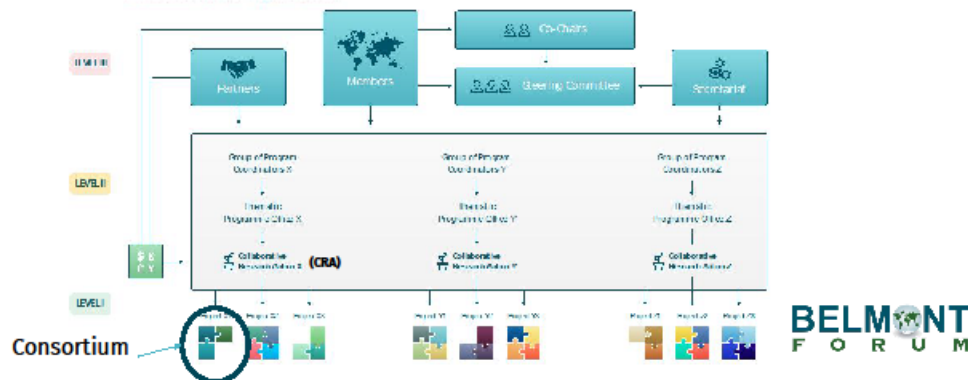
Since 2012 the Belmont Forum has successfully launched 19 Collaborative Research Actions (CRAs)

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The Belmont Forum Structure

Support international transdisciplinary research providing knowledge for understanding, mitigating and adapting to global environmental change.



Belmont Forum Requirements




Reminder: Eligibility requirements vary from call to call. Please refer to individual CRA call text for specific requirements.

- Collaborators from at least three different countries requesting from at least three funding agencies
- Transdisciplinary including natural and social scientists and stakeholders
- Meaningful co-production/participatory approaches/co-development/co-implementation
- Researchers from countries not listed in the CRA call text must bring their own funding or provide in-kind contribution.

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Benefits of working through the Belmont Forum Process

- Trusted collaborative process used by over 150 members and funders through 19 CRAs over the last 12 years
- Single point of entry for proposal submission: [BFGO](#) - 
- One agreed upon, collaborative and transdisciplinary review process
- Transdisciplinary community building process
- Convening of the border TD and Belmont Forum community in collaboration with Future Earth at the annual Sustainability Research and Innovation Congress (SRI Congress)

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Register for Belmont Forum Communications

Connect with the Forum

Connect with the Belmont Forum through its social media channels and mailing list, join the international community, or write to us at our headquarters address.

Social media

Follow the Belmont Forum, Awardees and staff, member or partner organizations are encouraged to add the Belmont Forum to their social media profiles.



Mailing List

Complete the form below to receive the Belmont Forum's newsletter and notifications about new funding opportunities. The Connect List provides monthly updates on current calls, funded projects and other related activities. Awardees and staff at member or partner organizations should join the appropriate communications list below and are encouraged to provide Twitter and LinkedIn information (so we can follow or connect with you). All fields are optional unless stated.

Mailing List Sign-up

Name
 First Last

Email
 Enter Email Confirm Email

Phone

OR

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Urban Green and Blue Spaces

Michelle Manning
Senior Programme Manager
Resilient Environment
NERC-UKRI
16 June 2022

Session 1 Explore the key research challenges and questions

- ▶ Preparatory work via a 2 stage process with use of the online 'Well Sorted Tool'
- ▶ First stage - participants asked to submit 2 highest priority topics:
 - 'Thinking about the end benefit and multi-functional benefits which an urban green or blue space can provide, what are the current gaps and priorities in research needed to enable their creation, maintenance and sustainability'
- ▶ Second stage - participants asked to group priorities into groups which made sense to them

Outputs

Group Names

| | |
|------------|--|
| Red & Blue | financing, valuation, land ownership, land management, maintenance |
| Green | scale, location, accessibility, planning, connectivity, trade-offs |
| Orange | heat, quality, vegetation, engineering, monitoring, biodiversity, smart-tech |
| Purple | participatory approaches, inclusion, culture, behaviour, communication, equity, justice, collaboration |

► <https://www.well-sorted.org/output/Urbangreenbluespaces14June/index.php>

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|------------|--|
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What do we need to know?

- ▶ What do we really need to know to unlock the benefits of urban green and blue spaces
- ▶ What research challenges and questions do the research funders need to prioritise
- ▶ Multiple research challenges/questions
- ▶ Bring in other topics where it makes sense when looking interdisciplinary and at multi-functional benefits
- ▶ More general encompassing questions which topics could fit into - don't be really specific

Things to keep in mind

- ▶ Go beyond what's been researched before
- ▶ Interdisciplinary
- ▶ Multi-functional benefits
- ▶ International comparators
- ▶ Looking to the future - resilience
- ▶ Existing green and blue spaces as well as creating new ones

Logistics

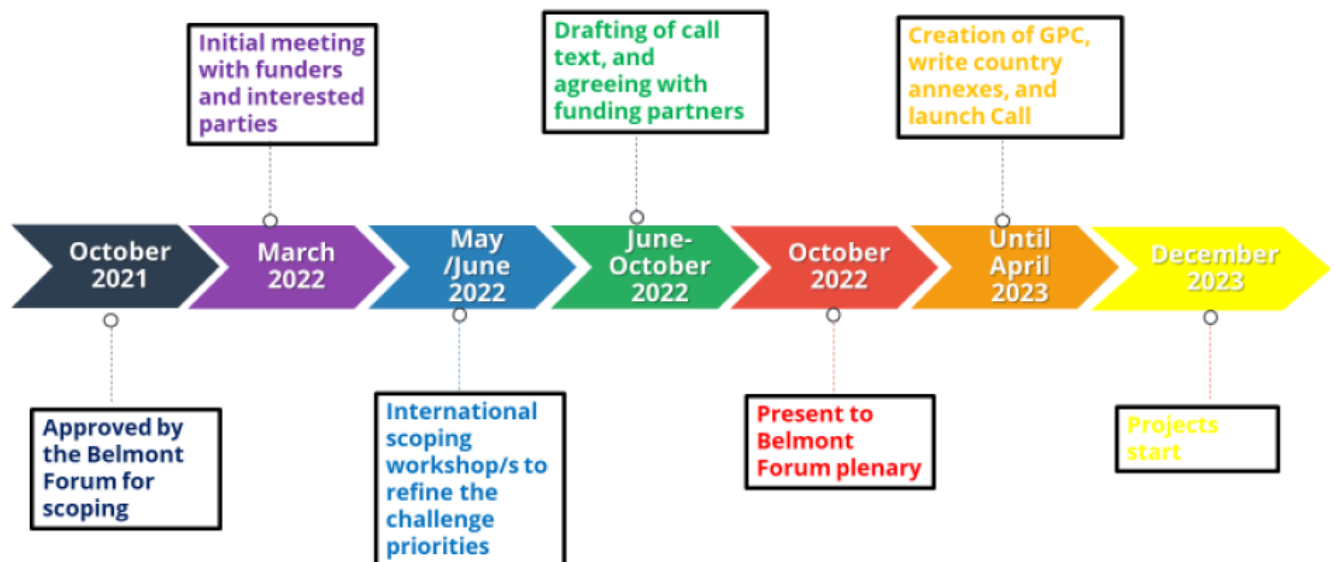
- ▶ Padlet - section for each cluster of priority topics
- ▶ Free movement for participants to move to breakout room of their choice
- ▶ 10 minutes discussion
- ▶ 35'ish minutes draft research challenges/questions - could/should be multiple
- ▶ Have a break!
- ▶ Move onto a different room - or stay where you are if not quite finished

iv. Next steps

Next steps

We are holding 3 of these workshops in total (9th, 14th, 16th June)

- ▶ Padlets will remain open until 5th July
- ▶ Belmont Forum Funding Timeline
- ▶ Scoping report



Appendix D

Session 1 padlet

9th June 2022 Workshop

Group 1. Culture, Communication, Inclusion, Behaviour, Learning, Justice, Equity

How can we use co-production practises to design urban spaces and blue-green infrastructure so that they deliver multiple benefits for diverse communities and taking into consideration multiple and diverse values

- sub-question: how can we build in robust and accountable structures to sustain that co-production when aims come into conflict e.g. community wants something different to researchers/budget-holders
- co-creation to revalue urban blue/green infrastructure

Legacy thinking for the future- Future design for long term sustainability of green and blue spaces

- encompassing urban resilience and long-term strategies
- considering future urban lifestyles
- yes, and how to engage diverse communities in this

What constitutes true interdisciplinarity, how to identify disciplines that support a research question which covers the challenges that are created to be funded. How to support interdisciplinary working, this needs to be part of the project application.

- And how do we think about problems, not disciplines

How do you change people's minds and mentalities about the places they inhabit (environments, places, 'nature')?

- I'm not sure that we necessarily do need to change people's minds and mentalities? How do you know that this would be helpful or valuable?
- People's perceptions and environment orientations change with increased environmental knowledge e.g. this species is invasive...how can knowledge be embedded into behaviour change?
- Changing approaches to transport, health, diet, non-human animals, etc.

What do "green and blue spaces" mean to people in different countries? How does this change culturally?

- Do values differ? Why? What does urban nature mean to people?
- how does climate (and will future climates) impact these values
- What ways of understanding and living with blue green spaces are already working around the world?
- learning from best practice examples of green/blue spaces // a toolkit for implementing these learnings in cities

How can the arts, culture and heritage devise creative ways to establish and care for urban green and blue spaces? How can culture and heritage organisations work with communities and inform policy?

- How can we value the benefits of accessing and using green and blue spaces from an individual, community and societal level to be inclusive?

- Choice and preferences in using green and blue spaces
- How do people get their environmental knowledge – can arts/culture/heritage engage with people who are otherwise unengaged?
- Good point RE how people get their environmental knowledge!

How to adopt an inclusive approach to the design of blue green infrastructures/urban environments

- inclusion of human/non-human actors

How can transdisciplinary approaches ensure we meet the demands of the present and preparation for the future inequitably unlocking the benefits of urban green and blue spaces?

What would the future be like if nature becomes the main source of our healthcare?

- Cultural perspectives on how nature is already embedded in healthcare – do we see environmental co-benefits with these practices too?

Social value of green and blue spaces

How can we value the benefits of accessing and using green and blue spaces from an individual, community and societal level to be inclusive?

What factors influence the cultures and values of decision-makers? What understandings are needed in order to inform decision-making behaviours in line with sustainability goals?

How can non-western philosophies and understandings of the rights of nature inform our understandings of the benefits and care of green and blue spaces?

How to be more place, space and culturally sensitive and able to harness tacit knowledge of e.g. indigenous people and other local communities so that solutions are context sensitive. Landscape research is difficult to generalise because landscapes are specific.

How can international collaborations enhance mutual understanding of the importance of urban blue and green spaces in different countries and cultures?

International Comparison/Research

- Within educational research, it is quite common to take a 'we came, we saw, we did, we take' approach. This can be culturally insensitive either to the culture being drawn on, or on the culture and environment where the 'new' insights are being used (Forest School education is a very good example of this). It would be good to see calls that are sensitive to cultural insights and that show sensitivity to what can be learned as well as what can/not be taken/appropriated/used. This is as important for methods as well as the knowledge itself. There is a need to move away from reductive forms of inquiry and complement trends with narrative and culturally sensitive inquiries.

Where people live is influenced by affordability. How can we bridge the socio-economic divide in aesthetics of green and blue spaces to even out health inequalities and improving health and well-being outcomes?

Saplings, seeds, environmental restoration resources, to be costed into the budgets. Funding for constructing/planting/creating the interventions themselves. Suburban trees planted by schoolchildren for my local branch of the Woodlands Trust have a 90% survival rate, as the children continue to care for them.

Group 2. Trade-offs, Location, Resources, Land management, Financing, Soils, Value, Biodiversity

How can we best inform policy implementation on urban blue-greenspaces?

- Q What knowledge and evidence is required to inform and change the behaviours of decision-makers to maximise the benefits of urban blue and green spaces; how can such knowledge be continuously informed by citizen science and wider publics; and what can we learn from the processes of translating evidence into policy and practice in different international urban contexts?

How can we understand the pathways between ecosystems (green - blue spaces) and ensure value to downstream users are maintained (e.g. if you're using rivers for angling but the land management has led to soil erosion which ruins spawning habitat.). Can financial routes be established to deliver funding 'upstream' to stop issues at the source.

- Trade-offs
- following on that example, how to bridge gaps between stakeholders e.g. anglers perceptions on measures that seem to them problematic e.g. leaky dams potential blocks vs opp for floodplain reconnection and habitat (e.g. spawning)
- which also links to my comment in the red group – how do we ensure that co-production processes are strong enough to withstand the pulls of groups with different objectives?

What outcomes are we seeking from investment in blue and green spaces, for which species or people groups, and through what means?

Ensuring long-term engagement and investment

- What are the most appropriate methods to quantify/monitor ecosystem services provided by urban green and blue spaces? These need to be cost-effective, timely and simple to carry out (i.e. to ensure this work can be continued via policymakers or citizen science projects after short-term funded projects end).
- how to ensure baseline quality (e.g. uncertainty level) of data for evidence-based decisions, adaptive management and cross-intervention comparisons (and upscaling to city-wide)?

How to balance diversity and magnitude of benefits from Green & Blue Infrastructure (i.e., breadth vs. depth)?

- GBI = Green Blue Infrastructure

How [as academics] do work with policymakers to enable future policies beyond providing an evidence base?

How do you build a short-term project that can take on a life of its own – through stakeholder leadership/ownership, where the long term outcomes may come out after the project funding has stopped?

- BIG ISSUE: interventions tend to have short term resources, and we need longer term adaptive management including monitoring and maintenance
- coordinate local authorities and communities, Citizen Science, etc
- With any landscape design the landscape starts to develop and grow after the end of the implementation of the project so long term thinking is necessary in any case

The importance of co-development and a sense of ownership of long-term projects

- How do we involve multiple stakeholders in co-development of projects from their inception all the way through to the final outcome? The outcomes should also be realistic for the timescale and may reflect the long-term nature of these concepts (i.e. the "big questions" are unlikely to be answered in a 3 year funded project, but there may be smaller steps towards that which are achievable that can also set up follow-on projects)
- also allow and raise awareness of the fact that NbS will take perhaps unforeseen trajectory, but still deliver positive (and possibly neg) impacts - adaptive management & education is key

How to balance planning across whole city-regions with outcome-focussed interventions to benefit local communities?

- Thinking in a long-term horizon scanning way that helps thought leaders and policy makers work toward challenges that are seen as incoming. Many policy needs that are in the present are temporally difficult/impossible to engage with from a research perspective NOW - but if we are looking 5-10 years out.
- needs bottom-up & top-down connectivity + coordination!

Some governments have formal commitments to consider future generations in decision making - does this make a difference about how they think (with their communities) about green and blue spaces?

- Urban planning and time frames are taking longer time scales than some of these projects will (Urban planning over 15-20 years, coastal planning over 25+ years)

Just transitions

- How might green and blue spaces be able to help in moves to promote more just transitions?

Environmental justice and social equity aspect of BGI needs investigating. Do we all benefit equally or maybe the socially disadvantaged groups are left out more?

- This can be upscaled to various levels - national to international. Good for a comparative study.
- KEY imho...just an example: how transport access to BGI is unequal e.g. "green" belt in UK

Non-human-centric benefits

- How can we integrate these non-human centric considerations in a transdisciplinary approach?

We also need to think outside human timelines, especially if we are looking at research which explores human and non-human ecosystems, so very long term research impacts, especially if we are focusing on a de-anthropocentric approach to research. Humanities, social science and arts research funding is often much shorter than physical science research funding, and if we are collaborating across disciplines we need to understand that longer funded timelines are needed to explore longer term impacts.

We need to understand the potential benefits and trade-off experienced by the public in accessing and using green and blue spaces in urban and rural areas? What is the health, well-being, health inequalities, health outcomes and impacts taking account of design, access, what are the priorities? What about community assets to be inclusive to include social value?

Decision spheres and leverage points

- *How do the spheres of influence of decision makers differ across countries and what can we learn about how to effectively influence multifunctional green/blue space development?*

Understanding links between heterogeneity in green-blue space function and social access/engagement

How to incorporate diverse perspectives and communities in understanding the trade-offs

How does biodiversity in green and blue spaces vary across countries? How does this impact how people value/use green and blue spaces?

- *What are the biodiversity baselines? Do people think this needs improving? Is biodiversity seen as "good" in all countries?*
- *Yes, plus trade-offs between creation of novel ecosystems/use of animals/plants as ecosystem engineers and public engagement with/concerns relating to creation of green and blue spaces in cities*

Separating 'culture' and issues of equality and inclusion from the more technical/measurable/objective themes within this group seems a very artificial distinction. Equality and inclusion shouldn't only be priorities for the more subjective, arts/humanities-type research questions, and a critical understanding of how science is part of culture - perpetuating and replicating its inequalities - would be good to see across all of these groups.

Group 3. Scale, Connectivity, Accessibility, Sustainability, Maintenance, Quality, Monitoring, Smart-tech

How can we understand the relationship of urban green and blue patterns and processes at different spatial scales?

Benefits across scales

- *How can we link understanding of green-blue space multiple benefits at local-city-national-global scale? What observations and models are needed? I would differentiate between the kind of policy scales and spatial scales?*
- *scale can mean designing a modular strategy for deployment of nature-based solution*

Understanding co-benefits, quantifying and evaluating them, and links with policy/decision making

- *are parks in the right place and designed with future users in mind?*

How can co-benefits be modelled across multiple scales and what data are needed to drive simulations?

Temporally dynamic people-spaces

- *How do we characterise and manage the nature of how green and blue spaces and their functions change through time and how people's interaction with them changes. International comparisons may offer a lot of learning*
- *e.g. can we get data - to capture use and interaction with time and weather, etc.? And can we model this?*

Understanding the water quantity and quality impacts of individual blue-green spaces and their system-wide interactions at larger scales (city/catchment)

How to harness/engage local community to help build, monitor & maintain interventions in the longer term?

- *Citizen Science*

Win-win policies/interventions for BGI, air quality, Noise, climate change, UHI

How can we maximise the use of bottom up processes and urban acupuncture to generate a larger organic urban structure? Perhaps also using tactical urbanism as a kind of experimental approach

How different stage of urban development might influence urban green and blue spaces and associated socio-environmental functions.

- *This can include urban features (urban form) of compact city, urban sprawl, shrinking cities, mega-city...etc.*

How can we define different forms of connectivity between, and access to, urban green and blue spaces?

- *Is "connected" literal or can habitats within, say, 10m still connected to some degree? What size of habitat corridor classes as successfully connecting two areas of urban green space? If you are quantifying access to green spaces, do you set parameters for this; i.e. does this need to be a certain size, shape (edge vs interior), quality (what ecosystem services does it provide)?*
- *Connectivity/access for whom? Mobility varies so do we strive for minimum required for all? Or some sort of trade-off? And to achieve what? Support rare/declining/protected species? Support access for the least mobile?*

Positive nature-human feedbacks

- *How can we create and support spaces that result in growing positive feedbacks between ecosystem health and human health*

How green and blue infrastructure might be better mainstreamed into urban planning systems .

How are space/parks be used (& when) and will this change in the future? How will these spaces look in future? (with extreme weather, ecosystem change e.g. NERC treescapes and disease)

How to balance "romanticised"/artificial views of nature with natural evolution of interventions that might increase or decrease original sought benefit objectives?

- *The synergies and tensions of cultural values and aesthetics with ecosystem function*

Optimising Blue-Green spaces interventions (or improvements to existing places) can be optimised to mitigate changing risks from flooding and climate change

How to measure benefits from connectivity between local interventions for physical, biological and human flows, helping to assess cumulative effects city-wide

- *And negatives of connectivity? E.g. soil from terrestrial environment reaching river beds and clogging spawning beds*
- *defining metrics for connectivity and accessibility*

How can we increase our data collection capacity to support scaling and modeling of urban blue green spaces.

- *E.g. Mainstreaming data collection and sustainable monitoring through network of accessible devices*

What can we learn from different place-based projects, thinking about international comparators, and connections from locals to global? (What cannot be translated/transferred is part of that learning.)

How to exploit full potential of Digital Twins (or BIM) to optimise 1. Planning, 2. Delivery and 3. Monitoring of green and blue infrastructure?

- *Planning (e.g., to focus investment where it will deliver greatest benefits to those in greatest need)*
- *Delivery (e.g., to mitigate risk of gradual reduction to tokenism through cost-cutting b/w planning and implementation)*
- *Monitoring (e.g., to evidence the benefits delivered, and increase these in future schemes) across different timescales*
- *driving data and digital transformation to create more effective tools/models to support urban green and blue spaces*

How to advance the Urban Green-Blue as a countermeasure to the overheating urban environments and to lower the urban/buildings' energy use in different climate zones under the changing climate context.

Group 4. Others

Issues faced in Global South cities are under-represented.

- *How urban green and blue might address socio-economic challenges for cities in global south.*

The role of private urban green and blue spaces

- How does this vary across countries? How do cultural norms/preferences vary and does that impact the role/use/design of public green and blue spaces?

Sand pits and pre-call networking

- Inclusivity matters when we organise these events. Consider providing funding for people to travel to 'in-person' events if they live far from the event location/aren't in a permanent academic role/from marginalised background. Take care to include a mix of people in these events

Climatic drivers -narrative around hazards

- across the globe the need to manage climatic factors are different - a little sunshine, rain, snow etc. is welcome. When a little becomes a lot these become hazards and how problematic climatic hazards are can vary significantly but is one of the multiple benefits of green blue infrastructure. Do different communities create narratives around climatic hazards that can support the creation of "value" in directing public resources into green blue spaces

Session 1 padlet

14th June 2022 Workshop

Group 1. Financing, Valuation, Land ownership, Land management

Develop a concept of stewardship - to see how it can be incorporated into a framework for development but perhaps even more significantly maintenance.

The value proposition. How prove it, how make the business case and investment case for decision makers.

- Also, how to attract private investment.
- How to appraise blue/green value against other pressures on urban land?

Long-term maintenance. What are innovative approaches globally, e.g. community, legal, real estate, planning obligations etc. Can we learn lessons/best practice check list?

- Also nature-based jobs. What are the skills and training required for stewardship of green infrastructure? How can this translate into job opportunities that may support fair and decent work under a just transition?
- Skills for maintenance
- Finance models and identifying funding models for maintenance that will maximise long-term benefits

Examining how the legal systems (and subsequent policy frameworks) in different countries support or challenge the allocation of funds for investment in GI/environmental improvements.

Frameworks for delivery. How are stakeholders (Gov, business, 3rd sector) developing frameworks to deliver. E.g. Building with Nature, BRE Communities, BNG, etc). How work, commonalities, impacts?

- There is a need for urban blue/green skills

Understanding the options available centrally, regionally and locally to fund GI but also addressing where redundancies in existing funding for capital investment can be modified to fund capital/maintenance.

GI and the climate emergency. How prove the co-benefits of a joined up approach. Ensure don't optimise for carbon at the expense of nature. Also, adaptation and resilience.

**Understanding of business case as distinct from economic case for blue and green spaces
Develop novel models for accruing land for blue and green spaces using insight from infrastructure and recognising best practice in different global context**

- *important issue and challenge for mid-size cities of developing countries. to provide new green and blue spaces, land is required and most land is under private ownership. expropriation does not work all the time and it is costly. so new models for land accrue is quite important. what are the alternatives to expropriation or to use of public lands? can we bridge between valuation of benefits of green/blue spaces and land ownership?*

Valuing and measuring biodiversity, wellbeing and public health

- *How do we develop qualitative as well as quantitative valuation mechanisms that can be rolled out at scale? How do we reconcile different values measured in different ways?*

How can we define, qualify and quantify "quality GI" and how do stakeholders in different locations (nationally and internationally) apply alternative framing (metrics vs. bespoke understandings of place/context) in their decision making ?

What are the jobs and skills that are required for implementation and stewardship of green and blue infrastructure? How might these jobs form part of fair and decent work under a just transition? What might the retraining and reskilling opportunities be for young people and/or workers in carbon-intensive industries?

- *From personal experience I've seen first hand a need for blue/green skills in the construction sector.*

What are the skills gaps (outside academia) for realising beneficial ecosystem functions in new and existing spaces, building on existing knowledge and with an understanding of barriers and inertia?

- *specific area of contractors as well as a range of other actors in creating and maintaining high quality urban GI.*
- *Especially retraining/reskilling for people with professional experience or vocational qualifications. We perhaps know quite well the degree-level skills requirements for urban GI, but what are the training and skills requirements (e.g. short courses, skill passports) for construction and land-based jobs, for example?*
- *Also relates to community groups and individuals (opportunity to share knowledge, e.g. from older people to younger people)*

Making explicit the power relationships driving urbanization (its financing, planning, and construction) that have tended to prioritise profit, and ensuring that priorities around biodiversity and climate change are instead prioritised by these different stakeholders.

- *land ownership and land held under 'threat' of development. Do we know the extent of this?*

Reconciling value

- *Different actors (people, organisations, government etc.) value different things in different ways. Those values can also change in time, and vary through space (e.g. proximity to b/g space, connectivity between b/g spaces). How do we reconcile these different measures, values, and preferences to inform the design, installation and upkeep of our b/g urban spaces? How do we assess b/g against more traditional interventions?*

Challenges and solutions for valuating multi-functionality of green infrastructure -how to balance economic and non-economic value, so as to NOT under-estimate its importance and to communicate with different sectors.

There lacks a common mean of valuing green and blue spaces in urban places.

Climate Resilient Blue Green Urban spaces

- *How do we ensure they are resilient to climate (and other changes) in the long term - both through design, but also through the service delivery models?*

The relationship between human -modified and natural environments. Green and blue space being developed as the image of the place, which can lead to high price housing and gentrification around the parks or waterfront areas. The development projects can affect the nature of the local communities and land management.

Role of social enterprises and blended funding models

Who doesn't value green and blue space and why? Lots of research will be working with people who are already signed up to benefits, what of the people who don't feel that they want to engage and who value other urban land uses to the exclusion of urban green infrastructure.

How we can expand urban blue & green infrastructure for climate change mitigation and adaptation from the scale of individual cities in local scale to globally effective long-term climate measures. we have to think about how we can build long-term cooperation among the world's cities and what kind of economic incentives are needed.

Importance of not over-selling green and blue infrastructure. What can GI not deliver, and how can we manage expectations (especially around financing and business cases). How to avoid epistemic communities/communities of practice over-selling GI through disciplinary norms and exclusion of alternative perspectives?

Economic evaluations of UGBS interventions

- *methods for economic evaluations of natural experiments and systems-oriented interventions*

Group 2. Scale, Location, Accessibility, Planning, Connectivity, Maintenance, Quality, Trade-offs, Biodiversity, Resilience, Vegetation, Smart-tech

Impact of multiple, simultaneous perturbations on ecosystem multifunctionality

Quantifying socio-environmental impacts of urban green infrastructures in geographically different areas and those differing stages of urban development with the advanced economics of ecosystems and biodiversity

Integrated planning of green and blue spaces across spatial dimension that is able to address system problems (e.g. biodiversity loss, cascading climate hazards) caused by land use change.

- *we need to understand (across spatial and temporal scales) natural-technical-social impacts and benefits of how interventions work (or don't) at scale*
- *Agree*
- *Yes, this is a key question to address*

Flooding impacts on cities. Both issues and benefits to urban spaces and environment.

- *already covered natural waterways are a challenge. we need to find out how to uncover them and use them urban green blue corridors. this needs collaboration of different disciplines and also combination of nature-based and engineering solutions.*

Need to consider green and blue spaces across the whole range of sizes of urban areas from 'micro to mega' cities

- *Also challenges of cities for integrating urban green blue spaces at different stages of urbanisation (e.g. urban sprawl, densification, regeneration, shrinking, expansion....etc.)*
- *also we should consider the range of sizes of green/blue spaces from micro to mega. in densely built cities where land is a challenge, we need to find innovative ways of using even small spaces as parts of urban green and blue spaces*
- *this needs to consider trade-offs and their spatial and temporal characteristics too.*
- *Strongly support the idea of considering a range of urban areas (here recognising that the small and medium towns of today maybe the megacities of tomorrow, at least in some parts of the world)*

The focus is on green and blue spaces but a gap in focus is the 'brown' soil that connects the functioning of both

- *agreed - this function is often overlooked and is absolutely necessary to be considered within research*

From urban green and blue to globally effective climate change mitigation and adaptation measures: How can we establish cooperation among the world's cities and what policies are needed to make this happen?

Quantify socio-environmental impacts of urban green infrastructures in different areas/regions/countries and at different stages of development with advanced economics of ecosystems and biodiversity

- *Blue/green space provides so many benefits to the urban environment, but how do we get society in general to value this?*

How green and blue spaces can be integrated with built environment in a megacity context, especially in developing country megacities.

To study the combined roles of blue, green, and grey infrastructures, i.e. nature and engineering based solutions, is helpful in achieving optimized performances in urban space.

The spatial dimension

- Urban heterogeneity includes
 - Scales in the urban*
 1. Upscaling the benefits from local to city scale
 2. Scales: local/regional/national
 3. Functionality in relation to scales
 4. Size for wellbeing of individuals, communities, biodiversity
 - Biodiversity in the urban*
 1. monitoring
 2. mapping
 3. relationships
 4. links with wellbeing social issues
 5. balance with maintenance
 - Differences between urban/rural*
 - Synergies between green and blue*
- To help integrate BI and GI with engineering solutions – should more research determine the metrics that are appropriate for engineers to use – for example thermal insulation values of different types of vegetation

How do we engineer and integrate blue, green spaces into the urban environment that...

- Provide multiple benefits (flooding, water quality, health etc.)
- Resilient to seasonal and long term changes
- Are implemented at an appropriate spatial scale
- Integrate with existing grey infrastructure and the wider built environment

Improving understanding of multi-functionality (benefits and harms) as an inter-connected space-time phenomena. This has implications for scale, form (inc .biodiversity) analysis, planning and monitoring.

Balance between ecosystem services/disservices

- Understanding
 1. behaviour during seasons, during climate change
 2. Unintended consequences
 3. Uncertainty to the extent of services (e.g. flood risk, water pollution)
- Promote synergies that minimize disservices and enhance benefits
- Effect on engineering/designing/decision making/urbanplanning

Exploring how built-environment affect UHI (Urban Heat Island) and how that can be tackled by integrating blue and greenspaces.

Need to focus on human health and wellbeing as well, cultural priorities as well as the more technical aspects of NBS

Cross-boundary thinking

- To what extent can we find common ideas and solutions between urban areas across contexts (climatic regions, political regions etc)

How can we make our scientific research outputs more engaging (and understandable) to local communities and decision-makers especially in diverse cultural contexts (maybe this could include working with the arts and social scientists etc.)?

What do developers need to know in order for research to inform policy, how can evidence be presented better

Competing land use, multifunctional demands on spaces

I heard 3:

- 1. *What do stakeholders need to know, hear, how communicate better*
- 2. *Contested spaces, how understand and resolve trade off for scarce urban sites.*
- 3. *Long term resilience, how GI helps adapt to climate change, but also are we creating the right GI for future. Temporal lens.*

Group 3. Participatory approaches, Inclusion, Culture, Behaviour, Communication, Equity, Justice, Collaboration

Dealing with local conflicts due to land ownership (such as farmers..) and 'urban; suburban' waiting. participation with minimising confrontation

How do we use living labs where we're using the same approach in different places and track the various outcomes?

How can we ensure that longevity is built into collaboration and community engagement so that communities are not abandoned/forgotten after funding has ended

Learning from failures as well as successes

Language and policy mobilities: how do we tap into good practices and examples globally that might not call themselves 'green infrastructure' or 'nature-based solutions'? How do we acknowledge and respect the fact that there may be a long history of working with nature in urban spaces, using different knowledge systems and terminology?

Just transitions: how can green and blue infrastructure support a just transition for places that have relied heavily on high-emitting/carbon-intensive industries? What is the role of green/blue infrastructure in fair and decent work, environmental remediation, and resilience/wellbeing in de-industrialising places?

How to deal with heterogeneity of territories (city center - suburb, countryside) and actors (farmers, citizens). Balance participations and acceptance of different viewpoints for co-creation

Transdisciplinary research

- *Is this really the model that we are seeking to work in? If so, what 'shifts' in teaching, training etc need to happen in order to truly support development of transdisciplinary research and researchers?*
- *What are the trade offs with the need for depth of specificity within and from disciplines.*

- PhD students are well placed to develop novel trans-disciplinary areas

What might effective 'co-creation' or 'participatory' approaches look like in different political, cultural, social and ecological contexts globally?

What can we do better in the way that scientific research outputs are designed to be more engaging (and understandable) to local communities and decision-makers(this could include use of storytelling, arts etc.)?

The use of historical sources to capture the multiple lived experiences of specific greenspaces to create stories of how communities value them, and in turn how this place making has and can be used to preserve and / or develop specific places to meet current challenges.

Who? when? where? GB-infra are visited/used ?

How do we value the lived experience that people have in blue/green environments? How do you factor these into decision making processes?

Need to focus on 'non-users' as well as 'users'

How do we encourage public participation into resolving urban problems such as Urban Heat Island which does not have an explicitly visible impact on their lives?

Mapping with (legal) accuracy

- Mapping technologies provide an incredible resource to understand green, blue and grey spaces at a macro scale.
- Need to be sure that the mapped areas are truly accessible (e.g. allotments, playing fields) and/or biodiverse (e.g. school playing fields).

Knowledge co-production to maximize the multiple benefits for all stakeholders

- It is important to understand the differed perceptions of the benefits provided by urban green and blue spaces among the academia, practitioners, decision-makers, and the general public, and to identify the knowledge and interest gaps. Such understanding is crucial for knowledge co-production to maximize the multiple benefits for all stakeholders.

Simple 'how to' guides for arts-led participation

- Develop easy to follow, graphically attractive, guidance on how to set up a website (for free or nearly free), produce videos (e.g. on an iphone) and upload to youtube, speak over Google slides etc. Not always helpful. to develop 'perfect' proprietary technologies, could provide guidance on easily available, free resources. with community groups 'training the trainers'. Planning consultation processes have some familiarity with this but are generally a one-off conversation when planning permission is granted/denied, rather than for ongoing maintenance concerns.

Systems thinking and approaches needed to truly integrate perspectives across the science space - in order to answer burning research questions. Must be truly integrated to make progress (and build on the progress/learning to date).

What motivates people to engage with blue and green spaces? What is the genuine grass roots approach in this context?

How do we engage non users, or recognise non-typical forms of engagement that may offer meanings that are unrecognised.

Group 4. Others

Opportunities for international comparisons and learning

- *e.g. looking at international comparisons across different cities, social, physical, climatological contexts*

Longitudinal studies

- *Of social, natural, physical responses, of multiple sites, in multiple locations to understand how blue/green systems perform through space and time*

Session 1 padlet

16th June 2022 Workshop

Group 1. Financing, Valuation, Land ownership, Land management, Maintenance

Longitudinal studies - e.g. trends in green/blue space creation in cities

Development dynamics, local plans and relative value of ecosystem services in urban and post-industrial landscapes

Despite all the evidence of the benefits of green space, we still cannot get them delivered or maintained. So we need to look more at development process, decision making and how greenspace is balanced compared with other priorities. In live developments.

Link to social benefits and wellbeing, different models for provision/access, and relationships to green/plan types

Experimental management structures -urban commons, participatory management, direct democracy, eco-allotment.

Different models of land property designations, collection of data connected to diverse uses of varied forms of greenspaces (including temporary ones). Building codes, standards, regulation, and how it works alongside the informal uses of greenspaces.

History of landscape designations in comparative analysis.

Alternative uses of green space – nomad gardens, Incredible edible etc.

Group 2. Scale, Location, Accessibility, Planning, Connectivity, Trade-offs

Enablers for Strategic Planning of Blue-Green infrastructure

Barriers to access

- How do different demographic groups experience physical and social barrier in accessing blue and green spaces?

Identifying multiple uses of green spaces, including informal green spaces

- urban communities use green space in a diverse series of ways, and often use informal, unmanaged sites (derelict sites, informal green/blue space etc) in ways that they do not use more traditional forms of G&B space. How can we understand, allow for management of, design for and measure this diversity of use?
- Festivals' or other occasions in a green space as an enabler for the space to become embedded in the community creating the 'urge to steward'
- Agree festivals are great!

Vulnerability of Green Spaces and positive action surrounding them.

- Linked with taking a more strategic approach
- AND .. making MORE green spaces.

Brownfield rewilding

- How do we value biodiversity rich spaces in cities? To what extent we allow undisturbed rewilding in marginal urban or peri-urban areas, which would require reduced human access to avoid disturbing other species?
- How do we manage the space to increase biodiversity?
- I think a key challenge here is the need for strategic/holistic plan for the management of brownfield land - in virtually all cities this is very ad hoc
- But avoid perceived/ real exclusion of people from the landscape -striking a balance between protecting biodiversity and connecting people with nature. Perhaps more challenging in high density urban environments?

Green and blue spaces as 'biodiversity farms'?

- Is there an opportunity to introduce the concept of a 'biodiversity farm' as a counterpart to food / energy / material farm? A biodiversity farm would have a dual focus of habitat creation and high-quality space for urban communities. Defining the concept in this way can help to describe the socio-economic benefits.
- Is there a way to make the human benefit more evident in the description I wonder.
- To try and expand a little - in a food farm we manage the space to enable cultivation of specific plants (crops) and animals (livestock) that provide a direct human benefit (foods) - what species would we cultivate (and how?) in a biodiversity farm to create a similarly directly understood human benefit?
- What about the XXI century park? A park in which landscaped, cultivated and wild green areas are combined? A park in which users with different needs can enjoy the relationship with nature they seek?
- the XXI park certainly seems to fit the spirit of the discussion -arable farming systems rotate between different crops to manage soil quality and diseases - could we imagine a rotation system in such a park? so that it becomes a more dynamic space?
- perhaps this also brings in the concept of seasonality - different foods are cultivated at different times of year in a conventional farm, does the XXI park change according to the season?

Complex systems

- Can we develop our theoretical understanding of complex systems connecting UGBS, human and environmental benefits -especially to understand potential impacts of interventions, possible unintended consequences, trade-offs? Will require different types of evidence (quant/qual etc.) to understand parts of the system and how connect

How do we manage the conflicting demands of different communities - in terms of gender, culture, ability, sexuality... but also behaviour in B&G spaces.

- This chimes with the purple discussions we had earlier,

Characteristics vs benefits for who?

- How do different sizes/types/qualities of UGBS with different built infrastructure and amenities provide different benefits for different communities and what range of multiple env/social/cultural services?

Barriers to moving towards strategic GI planning and implementation

- There is a need to move towards more strategic GI approaches, moving away from more reactive 'any GI anywhere' outcomes. It would be valuable to explore the barriers to moving towards this approach, and in turn to identify solutions that can encourage this approach.

Considering strategic GI planning within dynamic systems

- Transitioning to strategic approaches to GI planning, and urban and catchment scales for example, can encourage the achievement of multi-functional benefits. Here, there is the need to take into account the temporal dimension. Although some factors are constant (e.g. soil profiles, locations of river corridors set), others are dynamic (e.g. cultural factors, prominent political agendas, availability of data). It would be valuable to explore these themes, potentially through scenario-based approaches. This could help to build flexibility and adaptability into strategic GI planning.

Connections/ disconnections among green and blue space and connections between people and spaces

- Links with access, strategic planning, vulnerability, unintended disbenefits...

How can we make trade-offs more visible?

- Can we use arts based methods to show what trade-offs there are and to be explicit about who is making those decisions.
- Transparency in decision making processes - so different stakeholders understand why their preferences may not be feasible

Making trade-offs visible

- How do we make visible/visual the trade-offs that happen when making decisions about the benefits and disbenefits of green and blue spaces? Issues of transparency and power become apparent here.

Understanding scale is critical to quantify and attribute change from particular blue-green interventions.

- For example, from NFM research the size of our interventions is often inadequate to make a significant difference in any one ecosystem service, even when different types of intervention are stacked. Another example is monitoring at too large a scale that means that the interventions are unlikely to be observable or amenable to attribution of which blue green intervention is causing the change –that is needed to inform future feature design. Perhaps we need to consider all scales across a demonstration observed urban environment in our design?

Looking at the potential of developing or maintaining green-blue corridors in LMIC cities - with conflicting pressures of informality, densification and economic development

We need to think about how to attract young people to visit green spaces more often and be outdoor. Tech can help in this, since most young people have phones and like to be in places with strong connectivity.

- I might argue that we need to explore when where and how young people (of various ages) engage with green spaces of different scales and localities. Asking this question will be key to answering the question about how we can engage young people in green spaces more often.

Benefits from engagement

- We know engaging in design helps public wellbeing: so, how can we help the designers and developers of green spaces deliver meaningful engagement within transparent decision-making.

Strategic green space management

- How can cities manage the network of large and small, public and private green spaces to enable multiple benefits? What governance structures currently allow such approaches to happen? (My perception is that European and US municipalities have the power to do this better than UK municipalities because they have broader powers and often also have autonomy overfunding).

Engagement with local inhabitants/businesses prior to and during the design of blue-green systems is critical for the success of physical interventions including intended or unintended behavioural change.

- For example, those who live and work in a particular part of an urban area may have direct experience of how the locality behaves with natural forcing (e.g. exactly where it floods) often better than our models. Equally importantly, if the ‘scientists’ do not explain why certain blue-green interventions may not be effective in their locality – then using another flooding example, people may falsely abandon use of property-level protection (PLP) or flood alerts and put themselves in worse danger. Thus, quantification of people’s attitudes/behaviour before-during-after interventions by social scientists may be essential for the success of physical interventions – particularly given the greater uncertainties associated with the effectiveness of blue-green rather than grey infrastructure?

Group 3. UHI effect, Quality, Vegetation, Engineering, Monitoring, Biodiversity, Smart-tech

Long term funding for observatory networks

- The majority of funding calls operate at 3-5 year time horizons, which does not offer sustainability for monitoring and adaptive management. LTER models of funding offer such security, but for a single city. Belmont could offer an innovative funding model for a hub-and-spoke system of distributed observatories.

Make use of low-cost smart sensing and edge computing platform for multimodel monitoring (to better understand behaviour and the environment we live in), processing on the edge to deliver real-time interventions, where they are needed.

- Definite – relatively small investments in technology (in the grand scheme of things) can yield considerable insights. Air quality, temperature and noise are easy wins.
- Yes, besides collecting data at higher granularity, you can feedback instantly, send instant warning/alerts, nudges, aggregate data, and incentives.

In UK context, we have very good implementation of BGI (a nature-based solution) using accepted engineering practice – but we have virtually **no direct observational evidence of effectiveness of installed BGI**** for flood mitigation or pollution mediation (and possibly for other biophysical interventions?). This is critical for genuine improvements to resilience to environmental change, and is valuable in improving BGI design for specific locations. Very little evidence that this gap in natural environmental science / evidence is different in other countries**

- Definitely agree – is this an issue with a lack of studies, lack of publication (e.g. out of grey literature or compliance reports following installation), or just a lack of meta-analysis/synthesis of existing work?
- My view is that there is a lack of meaningful observation (monitoring allied with analysis that is fit-for-purpose); an international programme such as this has the potential to bring such developing hard evidence from other programmes together as well as co-develop experimental designs to deliver such information cost-effectively

Urban observatories for long term 20-30 years research (Similar to USA LTER) that can form the framework for adding multiple research grants. Then we can address many aspects of urban BG as we answer different questions and find new questions to answer.

- LTER model would have to be modified to handle multiple cities.
- LTER sites are supposed to coordinate similar types of research across all sites, with modifications for site specific needs. There are also NEON type observatories that are more integrated and have the same methods and specifications for sensors at all sites. But yes I agree that with better and consistent funding it would be possible to use the same methods across many urban sites in many cities and many countries to achieve the program aims.

Core outcomes

- Many techniques exist to monitor the urban environment and there has been a proliferation of studies / methods / questions in the past couple of decades. What is needed is a consistent suite of inter / multi / transdisciplinary outcomes, drawn from diverse stakeholder groups, that can be collected across different landscapes to enable comparison, collaboration, and integration.
- Yes, and it can be useful to build on SDG 11 goals/targets

- *yes, but the type and quality of data are not always fit to purpose (e.g. lack of labelled data)*

Need much more research on the integrated benefits of all kinds of biodiversity in Urban areas on ecosystems and human wellbeing.

Research on how to scientists and social scientists can effectively work with Urban planners and politicians to influence urban developments.

- *and construction companies and architects too!*
- *engineers and technologies who also can action the development.*
- *Communication is key- can we build a common and accessible language in this area*

Engineering challenges around indoor air quality

- *With net zero goals in mind, heat pumps are being promoted in many houses, but these require sealed environments which could have negative impacts on air quality. There is a broader piece here around trade-offs too. For example, green infrastructure can be useful in removing particulate matter from car tyres from outdoor air in urban space but green infrastructure also contributes to VOCs so trade offs need further consideration.*

Smart tech for capturing energy from people and vehicle movements.

Need better cost effective smart tech for monitoring the microenvironment in urban areas at many sites to address urban structural and biophysical complexity. Also improved models and data handling to deal with the mass of data these smart sensors would produce.

Value of working internationally, especially with cities in very different contexts and climates - also thinking about services and service design

Mainstreaming blue-green into design - making it the 'norm' in infrastructure/property design

- *and what are the 'best'/most effective design options within indifferent contexts*

Designing for multiple benefits

Transdisciplinary approach (not studying transdisciplinarity, but application of well-founded methods)

Group 4. Participatory approaches, Inclusion, Culture, Behaviour, Communication, Equity, Justice, Collaboration

LMICs - develop potential of the spaces but in countries that are heavily indebted

What obstacles prevent some communities from accessing urban green spaces and using them more? How can inequities be resolved?

- *Miniature tech is progressing very fast and can be used for behaviour change and social prescribing, linking with local activities in green spaces.*
- *Panopticon*

How do we coproduce (new/ better) greenspaces with multiple users to meet many different needs?

How parks have been used and by whom and for what purposes over time

Cultural barriers to using urban blue and green spaces

How can researchers work with different communities to create/improve/use green and blue spaces, i.e. to do something rather than just find out about something

Value systems

- *It is important to explore the values and stereotypes that people (e.g., young women & girls) inherit from family, teachers, friends etc., which prevent them from engaging with green and blue spaces.*

Parks as spaces of ecological education and participatory co-creation

Definition of urban green/blue spaces -commons, public, private, etc

Increase access to private/ semi-private green/blue spaces

How can we get beyond merely establishing the benefits of green space to actually start making a difference in terms of expanding provision, expanding access and reducing inequities?

Value of arts-based methods to work with communities

Knowledge/Action

- *How communities getting involved in using green/blue spaces differently (e.g. swimming, gardening, fishing) makes ecological issues visible: e.g. river pollution, biodiversity, bad management. Participation and community ownership as a prompt for environmentalist action and grassroots activism*

Changing perceptions

- *Changing public perceptions of what counts as 'good' greenspace: the problematic legacy of nature aesthetics*

Differences between community perceptions of the value of different green spaces for community benefits versus the biodiversity benefits of these spaces -the trade off between aesthetics and community benefit versus ecological/biological benefit

Governance of the space

- *How does opening up what people want from their local areas challenge and enable different forms of governance of the locality (not just PARKS).*
- *Good question - and how do different governance/policy contexts in different countries allow for participation/co-creation/community involvement differently?*
- *And how the bottom-up governance of these space does not lead to the disengagement of local authorities in providing resources to maintain local green and blue infrastructure?*

Lost spaces

- *What is the value of 'lost green and blue spaces' in urban areas in terms of community memory, perceptions, identity etc. as well as in terms of environmental loss? Are there opportunities for arts and design-based methods to highlight the values of these lost spaces to communities?*
- *Such a fascinating question.*

Participation in research from those not harder to reach groups-why aren't they participating in the green/blue spaces, what are their unique barriers, and how do we overcome them?

Encouraging participation and engagement in strategic GI planning

- *Considering issues and barriers to participation and engagement in strategic GI planning (rather than site-scale GI interventions) to enable multiple perspectives to influence these approaches*

Temporal dimension

- *Daily as well as seasonal profiles. These can vary dramatically for different climate zones.*
- *Also more long term - uses of green and blue spaces varies hugely across historical time, and we should not expect it to stay the same in the future irrespective of changes in climate or ecology.*

Group 5. Others

Comparative study of urban land use designations in different states, and how they support different forms of Green and blue space use, development, design and biodiversity.

We must have equity in funding for overseas and UK institutions and their people, and not rely on in kind or local funding in less well-resourced countries.

Appendix E

Session 2 padlets

(In no particular order)

Calls with longer timelines and smaller mini-projects and/or flexibility built in maybe worth considering - which allows for collaborators to flow in and out of the broader project/problem space for greater collaboration and delivery options

Sustainability of Projects

- *There could be a requirement for different kinds of organisations to be involved (especially those from underrepresented groups). This could include schools and other provisions - important for sustainability of some of the projects that would likely be proposed. I wonder about the kind of funding offered i.e. funding time, resources, interventions, evaluations. Funding particular opportunities might be more helpful for non-academic organisations, too?*

Always a danger that calls may be overtaken by researchers in higher income countries - this needs to be taken into consideration in the context of funding/funders, network/consortium development - how do we make sure that the process is inclusive of, and supportive of LMIC researchers.

Acknowledged diversity of research team members - gender, ethnicity etc

[In the NERC Innovation space] past £25k Pathfinder > £150k Project funding model was v. helpful: currently, there's a relative lack of calls for projects of intermediate size, e.g. £50-200k.

- *i.e., need for funding *beyond* proof of concept, but prior to very large projects employing established methods/tools etc.*

How to we incent communities, NGOs and other stakeholder partners to participate - bringing in funders who can support their partners (foundations, development orgs, philanthropy) will be key to bringing in the right community partners

Should the call be weighted towards majority world researchers?

- *Universities in Western Europe, North America etc. have whole departments to support researchers to manage grants/funding calls etc. Are there mechanisms to balance in favour of those researchers who have to do it all*

Programme integration

- *Could all forum contributors fund an international programme integrator and translator to get the most from the programme*

Thematic areas to be able to cover wider socio-environmental issues and urban development status in non-western countries and/or low-mid income countries.

'Network' funding is highly valuable to bring researchers, practitioners together but should allow for substantial spending on research/innovation therein, not only knowledge exchange etc...

- Research and innovation can be a **vehicle** for network building, not only a next step thereafter.

Long lead in for funding calls

- *and understanding that detailed outcomes of co-production cannot always be specified before the work has actually happened*

Required involvement of ECRs & non-academics

A sandpit event for networking and allowing proposals to be developed to then bid for the funding would encourage inclusivity (quantified via an application processes) and co-designed research questions (rather than losing stakeholder directed questions that are typical with peer-review and NERC panels that focus on "science" only) – plus encourages early career researchers (as increased chance of success and easier to apply for a sandpit)

- *from the other padlet – someone wrote: sand pits and pre-call networking*
Inclusivity matters when we organise these events. Consider providing funding for people to travel to 'in-person' events if they live far from the event location/aren't in a permanent academic role/from marginalised background. Take care to include a mix of people in these events

Opportunity for future BF CRAs to have overlap with the current call, and there is experience of variations on the same themes.

- *One comment that came up in the chat was overlap between things like Urban Blue and Green spaces and food security might be an interesting one to consider.*

3+2 format

- *Could have a format where you have a full on research project for 3 years with capacity to bid into a 2 year extension period that continues monitoring, longitudinal work, impact development – would suit development of urban green/blue space pilots*
- *Or even 0+3+2 where a period of pre-research time is funded to get the project properly thought through and develop networks and relationships*

As there are numerous parallels and overlaps between this potential call and others already announced, would there be a way to prioritise a) the riskier, less traditional intersectional research questions that have come up today, and b) encourage funding to go to places where it hasn't already been given?

- *perhaps some way that prioritises SDGs and particularly resilience to climate change?*

Mixes of smaller and larger grants may be a very useful to consider.

- *depends on the ambition – speed vs risk, opportunities to snowball and bring collaborators in throughout the lifespan of the project*
- *allows for greater exploratory/riskier research.*

Bring in stakeholders at an early stage through sandpits

- *Having stakeholders participate fully in sandpits and projects would help*

I urge not to favour large grants.

A range of different opportunities, from networks, sandpits, to large grants.

Network development would be really valuable to bring in global south and connect to other countries

- *We'd need to ensure civil society participants' costs were fully covered - but this would be a good form of relationship building.*

Record your ideas or comments on the most effective delivery mechanisms of any research investment

- *networking grants could be useful that could bring together some of the finding that are already out there. Lots of things coming to an end in 2024.*
- *Sandpit type activities useful to build transdisciplinary consortium/community - in advance of a call.*

Possibility of having different research opportunities, long-term (3-4 yrs) and short-term (1-2yrs), depending on the desired outcome. short-term research can be good for developing new and innovative ideas and the long-term ones for well-structured research to be carried out in different contexts

Get government-consultancies-communities involved as co funders to provide bite to the findings/outputs

- *Also, ensure that there are specific outputs related to policy, skills and practice built into the programme (and this get funded as part of the process). This would help to get buy in from external bodies (so they feel they get bangs for their buck) and they should then be able to identify the pathways to application (either in gov policy or practice). And developers/real estate companies too. They need to hear and own the results.*

How can ECRs become more active and how we can make it easier for ECRs to access funding? We need to propagate a whole new wave of academics within this area of research.

Diversity

- *Diversity... of mechanism e.g. embedded researchers (working with co-funders e.g. from government) AND large-scale interdisciplinary projects AND blue-skies through to applied AND inclusive/considerate of ECR (temporary contracts etc) AND considerate of science push vs policy pull*

Diversity of funding mechanisms is key.

Longitudinal and comparative studies

- *require long term (4+ years!) funding support, it will take at least 6 months for an international/interdisciplinary project to get going. not everyone needs to be funded the whole time, but for example we won't learn anything new about how b/g spaces perform in a 1 year monitoring study. Monitoring of long-term performance and maintenance mechanisms is vital - especially in the context of climate change.*

Networks of academics

- It is really difficult to hear about opportunities in research councils that are not aimed at your discipline. Academic networks would help (this is a great start! Very glad I saw it on Twitter ... not disseminated via my Uni). Knowledge mapping is a good idea (could create a website and ask academics to upload their info - doesn't have to require huge resource).

Potential funding resources for partners whose countries do not join this Belmont call.

Ensure reviewers are well-briefed on the nature of the call and are able to review inter/transdisciplinary proposals. This means (a) acknowledging proposals may cross remits or disciplines; (b) that there may be an emphasis on applied research rather than discipline-specific 'excellence'; (c) having realistic expectations about what is possible and feasible within an international project; and (d) recognising that the outcomes might not always be known at the outset of transdisciplinary working.

- Always a challenge... one option might be to consider setting up an international science advisory board to oversee these processes and subsequent projects?
- Agree with this point. Inter-disciplinary approaches seem to be disadvantaged by the process.

Fund networks 1-2 years

- Networks with commercial developers, municipal authorities, communities, perhaps regular meetings by Zoom to keep time commitments manageable (still pay some e.g. community participants). Could include participants worldwide if possible. Needs good RA/administrative funding. Outputs should be appropriate e.g. blog posts that anyone can write rather than summaries of 2-4 pages rather than requiring academic outputs e.g. journal papers/books

Catalyst awards

- important if want to do something truly innovative and high risk
- Yes, more of these!

Duplication of disciplinary specialisms internationally

- This is essential for equal weighting and comparability

Blended funding models

- leveraging funding from multiple sources (research councils; private etc)

Allow funds to support PhDs within the project

- Important for new skills amongst many other reasons

Place-based, action learning on GI with all the relevant partners would be an innovative and productive approach.

- Agree.

Make some funding multi-stakeholder -developers, communities, policy makers as well as inter-disciplinary academics. Stakeholders need to be an integral part of the design and delivery, not just recipients of outputs.

- Agreed!
- Yes - this means being able to allocate staff time to non-academic partners!

Interdisciplinarity and International "Overhead"

- It takes proportionally more time, effort and resources to undertake interdisciplinary research. This is also the case for working internationally - especially across continents. Funding calls need to be of a scale to recognise this 'overhead' required to build a common language for interdisciplinary research and collaboration.
- Yes. Maybe more initial small sums to build the network/proposal.

Require long lead-in times to develop complex international and interdisciplinary proposals. Consider funding that can cover staff time (not just travel/subs) to develop high-quality proposals.

- You could hold community building events during the proposal call stage
- Belmont could also help bring in stakeholders into the proposal development process.
- And community groups/representatives can't afford to engage in our lengthy processes for free.

Sandpit

- A creative forum to bring interdisciplinary researchers together for a good amount of time to develop in depth discussions and novel ideas and collaborations (seen as advantageous compared to match making). A lot of novel collaborative research results from these in the past and is perfected suited to the topic.

Learn from other large projects!

- I know we are being asked to design a delivery mechanism, but many projects have come before with a variety of methods. I would like to see an evidence review of what worked and what didn't. I don't feel competent in designing a delivery mechanism without that information. Perhaps the first phase of any funding could do that work?

Doctoral Training Programmes

- Postgraduate researchers (i) are great value for money, (ii) are excellent for encouraging interdisciplinarity, (iii) can bridge geographical divides, (iv) represent the next generation of transdisciplinary researchers, (v) can adopt a variety of methods, (vi) can produce a variety of outputs, and (vii) can work collaboratively to address multiple facets of the same challenge in a modular way.

Seminar programme?

- I've had great experience with the ESRC-NERC seminar programme to enable discussion across disciplines. I wonder whether funding such seminar programmes could be a great way of supporting bid development. This might be particularly important if there is only small funding pots available.

Enabling collaboration with non-academic partners

- Urban GI in practice is facing challenges linked to funding and capacity. Approaches are needed to facilitate greater engagement with end users to enable research outcomes to have a positive impact on practice

AHRC Connected Communities programme had really useful sandpit events that had funding attached to kick start new collaborations and small grants. These were really useful - and could be a good model.

Funding unusual data collectors

- *Local young people (e.g. 20 year olds with high school cert) are often used as great qualitative data collection processes in the global south. It is important that such methods could be used in the global north. A point being that this embeds the research in the local community.*

Funding for local authority delivery partners on an equity basis (Global South and UK) -i.e. trusted equal partners

Earlier careers

- *More support for early career/less experienced researchers. It's hard competing against more experienced and well-connected teams in the main research grants.*

Enable partners to be costed in, especially if we need local government, NGO or community group involvement. And provide really clear guidance on what partner costs can be included.

Funding for partners including artists and community groups

Smaller pots only if admin is significantly reduced for them.

Small catalyst grants (similar to Resource Recovery from Waste programme) to kickstart a proposal - to provide funding to bring partners on board, select case studies etc. can be very helpful.

'Enabling' research

- *Funding for enabling researchers to work with end users to directly pass on/translate/ findings into policy, practice etc.*

Networking grants could be useful for LMIC inputs into this thinking - so to ensure that our research agendas incorporate their interests and needs rather than imposing a view of green-blue on cities. This links to the decolonialisation of research agendas.

Two stage funding applications - with an Eolstage - can be better for managing community expectations alongside community effort to help co-create full blown proposals.

- *Agree, learning from SUE programme experiences*

Bureaucracy and language barriers

- *Establishing international collaborations across institutions is extremely challenging. It is a bureaucratic process in itself, but this gets worse when bureaucratic traditions are different, and even more when the languages spoken are different and there is no provision for this.*

Funded staff research time

- *Funded dedicated staff time is essential, both to prepare the grant application and to deliver the project if successful. Not all institutions are used to offer this to their*

staff - especially not all post-92 institutions. Funded research time for staff needs to be embedded in all grants, even small ones.

Long term projects -

- for arts and humanities researchers, or any project working with a community, long term projects are ethically sound in that they build a relationship with a community (Rather than parachuting in and then leaving the community). They also would allow us to understand changing uses of green space as they changed around the community, and as members grew older, allowing us to capture generational change. This is also tremendously important for ecological projects - studies 5 - 10 years in duration that are able to monitor the effectiveness of UGBI interventions

Global programme to facilitate global south-north and north-south learning. Also funding mechanism that allows partners from Global south including NGOs be fully compensated for work

Ethics and equity

- We need to be able to fund partner's time fairly. This applies both internationally and in terms of community/third sector partners in the UK.

Two step process

- A first step as a pilot or proof of concept stage and a second step which rolls out and increases the size.
- Agree but really encourage flexible approach to what shape first phase projects take e.g. we need theoretical development, building of interdisciplinary partnerships, problem framing (including working with partners), not just 'small scale' or experimental type work
- UKPRP model seems quite useful to do this kind of two stage process?