Climate and Biodiversity Emergency issue

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Climate and Biodiversity Emergency issue

Just as we were starting work on this edition of the journal, the LI declared a Climate and Biodiversity Emergency and now, as we go to press, the Institute has brought together an expert panel to coordinate a response over the coming months. The Panel will provide advice and develop a list of potential actions that the LI and its members can take, we will update you as we progress.

As part of Landscape's editorial response to the Climate and Biodiversity Emergency, we are initiating a quarterly call to readers to submit their most inspiring ideas for addressing the climate emergency, the first of which are set out on page 44. A doodle, a video, case studies of best practice, all are welcome.

In this edition, we look at the needs of refugees affected by climate crisis and the work that our Humanitarian Landscape Collective is involved in [page 11]; we remind members of the role of UN Sustainable Goals [page 12]; and the importance of communicating the urgency of climate change with the public [page 22].

At the heart of a change to our practice and behaviour is reflecting on our history and knowledge. We celebrate the 50th anniversary of Ian McHarg's Design With Nature by looking at his continuing relevance to the climate change debate [page 17] and we publish the first of a series of resource guides [page 50]. We focus on making the most of the tools already at hand such as Environmental Net Gain [page 34], BIM [page 69] and landscape character [page 54] all of which have a part to play.

We showcase projects and initiatives adapting to climate change or reducing carbon, including proposals to install ground source heat pumps in public parks [page 28]; a vision for a biodiverse Thamesmead development [page 31]; and the work of Slow The Flow Calderdale, a community initiative to tackle flooding [page 40]. The Slow the Flow Calderdale is particularly inspiring, demonstrating what an active community group led by our members can achieve.

Whilst we first published a policy position paper on climate change in 2008, we need considered action and changes to practice to respond to the environmental crises that we now face.

The landscape profession is well placed to be at the forefront of solutions. Our voice is one of honesty and integrity, and our Code of Conduct requires us to be responsible to the environment and future generations. We welcome your contribution to this important agenda.

Eleanor Trenfield CMLI
Director, ETLA
Honorary Editor of *Landscape*

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We asked four practitioners and commentators to explain what they thought landscape and other built environment professionals should do next to address climate emergency

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Anna French

As landscape architects, we believe the work we do makes a difference. But I think we also know, deep down, that we've been fighting a losing battle. Trees that shouldn't be cut down are felled, wild plants and habitats are sacrificed for profit and money spent on glass and concrete always takes priority over anything green. Our best laid plans are squeezed, watered down, never implemented or poorly maintained. But we are such optimists that we always imagine that one day people will wake up to how important our work is.

We probably also took note of the Paris Agreement and breathed a tentative sigh of relief when it was signed back in 2015. Yet somehow, inexplicably, we have let this catastrophe unfold. And while we've been busy studying, working and raising our children, the sands were running through the hourglass.

When I heard Greta Thunberg speak at the UN earlier this year, I had a feeling that this was the wake-up call. I took my daughters to the Global Climate Strike in March and was chastened by the urgency and power of the young people's message. The more I read up on climate change, the more the extent of the damage became clear.

Now we understand that it has already gone so far and with such pace that there is a possibility that we will not get through this with our civilisation intact. Prof. Will Steffen explains reductions pathways. *"Next realistic chance to peak global emissions is 2020. Then we can still hit the 2°C but we've got to get out of carbon by 2040. But if we delay to 2025: Impossible! You'd have to totally decarbonise in one decade."*[1] Whatever the outcome, as the effects of climate change take hold, we may grasp for any solutions that are about us. It is more crucial than ever for landscape architects to make sure our ideas are on the table.

We need to get clued up on water management, soil carbon storage, rewilding and permaculture. We need to preserve what biodiversity is left, restore peatlands and wetlands and design out urban heating. We need to learn to calculate the carbon footprints of our projects. We need to work out what ideas are important and what can be discarded. Electronic play equipment, and interactive displays are being installed with no thought about the impact. Electric cars will be part of the solution, but we cannot just switch all the petrol cars on the planet without causing another resource crisis. Public transport, walking and cycling are the future. Private luxury needs to give way to public enjoyment, we can imagine a more sociable, shared future where parks and amenity spaces are given much greater priority, rather than everyone obsessing over their own small patch.

Is runaway climate change the end result of runaway capitalism and colonialism? The youth climate movement certainly seems to think so. As Greta Thunberg said in her recent speech to the United Nations: 'Entire ecosystems are collapsing. We are in the beginning of a mass extinction, and all you can talk about is money and fairy tales of eternal economic growth.' So perhaps we also need to review our business models and consider a future of social enterprise, not solely focussed on profit.

Landscape architects are well placed to help but first we need governments of the world to get a grip of the problem. In their paper "Why Civil Resistance Works, The Strategic Logic of Nonviolent Conflict"[2], Erica Chenoweth and Maria J. Stephan argue

1. Global Strike for Climate on 20 September.
© Anna French

While we've been busy studying, working and raising our children, the sands were running through the hourglass

that once over 3.5% of a population become actively involved in non-violent civil disobedience, it is likely to tip the government to take action.

I set up *Landscape for Future* as a social media campaign in March to help get the message out to my landscape companions. Since then we have formed into a small group and along with many other landscape architects attended the Global Strike for Climate on Friday 20th September. Some of us congregated with the Green Building Council in London, others joined strikes in St Albans, Cambridge, Sheffield and Bristol. Our President, Adam White, attended with the International Federation of Landscape Architects in Oslo.

So next time I'd like to see us all out on the street. It is worth quoting Greta Thunberg in her speech made to the US Congress this September: *"And no matter how political the background to this crisis may be, we must not allow this to continue to be a partisan political question. The climate and ecological crisis is beyond party politics. And our main enemy right now is not our political opponents. Our main enemy now is physics. And we cannot make "deals" with physics."*

Anna French is a landscape architect and founder of Landscape for Future

Julia Barfield

I woke up to the urgency of the situation last October when I read about the IPCC report – and became obsessed. When the world's top scientists warn that we have 12 years to limit climate catastrophe we have to listen and act – professionally, politically and personally.

As professionals there is a lot we can do:

- We need to be fundamentally rethinking our approach and move towards more regenerative design principles based on a model of Doughnut economics and the circular economy
- We need to design low energy buildings, both embodied and in use and go further to be energy positive
- Buildings need to be loose fit, flexible and adaptable to changing needs and uses
- We need to design for long life, with durable, low embodied carbon, renewable materials with building services components that are easy to maintain and replace
- We should be designing with disassembly in mind and build out of reused and recycled materials so that we generate less waste, based on cradle to cradle principles
- We need to share knowledge and research on an open source basis and get much better at post occupancy
- We also need to crack the most difficult challenge of all – the decarbonisation and upgrading our of existing housing stock

I am on the steering group of the *Architects Declares* movement. Having morphed into *Construction Declares* to include all of the construction community, we now have 1500 practices around the world who have signed up and it's growing daily. The movement sets out 11 commitments of positive action and in November we are gathering to discuss collectively – 'what next'. It is a grassroots, decentralised network where every signatory has committed to push ahead with their clients, co-professionals and supply chains.

This is where it gets political, because we need government commitment to higher building standards, a fabric first approach, phasing out fossil fuels completely. The government should remove VAT on refurbishment – VAT was even recently added to solar power while tripling subsidies on fossil fuels! The

2. The Walter Segal method building at Coin Street Building has now been recycled for a new community use in South London as the Oasis Play Building in Stockwell.
© Ben Marks

[1] The Anthropocene Equation, Owen Gaffney, Will Steffen. First Published February 10, 2017

[2] "Why Civil Resistance Works, The Strategic Logic of Nonviolent Conflict", Erica Chenoweth and Maria J. Stephan – https://www.ericachenoweth.com/research/wcrw

blocking of on-shore wind should end, fracking should cease and obviously airport expansion stopped. The IPCC report estimates achieving zero carbon by 2050 will cost 1.5/2% GDP – that seems to me to be a small price to pay for the future of life on earth. We need to embrace the thinking of Kate Raworth with her Doughnut economic model – she is rethinking economics and questioning the idea of constant growth on a finite planet. In short – we need to turbo charge our response to this existential threat. Act like our house is on fire.

This where it gets personal. I was on Lambeth bridge on 18th November last year for Extinction Rebellion (XR)'s first mass event – closing 5 bridges. It was three days after the birth of my first grandchild. Such momentous events focus the mind. She will be 32 in 2050. It seemed to me the most rational thing to do in the light of government inaction and apathy.

We all need to see the world through a lens of the climate/ environmental crisis. It should guide all our choices: what we eat, how we travel, how we shop – whether we stand up and speak out….

It's not about having less of what we want but rather having more of what we need.

Some interesting exemplars are:

- Powerhouse Kjorbo project in Sandvika by Snohetta, or innovative projects like the 2226 by Baumschlager Eberle
- OASIS Play building in Stockwell, by Benjamin Barfield Marks and Matt Atkins. A Walter Segal method building, disassembled from the South Bank and reconfigured in Stockwell for a children's charity. Is this is the most sustainable building in London?
- Nest research building by Werner Sobek with Rotordc in Brussels

Julia Barfield is an architect and director of Marks Barfield Architects. Barfield created the London Eye together with partner David Marks. She is chair of this year's Stirling Prize (see page 62) and is on the steering group of Construction Declares: http://www.constructiondeclares.com

Hattie Hartman

Landscape architecture is a profession of the future. I was both surprised and heartened to learn recently that – despite Brexit – current demand for landscape graduates outstrips supply and recent graduates are being snapped up in the job market.

The challenge has never been more profound. The interdisciplinary and collaborative nature of landscape design means that you are ideally placed to tackle the climate emergency holistically and make our cities and landscapes fit for the future.

Direct action by Extinction Rebellion and others has heightened awareness. Now we need exemplar projects, scalable solutions and policy change.

The delicate and imprecise boundary between architecture and landscape architecture is a fertile area for addressing the critical lack of guidance on how to climate-proof our cities. This means intervening as early as possible in a project cycle and making your voice heard on individual projects, in masterplanning and at the policy level.

At the project level, landscape practitioners must support architects in looking beyond a client's brief and beyond the site's perimeter. Ecology and other environmental impacts do not begin and end at a site's boundary. Landscape architects have a decisive role to play in ensuring that the entire team is well-versed on fundamental ecological issues such as biodiversity corridors, prevailing winds, handling of surface water and flooding, solar access and radiation.

You must dare architects to think beyond the building envelope and carefully consider buildings not as stand alone objects, but as part of the public realm. And finally, in your own specifications, rigorously assess your choices of materials and planting for their appropriateness to a particular context and for their embodied carbon.

The defining role of landscape urbanism in master planning is

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increasingly recognised, but it is gaining ground much too slowly. A clear grasp of environmental issues can elucidate a site's potential and provide the rationale for a design approach. Inherited landscape character, together with a site's natural systems and how they relate to the larger ecosystem beyond a site's boundary, should inform every master plan, just as architects' in-depth understanding of building typologies should underpin plot dimensions. This requires meaningful collaboration and working across professional silos.

Collaborative work both at project and masterplanning level can help unlock the seriously understudied area of urban climate form and address the glaring gap in planning guidance in this area. In the City of London, in Nine Elms south of the Thames and elsewhere, disjointed development has resulted in egregious examples of overshadowing and poor quality public realm. Lack of guidance means that urban transformation is currently developer-led often with total disregard to climate issues.

Building on the momentum of new policies such the Draft London Plan's urban greening factor and DEFRA's biodiversity net gain, both of which

3. Extinction Rebellion poster.
© Paul Lincoln

The delicate and imprecise boundary between architecture and landscape architecture is a fertile area for addressing the critical lack of guidance on how to climate-proof our cities.

draw heavily on landscape expertise, the moment is ripe for landscape professionals to proactively seize the initiative and help shape the emerging conversation about urban climate 'rules' and guidelines. An overhaul of planning guidance and increased enforcement in this area is both essential and urgent and landscape architects are poised to lead the way.

Hattie Hartman is the sustainability editor of the Architects Journal.

Louise Wyman

Question: 'What should built and natural environment practitioners do next to tackle climate change?'

Collaborate – the time is now!

On the eve of 2020 the environmental design, planning and construction sector is central to our country's future development. Yet how do we responsibly build the UK's future at a moment of global climate emergency?

We urgently need to modernise our national infrastructure; address our housing crisis and create future spaces for education, culture, business, healthcare, sport and recreation. Collectively we need to design inventive solutions to the climate challenges we all face. Professions that best understand the built and natural environment are best placed to respond creatively to our climate emergency, but the clock is ticking – the time is now!

Collaboration between landscape architects, environmental scientists, ecologists, engineers, urban designers, surveyors, developers, planners and architects nationally and internationally, is more important than ever to design and develop new ways of responding systemically and progressively to climate change.

In my role as Design Lead for West Midlands Combined Authority I work with our many partner organisations, regional experts and Mayor Andy Street's office to understand and quantify the scale of our regional climate challenge. We consult closely with the scientific community, young climate change protestors, local experts, academics and environmental practitioners. This led us to declare a regional Climate Emergency in summer 2019 and commit to becoming carbon neutral by 2041 at the latest. In September we committed to ditching the use of single use plastics across our organisation by the end of 2020.

Future initiatives we'll develop in collaboration with environmental partners include:

1. Designing nature into our towns cities. The West Midlands has an ambition to become a National Park City. We're working with the Landscape Architecture department at Birmingham University, NHS England, Sport England, Natural England and regional partners to diversity and enrich our regions' ecology. Alongside providing new spaces for wildlife, sport and recreation, we see new urban parks, footpaths and bike trails as central to the wellbeing of our diverse communities. We're proud to be hosting the Commonwealth Games in Birmingham in 2022.
2. Becoming a centre of excellence for modular construction. The West Midlands has the fastest growing GDP outside London. Birmingham has more start-up businesses than any other UK city. Construction is a core industry, as we build our future we plan to do so in a responsible way, using modular construction, renewable materials and energy to minimise construction waste. We welcome businesses and creative industries that share this ambition and want sustainable modular construction to thrive in our geography.
3. Providing excellent public transport to minimise car traffic. Transport West Midlands is central to WMCA's activity and is providing our region with new rail stations, fuel efficient trains, trams, clean buses, cycle paths and canal trails. New world class public transport systems, offer an efficient and enjoyable alternative to car use.

In November 2019 Andy Street will launch the West Midlands Design Charter. This will set the high level principles for our region's development and our ambitions for sustainable service provision.

We invite all practitioners who share our mission of responsible inclusive growth to bring your ideas and businesses to the West Midlands, we'd love to hear from you.

Louise Wyman is design and growth lead at West Midlands Combined Authority.

4. Testing is underway on the new tram extension outside Birmingham Town Hall.
© Midland Metro Alliance

#designthenation

southgate, bath

Woodscape had the pleasure of working with Macgregor Smith Landscape Architects, who headed up an incredible public realm enhancement project in the centre of Bath.

Movable planter seats allow reworking of the area for the various events. A circular seat design with offset tree void used a combination of Woodscape engineered timber slats and intricate bronze fretwork from Inspired Metal.

Large circular tree seats were produced for Brunel Square, utilising a bronze finish skirt to tie into the existing Bath design aesthetic, providing considerable seating space for an area with high pedestrian traffic.

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Woodscape.

The Humanitarian Landscape Collective brings together landscape practitioners and students. Five members of the Collective have outlined their approach to tackling climate emergency.

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1. Kakuma Refugee Camp, Kenya.

Climate change, mass displacement and unsustainable urbanisation are critically affecting those living in the world's most vulnerable places – the least well-equipped to overcome these challenges. A group of landscape practitioners and students has started the Humanitarian Landscape Collective [HLC] guided by the philosophy that the landscape profession has a professional and moral duty to help. HLC is a research initiative whose aim is to increase the presence of landscape architecture in the third sector.

The group's objectives are:
- ensuring that landscape architecture principles are used in improving the quality of life for the world's vulnerable
- educating ourselves and others on landscape architecture's value in addressing global challenges

The group is doing this in three ways:
- connecting with the humanitarian community
- transferring knowledge between this community and the landscape profession
- focusing on the research question "how can we support vulnerable communities in developing resilience to natural disasters?"

The group runs workshops and open dialogue with NGOs, humanitarian forums and fellow designers working with the world's most vulnerable people.

To find out more about the organisation contact Rhys Jones: rhysjones.la@gmail.com

Oana Baloi

Refugee crises whether caused by war or climate change demand a landscape-led approach

With increased frequency of events causing displacement and migration, the landscape architects' strengths in linking humanitarian practice with the climate response commitments of host countries demand the ability to read the land and understand the public realm dynamics. Essential to this is the capacity to incorporate nature-based solutions in the spatial development of climate resilient settlements whether temporary or permanent.

Some refugee camps are over 25 years old. They are places which need to provide safety and resilience for already vulnerable people. They need to avoid disrupting the capability of people to learn and perform livelihood activities and to avoid creating conflict over resources such as wood and water. In Uganda, the resources allocated by the government to Koboko, a small town neighbouring a refugee camp, do not match the population, because refugees leave the camp for town during the day. In response to this, inclusive and participatory public space projects have been undertaken by teams including landscape architects, designed to tackle the conflicts between host community and refugees, promoting peaceful coexistence.

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The outbreak of violence in the Democratic Republic of the Congo in 2017 led to 1.4 million people becoming internally displaced and over 31,000 refugees fleeing to northern Angola. The initial site selected for the new refugee camp was in a flood risk zone and was later moved to safer ground. In this instance, the team should have included a landscape architect in the very first stage of humanitarian response, to support the climate resilient planning of any new settlement and, if needed, to influence the site allocation to areas that were not risk prone without having to relocate the site.

Although humanitarian assistance is incrementally expanding the support to host communities, the typical spatial arrangement is based on a standard camp layout. A spatial redevelopment plan is also needed after a camp closure, which often implies a change of land use and environmental recovery. The trend in humanitarian assistance is to collaborate closer with local authorities in ensuring that they leave a legacy relevant to local development. This might include infrastructure such as roads, drainage, electricity and water supply systems and general structures such as education and health facilities. In Kalobeyei, a new settlement for refugees and host communities located in the dry lands of northern Kenya, the spatial plan rigorously followed both the humanitarian principles and the national planning policies, aiming at a resilient settlement managed by the host community after the return of the refugees to their home countries. The landscape architects worked to enable durable solutions in the camp setting, such as mapping of the seasonal streams in public space, to prevent the negative impact of flash floods; showcasing how water dams and community gardens with underground rainwater harvesting structures help the drought response. In some cases, the road infrastructure was modified from the initial plan in order to prevent unnecessary deforestation of the already scarce tree cover.

Landscape architecture's contribution to the development and humanitarian sector needs more documentation and outreach, while the sectors need more landscape architecture skills to ensure safe, climate responsive and low emission cities and settlements of all sizes, for all.

Oana Baloi is a landscape architect working in East Africa with UN-Habitat.

Joana Ferro

How the United Nations Sustainable Development Goals should govern our work

Are we living beyond the limits of our planet? Growing social, political, economic and environmental concerns over the misuse of our natural resources and the way we live, mean that the effects of climate change are becoming increasingly damaging. As professionals, communities, decision makers, right down to ourselves as individuals, we all have a role a role to play in making sustainable development our new 'business as usual'. By reinstating our connection to nature, actively changing our behaviour and taking action, we can prevent ourselves from 'sleep-walking into a catastrophe', as Arup's London Infrastructure Lead, Tim Chapman has put it.

Any solution must be credible and that means measurement, governance and monitoring. *Agenda 2030*, adopted by the United Nations member states in 2015, is a global policy which aims to address these issues. Its 17 Sustainable Development Goals (SDGS) are the first-time world leaders collectively pledged to act on

2. Host community consultation, Kalobeyei, Kenya.
© Oana Baloi

1·4 MILLION

PEOPLE INTERNALLY DISPLACED

[1] Thomson, S. (2015). *What are the Sustainable Development Goals?* [online] World Economic Forum. Available at: https://www.weforum.org/agenda/2015/09/what-are-the-sustainable-development-goals/ [Accessed 3 Oct. 2019].

a common universal policy agenda which emerged from the largest consultation exercise ever conducted, involving 5 million people globally[1]. Implementation of such a broad and diverse agenda poses challenges for policy and practice at national, regional and local levels across all sectors of society, but we can only meet the needs of our society without breaching the earth's ecological boundaries if a paradigm shift in our behaviour occurs.

So, what role can landscape architects play? There has never been a better time to highlight the role of landscape architecture in boosting resilience to the effects of climate change. So called nature-based solutions (NBS) can harness nature's capacity to offer a crucial response to climate change and provide sustainable development at the scale that is needed. The use of sustainability tools, embracing digital data and technology as a means of measuring improvements, considering the whole-life cost of materials and increasing biodiversity in our schemes to offset our carbon emissions are a few ways we can show tangible evidence-based benefits in our projects.

Landscape architects are perfectly placed to bring disciplines together to stimulate action for humanity and the planet. By adopting a new design ethos, based on human-centred principles and a systems-based approach, we can reverse climate change, increase biodiversity and carbon sequestration[2]. But fundamentally, we need to move beyond a checklist or 'compliance' approach to sustainability and make determined, sustained, long-term application of the SDGs in the world we live, to create the world we want.

We have only a decade to make a difference. That's why I encourage everyone in our industry to use the SDGs as a lens through which to challenge, frame, refine and expand the impact of your work, influencing projects at every stage, from idea generation through to implementation.

The real challenge is to put these 17 goals, objectives, a furthermore 169 targets and another 230 indicators, into practice. It is overwhelming, but as professionals we naturally already make a salient contribution towards a number of goals in our everyday work. We need to, however, avoid the limitations of a monofocal approach to sustainability. By focusing on SDG 11 and SDG 13 though to 15, which include sustainable cities and communities, climate action, life below water and life on land respectively, we could contribute towards restoring and regenerating the foundations of life on our planet, the biosphere.[3]

We are likely to be the last generation that can avoid a potentially unstoppable and irreversible climate disruption and we probably only have 11 years to do it. Let's work together to apply the SDGs to see what a better world looks like in 2030.

Joana Ferro is an urban designer in the landscape team at Arup.

[2] Naumann, Sandra, Gerardo Anzaldua, Pam Berry, Sarah Burch, McKenna Davis, Ana Frelih-Larsen, Holger Gerdes and Michele Sanders (2011): Assessment of the potential of ecosystem-based approaches to climate change adaptation and mitigation in Europe. Final report to the European Commission, DG Environment, Contract no. 070307/2010/580412/SER/B2, Ecologic institute and Environmental Change Institute, Oxford University Centre for the Environment

[3] Sharma, B. (2017). *Saving the Biosphere:* The case for biosphere reserves in Nepal | MAHB. [online] MAHB. Available at: https://mahb.stanford.edu/blog/saving-biosphere-nepal/ [Accessed 26 Sep. 2019].

Olivia Dunham

SMART tools and sustainable goals

As local authorities continue to declare climate emergencies, the difficult question of how to implement transformative climate action is beginning to be answered, albeit at a slow pace. It is becoming clear that a crucial element is planners and landscape practitioners working together when planning any type of development. Additionally, ensuring that the landscape, environment and communities are at the core of each project is essential to creating transformative climate action.

To accomplish each of these elements, the UN Sustainable Development Goals (SDGs) provide a much-needed framework to advance the transition towards integrated spatial planning that plans for a more sustainable and resilient future. Each of the SDGs' topics interconnects, including, but not limited to, health and well-being, the environment, proper land management, climate action and social justice. As such, the SDGs emphasise how an integrated approach to these issues is essential to protecting the environment and combating the climate crisis through a social impact lens. Planners and landscape practitioners have the expertise and ability to influence the private and public sectors, to utilise nature-based solutions which can play a significant role in building resilience to the climate crisis through the rehabilitation and expansion of natural ecosystems, as well as improve the health and wellbeing of society. Creating a network of climate change champions across all departments and sectors, focusing minds and building links that deliver change is key to creating long term, lasting and effective change.

The building density of our towns and cities is likely to continue to increase as governments resolve to address the housing crisis while simultaneously protecting the open countryside. The greater the density of our towns and cities, the greater the urban heat island effect and the greater the need for accessible open green spaces. Therefore, it is becoming more and more urgent for all stakeholders, including planners and landscape professionals, to work together to create a cohesive, just, inclusive and climate resilient society through an integrated framework such as the SDGs. Ecovillages are a great example of how planners and landscape practitioners can work together to create cohesive and consciously designed communities that regenerate social and natural environments. Based on the principles of sustainable development from energy to food production to the construction of homes, ecovillages put residents and the environment at the centre of the designing, constructing and maintaining processes.

Adopting climate change policy that is Specific, Measurable, Attainable, Realistic and Timely (SMART), to build robust and lasting climate change resilience into all levels of government and society, is vital. SMART policy has the potential to incorporate initiatives, such as area-based Green Infrastructure Audits that are designed to map, analyse and identify opportunities for improving existing and creating new green infrastructure. One approach to creating such infrastructure should be through the connection of existing pocket parks to larger parks through green routes, especially in urban areas. Designing strategic green infrastructure networks are a great example of how planners and landscape professionals can work together to create multifunctional natural and semi-natural spaces and places designed and managed to deliver a wide range of ecosystem services, such as water purification, improving air quality, space for recreation and climate mitigation and adaptation.

Olivia Dunham is a Consultant Environmental Planner at LUC.

Rhys Jones

Adapting Cities to Sea Level Rise

The effects of climate change have turned water into a threat for many cities around the world. By 2050, it's predicted that 800 million urban dwellers will be at risk from a sea level rise of 0.5m, impacting 570 cities across the globe[1]. This is already a reality for the people of the sinking city of Jakarta[1] and the village of Fairbourne, Wales, which will be abandoned to the incoming sea[2]. They are the start of massive displacement of people due to climate change – we are struggling to deal with the displacement of 71 million people, how will it cope with hundreds of millions more?

To avoid such a catastrophe, cities must become more resilient to sea level rise and landscape architects must stand with built environment professions in taking a pivotal role. The challenge is that the nature of water in the city is a complicated system, with the entire population having a stake in its use and demand whilst impacting on ecology and the watershed beyond the city boundary. We are also living in a time of rapid urbanisation colliding with the destruction of habitat and mass extinction[3], this means that all built environment professionals must marry the needs of nature and humanity. This is inherent to landscape architects and our holistic, systems-thinking approach makes us ideally suited to dealing with such a complicated challenge.

Looking at the wider picture, there must be a concerted effort by the wider built environment community to adapt cities to sea level rise and we must do so by engaging at 3 levels:

- influencing policy and planning
- the design and implementation of built solutions
- building capacity and upskilling at the community level

These were some of the conclusions of the Building Water

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[1] C40 Cities, 'Staying Afloat: The Urban Response to Sea Level Rise'. Available at: https://www.c40.org/other/the-future-we-don-t-want-staying-afloat-the-urban-response-to-sea-level-rise

[2] Tom Wall (2019) '"This is a wake-up call": the villagers who could be Britain's first climate refugees'. The Guardian, 18th May. Available at: https://www.theguardian.com/environment/2019/may/18/this-is-a-wake-up-call-the-villagers-who-could-be-britains-first-climate-refugees

[3] Greg Miller (2017) 'An 'Atlas for the End of the World''. National Geographic, 26th June. Available at: https://www.nationalgeographic.com/news/2017/06/maps-graphics-urbanization-biodiversity-atlas/

Resilient Cities workshop, which the Humanitarian Landscape Collective ran in collaboration with The Young Urbanists and engineers from Buro Happold and Ramboll. We agreed that this engagement must be undertaken by advocating our skills and ensuring that any influences at governmental level can be interpreted at community level.

In the design and implementation of built solutions, a holistic approach must be taken which includes an acknowledgement of the impacts, specifically this can include:

- mimicking the natural framework
- designing adaptable and connected infrastructure
- accounting for impacts on the social environment

A case study of these in practice is the Socially Inclusive Climate Adaptation for Urban Revitalisation Project in Jakarta, which aimed to relocate 400,000 people from informal settlements that sit on riverbanks and reservoirs that were at risk of flooding. These evacuated areas were turned into green spaces which buffer from floods, whilst providing numerous other benefits. This was achieved by participating with the community and agreed employment and housing certainty[4].

What is this is if not textbook landscape architecture? Such tasks are at the heart of our work and training and it's time that we applied our skills to where they belong by tackling the climate crisis. To turn these ambitions into action, we recommend starting with the outcomes of the workshop:

- we need to feed up-to-date data on sea level rise to the relevant people, informing sustainable development?
- we must create a dialogue between government, the built environment, and affected communities?
- we as the built environment community must lobby government for change in its approach to developing water resilience.

On behalf of the 800 million who will be affected by sea level change, I call on the profession to take them forward.

Rhys Jones is a landscape architect at LUC and founder of the Humanitarian Landscape Collective.

[4] C40 Cities (2016) 'C40 Good Practice Guides: Jakarta – Social Inclusive Climate Adaptation for Urban Revitilization Project'. 15th February, C40 Cities. Available at: https://www.c40.org/case_studies/c40-good-practice-guides-jakarta-socially-inclusive-climate-adaptation-for-urban-revitalization-project

Mena Shah

University students are leading the way in tackling climate crisis

Studying landscape architecture at university is one of the most opportune ways to be actively responding to the climate crisis, where resources and potential for collaboration are abundant. Landscape architects are both strategic thinkers and visionaries as well as detailed designers. Their work not only involves working with materials in outdoor spaces but also engaging with people, collaborating and forming good relationships. However, it is well known that large institutions can be cumbersome and that bureaucracy may stifle the potential of universities to act and respond with the speed and pace that the contemporary situation demands. There needs to be a radical change in education and perhaps some breaking of the rules with a little harmless guerrilla gardening.

Callum Egan, a designer, researcher and lecturer at Edinburgh Napier University's Centre for Interaction Design, has been trying to break boundaries by challenging the status quo in response to the immediacy of climate change. He wanted to see meaningful action result from the suggestions of sustainable practice at the University. The Lions' Gate is a small multifunctional garden based on permaculture design principles, giving life to a dead space at the back of the Napier building. He began plans in 2016 and it is now thriving with herbs and vegetables ready for the autumn harvest. Students from different disciplines have been directly involved in the whole process, creating a harmonious collective endeavour which draws on cutting edge research and technology.

Egan seized the opportunity by making use of the resources available at University, notably the energy and drive of young people, whose diverse approaches and idealism made for a richer and collaborative project. He sees permaculture as a radical perspective and his challenge – having one foot in the academic world and one foot out in a more 'alternative' future making – is how to make the radical mainstream. However, this leads to question, shouldn't radical and speculative thinking be at the heart of meaningful mainstream research?

Edinburgh School of Architecture and Landscape Architecture (ESALA), is also taking steps to reform education practices. Staff and students have come together to take action in response to the 'Architecture Declares' letter that all architecture schools across the UK received earlier this year. ESALA have curated a series of lectures and discussions that will begin from 25th September 2019, to reassess their current design practices, pedagogies and values; acknowledging the climate breakdown as a socio ecological crisis and the great responsibility they have as educators.

The breakdown is now. The climate crisis needs to be at the forefront of everything. Landscape architects need to take a more radical initiative when working collaboratively with other disciplines. We need to form stronger relationships with schools, environmental organisations and governing bodies – and why not begin by taking action in our universities? As the new generations of landscape architects, we need to be bolder and to critically question our designed landscapes in response to the climate emergency. We need to aim for resilient landscape frameworks and optimising socio ecological balance for a sustainable future.

Mena Shah is a landscape architecture student at the University of Edinburgh

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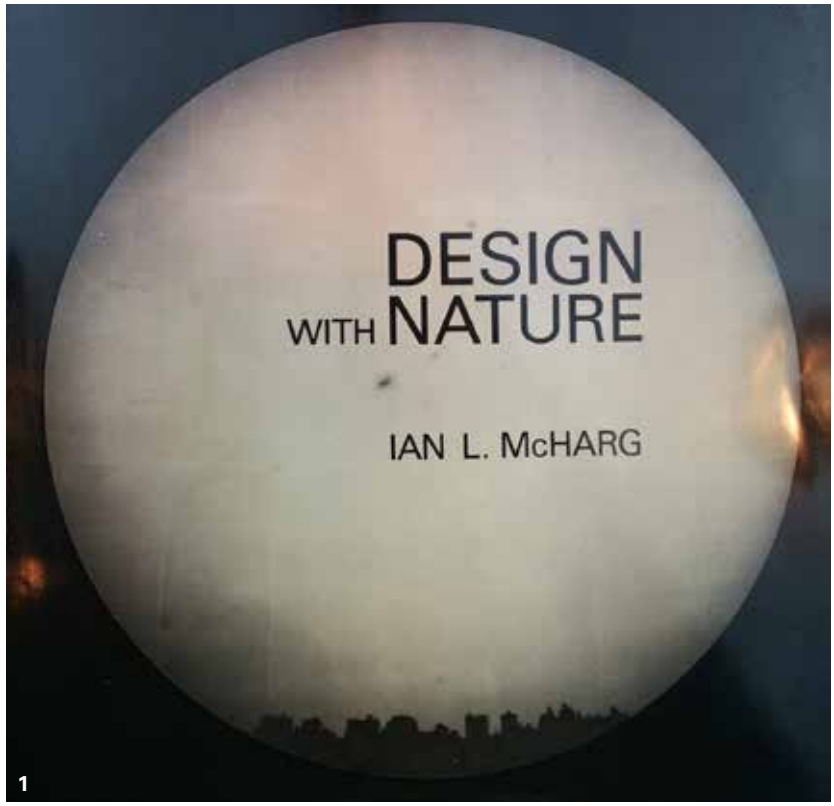
FEATURE

By Amber Roberts

Design with Nature

Ian McHarg's work, celebrated with an exhibition in Edinburgh, should be at the heart of our debates on climate emergency, argues Amber Roberts

This year marks the 50th anniversary of Ian McHarg's seminal text Design With Nature. The book profoundly influenced landscape architecture as a profession by focusing the minds of designers on the degradation of the environment and by providing a constructive way of transforming diverse regions and landscapes. During the current renewed call for climate action, many aspects of McHarg's original message are still relevant today and he continues to inspire and influence landscape architects around the world five decades since the first publication of the book.



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Man and environment

Design With Nature was the result of McHarg's personal experiences in the inter war and post war period in the UK and America. Born in Scotland in 1920 McHarg was keenly aware of the detrimental effect that humans were having on the environment; his experiences of the Clydebank shipbuilding industry in his childhood; the early twentieth century slums of Glasgow and the horrors of the second world war all contributed to his perception of the imbalanced relationship between what he termed 'man and environment'. Seeking a way to make positive change McHarg enrolled at Harvard University to study both landscape architecture and city planning, however, on his return to Scotland he felt thwarted by the lack of ambition for serious change in the UK. A role to reestablish the Landscape Architecture Department at the University of Pennsylvania, America under his mentor Dean G. Holmes Perkins in 1954, offered McHarg the opportunity to explore and develop solutions to the ills of the twentieth century. In this role McHarg was able to test his ideas with new groups of students each year, quickly developing and refining his approach and ethos.

By 1959, McHarg had designed 'Man and Environment' an atelier course for Masters students that set the basis of his ideas for Design With Nature. The 'Man and Environment' atelier provided a pragmatic approach to landscape design, with a defined method of survey and analysis. It also introduced students to a new expanded scale of landscape architecture and intended to shift their values from aesthetic design towards an environmental consciousness. This shift in values from visual judgement towards an ecological sensitivity is fundamental to McHarg's message in Design With Nature and is argued through his critique of dominant cultural approaches towards natural resources that have predominated throughout Western history. McHarg believed landscape architects are uniquely placed within the professions to provide solutions that improve environmental conditions while maintaining the qualities of life to which we have become accustomed, with access to food, leisure, jobs, homes and transport. He argued '... if one accepts the simple proposition that nature is the arena of life and that a modicum of knowledge of her processes is indispensable for survival and rather more for existence, health and delight, it is amazing how

1. Design With Nature front cover. Design With Nature introduced a new approach to landscape architecture with a heightened environmental consciousness and an easy to read writing style, the book took the design world by storm and continues to be required reading on all landscape architecture courses today.

2. McHarg invited a whole host of visiting critics to contribute to the course at the University of Pennsylvania in order to educate his students in the allied professions. Critics included Karl Linn, John M. Fogg, Aldo Van Eyck, Gordon Cullen and Ian Nairn. Students graduated with a fundamental understanding of a vast range of landscape issues and ideas. Left to right: Karl Linn, Fred Towers, Bob Carson, Bill Roberts, Ian McHarg, John Whalley.

many apparently difficult problems present ready resolution' (1967). McHarg strongly felt that while other professions focus on the needs of either human or environmental concerns, in comparison, landscape architects provide innovative ways in which the two aspects of 'man and environment' can flourish together. As such, he positioned the profession as being able to balance the needs and requirements of both human and environmental aspects and by publishing Design With Nature McHarg was able to advocate not only to his students in Philadelphia, but also to wider practitioners and allied disciplines across the world.

Synthesis of science, art and technology

In this effort to better integrate human processes within the environment McHarg championed a new level of interdisciplinary working. The 'Man and Environment' syllabus introduced McHarg's students to a wide array of professions by bringing together a range of expert critics.

The students were given lectures by specialists in fields as diverse as botany, psychology, architecture, environmental law, religion, ethics and particle physics, resulting in the graduates developing a wide-ranging and flexible understanding of the complexities of landscape. In the years prior to the publication of Design with Nature, McHarg collected articles and newspaper clippings on subjects that were beyond the traditional realms of landscape architecture: concerning himself with topics such as mental health in urban areas, early pesticide concerns and lung problems associated with air pollution, all of which continue to be important issues today. Leading by example, McHarg increased the breadth of information that was relevant to the profession. As his sources and interests varied widely to absorb a vast range of subjects, he used information from the sciences, arts and technology for the subject matter of Design With Nature.

By exploring how to undertake the collection of vast sets of data regarding the landscape, McHarg also needed to develop a way in which to understand and analyse this information. In the chapter 'Processes as Values', McHarg illustrates the 'layer cake' method of synthesising complex data sets of large-scale landscapes by layering maps of soils, climate, hydrology, plant associations, land productivity, mineral resources etc in order to assess the suitability of various land uses. The breakdown of the site into manageable chunks of information was then layered together to highlight contradictory aspects and areas of opportunity to build up a catalogue of 'suitable' functions for particular landscapes. This led to a greater emphasis on information collection and data synthesis that predated GIS and significantly contributed to its development. McHarg's method of survey and analysis created a significant role for landscape architects in reversing the effects of urbanisation and industrialisation, highlighting our capabilities of synthesising complex information about the landscape.

Shift in scale

Fundamental to the shift in focus for the profession towards an amalgamation of science, technology and art was, in turn, a vastly increased scale of projects. Throughout the early twentieth century the remit of landscape architects was widening from parklands and country estates towards infrastructural and large scale designs, McHarg pushed this further to encompass whole regions and nations introducing a new scale of analysis to the profession. Building on the ideas of those before him and in particular the ideas of fellow Scotsman Patrick Geddes, McHarg analysed landscapes at a national scale, merging together his understanding of both landscape architecture and city planning. For

3. McHarg was raised in Clydebank, Scotland, close to the enormous industrial docks of John Brown's Shipyard. The experience of witnessing the environmental degradation of the river influenced McHarg's later conceptions regarding the imbalanced relationship between humans and their environment. 1931, John Brown's Shipyard, Clydebank, Queen Mary under construction.

© Source: Britain from Above online archive, image reference SPW035741

4. The enduring relevance of McHarg's newspaper clippings collected throughout 1955–1969 illustrate the breadth of his interests and a new expanded realm of influence for the profession of landscape architecture.

© Source: University of Pennsylvania Architectural Archives, Image reference: 109.II.E.3.17

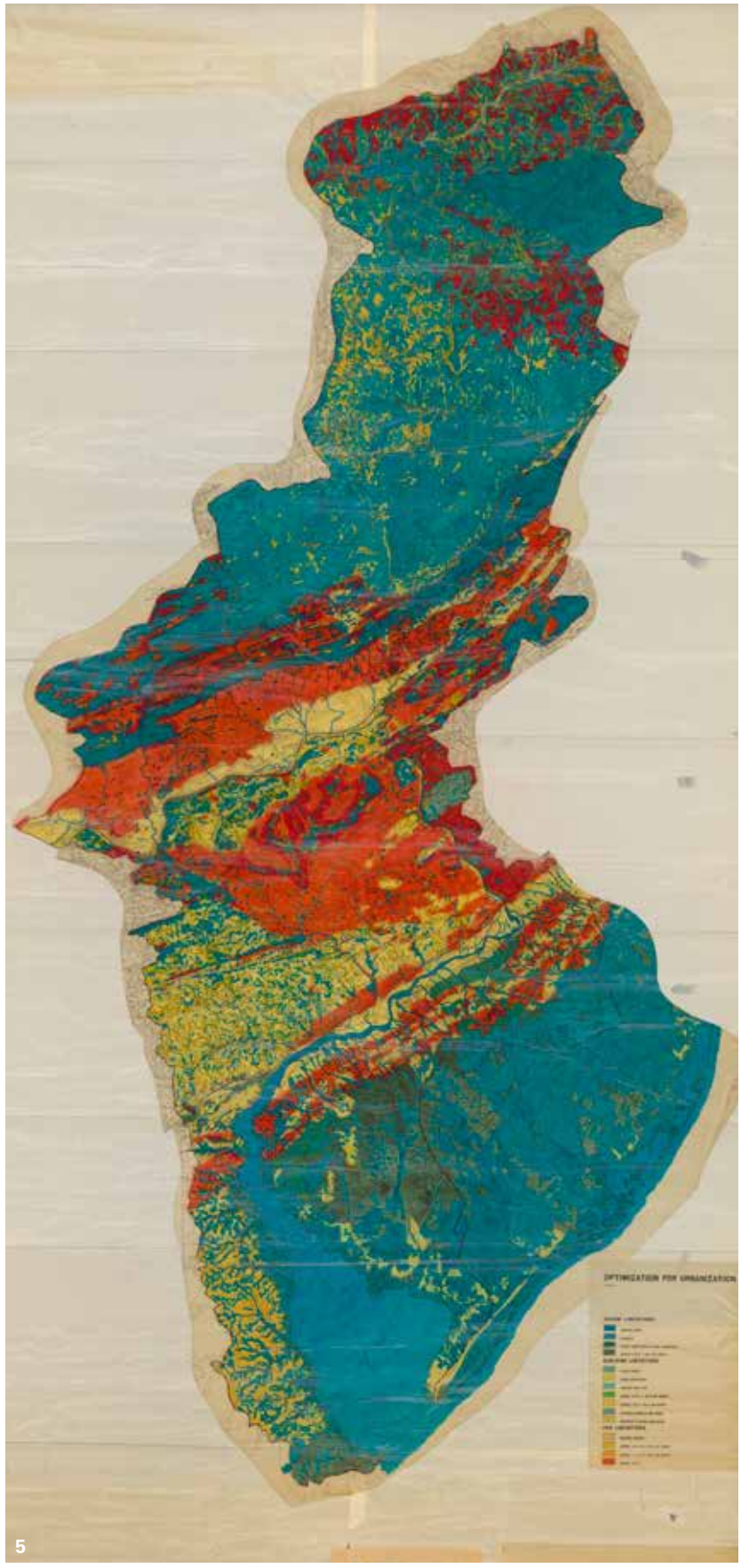
5. McHarg's students were required to produce large scale maps of whole countries in order to better understand the context within which their projects were situated.

© Source: University of Pennsylvania Architectural Archive, image reference 109.V.A.1.b.1

his early students, many of them new to landscape architecture having largely studied as architects for their undergraduate degrees in the years 1955–1965, McHarg reinforced the layer cake method as a way to break down the complexity of large sites and to understand them in stages. He encouraged his students to work in groups to study individual aspects of the site in greater depth and the results would then be integrated with the rest of the class, creating both a breadth and depth of information for a large scale landscape. The students worked on various projects from the Delaware River Basin, the Wissahickon Watershed and the Potomac River Basin and this expanded scale of design was fundamental to McHarg's writing in Design With Nature. His rigorous teaching of this shift in scale created competent and confident designers. Upon graduation from McHarg's first MA course in 1957 David Skinner undertook 'The Coast of Scotland' survey of approximately 6300 miles of coastline for the Scottish Development Department in order to create planning guidelines and conservation zones prior to North Sea Oil and Gas developments, while others such as Mark Turnbull (a 1968 graduate) went on to develop the beginnings of LVIA with the analysis of the Harris SuperQuarry in the Outer Hebrides. For the wider profession, Design With Nature impassioned designers to explore larger and larger scales of landscape.

Informed and relatable language

The book can also be celebrated for McHarg's creation of a new style of language for landscape architects: the environmental sensibility, eloquence and relatable nature of his writing was critical to the success of the book both within the profession and with a wider general audience. McHarg explained that the root of his conclusions stemmed from both unique life experiences and rigorous research, yet at the same time they related to a wider human experience: he argued 'these experiences are personal but far from unique' 1969:5. His ability to take his own personal experience



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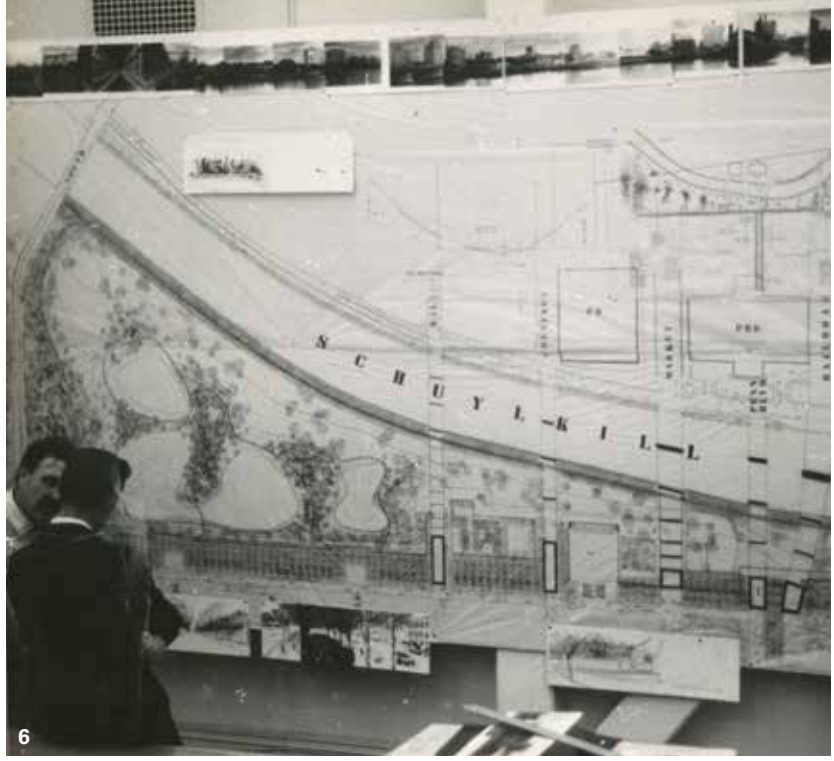
and motivation and make it directly relatable to the majority of readers was key to the success of the book. While his earlier articles exemplify McHarg's growing concern for the environment, published in journals such as the Architectural Review and written for a professional audience, they lack the personable style with which he was able to express his ideas in Design With Nature. Further to this, McHarg had a great enthusiasm and inexhaustible motivation to improve the environment that we live in and this is abundantly clear in Design With Nature. The book appealed to large audiences as a result of the fundamentally positive message of enthusiasm and hope for the future. The enthusiasm with which McHarg wrote about his concern for the landscape and the solutions for the future was infectious. Design With Nature presented a way in which we as designers can help to improve the world.

Continued influence

In today's fight against climate change we continue to balance the two aspects of 'human' and 'natural' systems by integrating and developing solutions that seek a greater balance of the man-made systems with wider environmental processes. In the case of cities and agricultural production, for example, through SuDs and agroforestry projects. The layering and synthesis of complex information is now fundamental to our profession and could play a significant role in our contribution to climate action. Understanding of multifaceted landscape data allows us to define suitable uses for different landscapes, enabling us to define floodplains, areas of high productive capacity, potential carbon sinks, areas more suited to residential and industrial uses. In doing so we are able to mitigate climate disasters and to offset aggravating factors. This aspect of the profession has begun to expand further in recent years, transferring our skills of data analysis to help us better measure the value that our landscape designs create, strengthening how we advocate the benefits of landscape design.



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6. 1957 University of Pennsylvania students standing alongside a design project for the Schulykill Waterfront, Philadelphia the project encouraged McHarg to introduce larger and larger scales of project to his new students.

The profession is currently developing more ways in which to measure the post completion development of our designs and to define the carbon footprint of our projects, allowing us to make more sustainable design choices. Furthering these skills is another way that we can extend our contribution to the fight against climate change. In addition, Design With Nature has helped us as a profession to analyse our sites to understand the wider environmental and human processes that influence our projects. This in turn allows us to understand the interconnections between global and local forces. As the size and scale of our projects continues to grow ever larger, this aspect of McHarg's writing maintains great contemporary relevance. The shift in scale and focus towards ecological systems and processes creates an expansive view of each project. Situating our sites into a broader context of environmental systems allows us to design solutions that can harness and support natural processes. The eloquence and ambition of McHarg's message, however, is much more difficult to replicate, while the method he presented showed us how to understand the landscape step by step, we can now aspire to developing a clear and relatable language surrounding our role in climate action that harnesses a positive message of pragmatic strategies and hope for the future.

Conclusion

McHarg's concern for the environment has palpable parallels with the issues that dominate both our professional lives and the crises facing the world today. While our understanding of the systems and processes that contribute to climate change may have become more sophisticated, our ability to implement the scale of change required has not yet been realised. McHarg provided us with a method, a scale of approach, a shift in values and a new language with which to advocate environmental improvement all of which continue to underpin the profession in its current form.

Dr Amber Roberts is a landscape architect whose work brings together research and practice: she is keenly interested in design that responds to contemporary issues of the built environment from climate change to ageing populations. Her research on Ian McHarg has been funded by the Dumbarton Oaks at Harvard University; the École Nationale Supérieure de Paysage and the Paul Mellon Centre.

The exhibition on Ian McHarg took place at Edinburgh College of Art Sculpture Court at The University of Edinburgh I October 2019.

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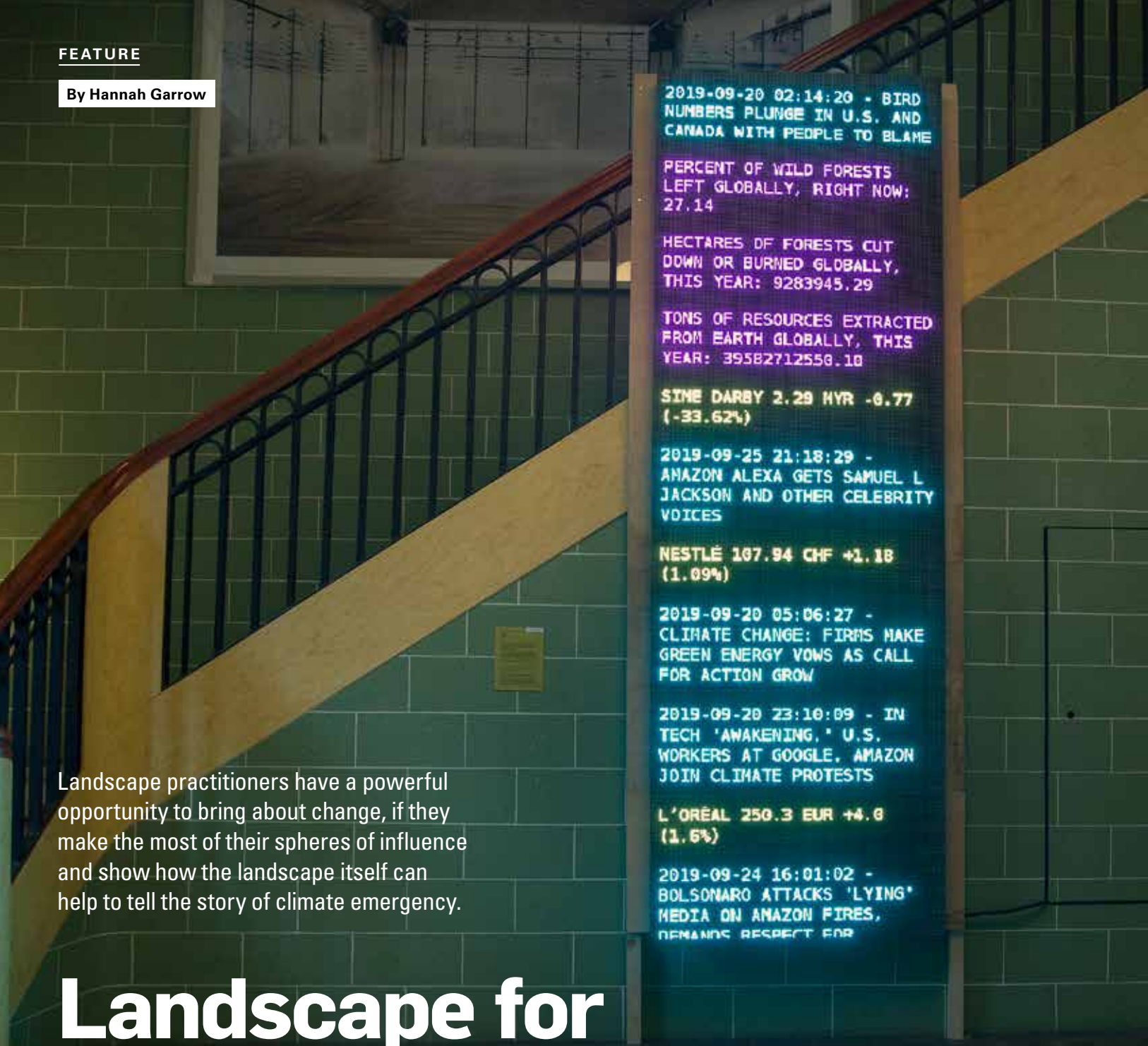
FEATURE

By Hannah Garrow



Landscape practitioners have a powerful opportunity to bring about change, if they make the most of their spheres of influence and show how the landscape itself can help to tell the story of climate emergency.

Landscape for mobilising climate action – climate literacy and behaviour change

1. (DE)WORK by: reWork was exhibited at the Oslo Architecture Triennale, September 2019.

Widespread acceptance that degrowth is required will come with widespread understanding that meaningful decoupling of economic growth from environmental damage is impossible.

2, 3. Watermarks, a series of site specific installations in Bristol, marking the levels of possible future floods. Images conceived and created by Chris Bodle.

The high water levels of major flood events have been marked out on buildings, walls, bridges and other structures throughout history. This is a worldwide practice – almost every country has its records of minor floods and catastrophic events. These marks are most often made by local people who happen to be in the vicinity of the flood waters and have the forethought and courage to mark the position of the water surface at its height.

Responding to the climate emergency

In June this year, the Landscape Institute added its voice to national governments, local authorities and campaigners seeking a greater emphasis on tackling climate change. The aim of the declaration was not just to speak out, but to galvanise and inspire the landscape profession to take action. Achieving a substantial reduction in carbon emissions requires transformational change across our society with everyone, as consumers, citizens, communities and organisations, making different choices and changing their behaviours. Theories of behavioural change suggest that, while governments can set the direction of travel with legislation, technologies and infrastructure that facilitate or drive action, it is only when this material change is accompanied by the individual and social conditions for change that behaviours will become an embedded part of our everyday experiences[1].

As part of the Institute's response to the climate crisis, it has committed to working with its membership to better understand what needs to be done to ensure that the organisation, and the wider profession are well-placed to make a positive contribution to national climate change targets and international obligations. This article intends to open this debate: asking readers to contribute their views and opinions about how we can mobilise against these global challenges. It considers our role as individual consumers, as corporate and business leaders and as a sector whose practices have implications for the ways in which the environment is designed, managed and maintained for future generations.

Individual action

It is, arguably, as individuals that we have the most control over the choices that we make. This explains why 'greening' citizen behaviours has been a central focus of government intervention and academic consideration of climate change mitigation. It is acknowledged that delivering government targets for climate change will require everyone in society to change their consumption practices to reduce the environmental consequences of their lifestyles. Yet, despite broad agreement that this transformation is needed, embedding widespread behaviour change is not easy to do. Humans are complex beings and what drives one person to amend their behaviour will often not impel another; making government or policy intervention far more challenging. Research on 'green' consumers suggests that even

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those who are convinced of the need for action, who see sustainability as central to their lifestyles and values, often have at least one aspect of their lives where they behave contrary to these beliefs[2].

Despite this, most literature acknowledges the importance of people's values, beliefs and attitudes as drivers of behaviour change. It is argued that the complexities and uncertainties surrounding climate change have made it easier for people to ignore or deny the imperative to take action. In this context, the link has been made between climate action and levels of awareness or understanding, sometimes termed climate or carbon literacy. Research shows that public concern about climate change has increased steadily over the past decade, but that while 94% of the population accept that climate change is happening, only one third think it is anthropogenic[3]. It is perhaps unsurprising, then, that public knowledge about the actions that contribute to climate change is even more limited. Although it has low potential for emission reductions, recycling is commonly cited as an example of climate action, while other activities such as flying less or reducing meat consumption are rarely acknowledged[4].

Raising levels of climate and carbon literacy amongst individuals is, therefore, a key way to create the appropriate social conditions for individual behaviour change to occur. This is the approach underpinning the Scottish Government's public engagement strategy for climate change[5] which sets out, based on an analysis of high emitting behaviours, the ten key things that individuals can do to reduce their climate impact. These include monitoring energy use in our homes and changing the systems that heat our homes; investing in energy efficiency measures; becoming less reliant on the car, driving more efficiently and using alternatives to flying; eating a sustainable diet low in dairy and meat; reducing food and household waste and reducing consumption.

While policymakers can seek to improve people's understanding of the causes and impacts of climate change, for example, by embedding climate education into school curricula or through direct marketing and communications strategies, the evidence suggests that increasing carbon literacy will not necessarily result in behaviour change. The 'knowledge-value gap' has been much researched and, as with the 'deep green' consumers who ignore their own bad habits, there are many instances where people are unwilling or unable to act[6].

Corporate responsibility

More recently, with the upsurge in interest in climate change and evidence of a more urgent need for action in international reports like that by the Intergovernmental Panel on Climate Change (IPCC)[7], criticism has emerged of approaches which put too much responsibility at the feet of individual citizens rather than corporations and governments. The concern is that, given the complexities of consumer behaviour and decision making, change at the level required to be commensurate with national targets is unlikely to come about without more collective effort. Individuals need to be considered as part of wider networks from households, communities and professional industries or sectors.

3. Ice melts – Western Antarctic Ice Sheet – future scenario projected on to the 'We the Curious' building.

94%
of the population accept that climate change is happening –

only one third think it is anthropogenic

Across Europe, SMEs were responsible for
64%
of carbon emissions

Only 24% were actively engaging in activities to reduce their environmental impact

4. 15.45 metre water level projected on the side of the @Bristol Science Centre.
© Chris Bodle

5. Water level projected onto Electricity House.
© Chris Bodle

6. 10.35 metre water level projected onto St Stephen's Church.
© Chris Bodle

The project estimates that the training has resulted in a

carbon saving per participant

The sustainability of corporate practices has been subject to attention for a good number of years, with many organisations now taking simple actions like recycling their waste, encouraging the use of reusable coffee cups and operating sustainable travel policies. However, governments have not been keen to push too hard, particularly where environmental decisions do not also contribute to cost savings. As a result, the focus on management planning, reporting or monitoring of business emissions has been largely on the public sector, where the arm of government has more reach.

While most people will be able to identify high-emitting industries like those involved in manufacturing, mining and quarrying, energy production, transport and construction, few smaller organisations acknowledge their role in combating climate change. A report released in 2013 by the European Commission, however, estimated that across Europe, small to medium enterprises (SMEs) were responsible for 64% of carbon emissions, but that only 24% were actively engaging in activities to reduce their environmental impact[8]. One reason provided in the report was that SMEs struggled to recruit candidates with the technical or managerial expertise – in other words, who are climate or carbon literate enough – to know how to devise and put in place projects and initiatives that will result in emissions savings. As with individual behaviour change, this points to the need for more targeted environmental training and education for those involved in business administration and corporate strategy to help them to understand and identify ways in which environmental improvements can be incorporated into business processes.

Taking this into account, Climate Outreach, an organisation that specialises in climate communication, has produced resources for business advisors working with SMEs which focus on how to promote sustainable ways of doing business. Their toolkit[9], which is available to download from their website, includes an online course and explores how businesses

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[1] Scottish Government (2013) Influencing behaviours – moving beyond the individual: ISM user guide
[2] McDonald et al (2012) Individual strategies for sustainable consumption
[3] British Social Attitudes Survey 35, Climate Change
[4] Howell, R. (2018) Carbon management at the household level
[5] Scottish Government (2013) Low Carbon Scotland: Behaviours Framework
[6] Howell, R. (2018) Carbon management at the household level
[7] IPCC (2018) Special Report on Global Warming of 1.5 degrees
[8] Caligouri et al (2010) SMEs and the Environment in the European Union
[9] Climate Outreach (2017) Effective communication guide: using values to promote sustainable ways of doing business

can use imagery and arguments to encourage people to see the value of adopting more sustainable practices. The Carbon Literacy Project, based in Manchester, similarly offers training for organisations and individuals to become more carbon literate covering climate change, carbon footprints, how you can do your bit and why it's relevant to you and your audience. Through participation in a day's learning about climate change, organisations can achieve certification demonstrating their carbon literacy. At present over 10,000 individuals and 29 organisations have become more carbon literate and the project estimates that the training has resulted in a 5–15% carbon saving per participant. In Scotland the Royal Scottish Geographical Society, working with Stirling University, the University of Edinburgh and the Institute of Directors, have likewise been developing a new qualification, aimed at managers in the public, private, academic and voluntary sectors. A pilot programme is being run in Autumn 2019 for which they are currently looking for volunteers.

Through practice

The focus on how organisations conduct themselves internally perhaps distracts from the bigger question about how different professions can contribute to tackling climate change through their practices. In 2013, the United Nations Global Compact published a guide for responsible corporate engagement in climate policy, which acknowledges the need for businesses to get more involved in climate action and debates. It highlights the key role that organisations of any size can play in not only reducing their own carbon footprints, but influencing others within wider industry, the supply chain or consumers. The document calls on companies to comment on government policies, set targets for action and ensure staff are informed and able to advocate for change. In doing so, it proposes a much wider approach to corporate action which encourages businesses to think about their spheres of influence. This is very relevant for landscape professionals, who frequently work within multi-disciplinary teams of professionals as well as with communities, educators and investors. The contribution members make as practitioners and professionals could thus present the most powerful opportunity to bring about change.

Of course, many landscape professionals will be involved in work that makes a positive contribution to tackling climate change; designing and improving standards for green infrastructure and sustainable drainage, managing landscapes to protect biodiversity and habitats, designing places that are water sensitive or assessing the impacts of renewable technologies to identify optimum locations. Yet, we are also working within a system which often gets it wrong – where development happens in the wrong place or delivers outputs that don't contribute to climate resilience or mitigation, or fail to design for sustainable behaviours rather than business as usual. The Landscape Institute has been working with other professional and advocacy bodies to promote policy and legislative changes that protect the environment and encourage climate resilience. However, there is also a role for member practices and individuals to advocate for change; influencing clients and other professionals, challenging procurement decisions, specifying construction materials and methods, and promoting sustainable design alternatives.

Going further, Canadian academic, Dr Stephen Sheppard, has suggested that there could be a critical role for landscape professionals in encouraging and raising levels of climate literacy. Using theories from social and cognitive psychology, Sheppard argues that government approaches to individual behaviour change have failed because they have not recognised the important connection between people and place. 'Seeing' the effects on a local landscape, he asserts, could be an important route to gaining community recognition; stimulating feelings of concern and fear that lead to action[10]. Landscape-based approaches and landscape architectural tools could, therefore, be vital in encouraging the public to look at the world through a climate change lens; helping people to "*read the signs of climate change all around them, engage in responding to climate change, and foresee future consequences of their action (or inaction)*"[11]. Sheppard puts forward two main ways of achieving this: making climate change more visible in existing landscapes and bringing people's possible future landscapes closer to them. Examples of actions include the routine use of climate messaging in landscapes such as labelling emissions on buildings or marks to show rising sea levels; the use of visualisation tools and techniques to illustrate to communities how places will evolve and what climate change might look like in their area; and working with communities to support citizen-led visioning, planning and monitoring.

Landscape for action

Through the work of its members, the Landscape Institute's aim is to protect, conserve and enhance the natural and built environment for the public benefit. And what could be more beneficial for people than preventing the potential destruction of life-sustaining systems? The literature considered above suggests that we can all take action to respond to the challenges that climate change poses; as individuals, as businesses and as landscape practitioners. For action to take hold, however, we need to embody our beliefs in every aspect of our lives. Rather than ignoring actions that are contrary to our values we should confront these, question ourselves and our organisations, clients and stakeholders. We also have a potentially powerful tool at our disposal – the landscape itself can help to tell the story of climate change; encouraging communities to understand its causes and helping them to visualise and connect with its impacts. In this way, landscape and landscape professionals could play a critical role in helping to raise levels of climate literacy and mobilise collective action.

Hannah Garrow worked for the Landscape Institute as Policy and Influencing Manager, Scotland and Northern Ireland.

The Landscape Institute has been working with other professional and advocacy bodies to promote policy and legislative changes that protect the environment and encourage climate resilience

[10] Devine-Wright (2010) Disruption to place attachments and the protection of restorative environments

[11] Sheppard, S. (2015) Making climate change visible: A critical role for landscape

7: Landscape Rebellion – Extinction landscape and fishing culture.
8: Landscape animated by plastic and fishing culture.
9: Fishing Culture – Community engagement to modify the landscape and explore climate change messages.

Further Reading

- Climate Change: What Everyone Needs to Know, Joseph Romm (Oxford University Press, 2015)
- There is No Planet B: A Handbook for the Make or Break Years, Mike Berners-Lee (Cambridge University Press, 2019)
- This Changes Everything: Capitalism vs the Climate, Naomi Klein (Penguin, 2015)
- SOS: What Can You Do To Reduce Climate Change – Simple Actions That Make a Difference, Seth Wynes (Penguin, 2019)
- Visualising Climate Change : A Guide to Visual Communication, Stephen Sheppard (Earthscan Ltd, 2012)
- How Culture Shapes the Climate Debate, Andrew J Hoffman (Stanford University Press, 2015)
- Two Degrees: The Built Environment and Our Changing Climate, Alisdair McGregor, Cole Roberts and Fiona Cousins (Routledge, 2012)
- Don't Even Think About It: Why Our Brains Are Wired To Ignore Climate Change, George Marshall (Bloomsbury, 2014)
- Building Revolutions: Applying the Circular Economy to the Built Environment, David Cheshire (RIBA Publishing, 2016)
- The Environmental Design Pocketbook 2nd Edition, Sofie Pelsmakers (RIBA Publishing, 2015)
- The Re-Use Atlas: A Designer's Guide to the Circular Economy, Duncan Baker-Brown (RIBA Publishing, 2017)
- Talking Climate: From Research to Practice in Public Engagement, Adam Corner and Jamie Clarke (Palgrave Macmillan, 2016)

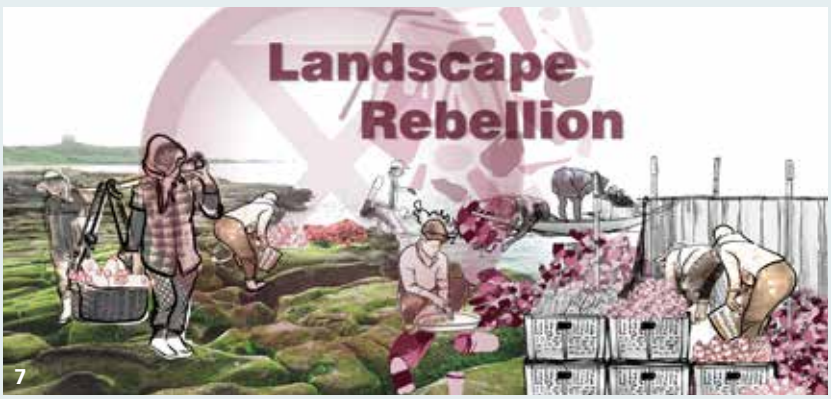
Landscape Rebellion, Laomei Coastal Park, North Coastline, Taiwan is part of a student portfolio on climate emergency by Chieh-Yun, Yin, University of Sheffield, 2019

Landscape is used to popularise climate issues and shift the public's attitude to climate change overall.

The site, Laomei Coastal Park, was a beautiful part of Taiwan but the landscape is suffering from both global and local environmental threats.

Landscape Rebellion aims to challenge the conservation policy, and carries out environmental and cultural changes to engage the public in the process of climate change.

The historical fishing community will be supported as the custodian of the sea, regenerating the fishing culture to combat plastic waste and environmental issues. As the site provides many climate change lenses available for exploration. Making climate change visible and meaningful to enhance public understanding on climate change. Achieving the approach to wake people up to the problem – and spur action for climate change.



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FEATURE

By Neil Jones

Powering Parks: using heat pumps in public green spaces to heat local buildings

A project led by 10:10 Climate Action shows how public spaces can be utilised to tackle climate change

As the climate crisis escalates, the challenge of finding sustainable ways to heat our water and buildings is becoming increasingly urgent. Most of the UK's heating comes from fossil fuelled boilers and a third of all UK greenhouse gas emissions comes from heating. Currently, for every kilowatt hour of heat we use, we emit about 220g of CO_2[1]. If we're serious about tackling climate change, cleaning up heat must be a priority.

That's why we're working on a potential solution: using parks and green spaces to generate low carbon heat for local buildings with the help of heat pumps. If those buildings are owned by the council, they could save money on their heating bill right away. Alternatively, they can sell the heat to other local buildings. In both cases, the money can be reinvested into parks for the future. It has the potential to help tackle climate change and generate cash for councils to reinvest. Collaborating with Hackney Council and Scene Connect funded by Nesta – we've set out to explore the potential of this system, starting with Hackney's public parks and green spaces.

1

Heat pumps offer huge potential in combating climate change. In their 2019 report, the UK's Committee on Climate Change set out the key role they must play in reaching the government's net-zero emissions target by 2050. Not only are heat pumps more efficient than gas boilers, they also produce about 6.5 times less CO2[2]. And when powered by renewable energy, the carbon emissions can be effectively eliminated.

Disruption to park users can be minimised and costs can be reduced by installing pumps at the same time as other improvement works, like upgrading drainage for sports fields – or during winter when usage is lower. The money the council can save (or income generated if the heat is sold) could support the parks revenue budget by potentially paying for a new park gardener, refurbishing football pitches or new playgrounds.

For this project, we first set about surveying every park and green space managed by Hackney Council. We looked at their size, tree cover, what buildings were in the park or nearby, how much heat they used and whether there were any works coming up we could piggy-back onto. We also considered things like whether they had an active park user group we could talk to about proposals as they developed. That process allowed us to whittle the list down from 58 to about 20 sites which had some potential.

What is a heat pump?

A heat pump is a cunning device for collecting the ambient heat all around us. They collect low-temperature heat from the ground, the air or a body of water and, using some simple physics, concentrate it and then pump it into buildings for heating. There are lots of ways this system can be used. In a fridge, or air conditioning unit, heat is moved from inside to the outside. In a heating system, the reverse is true and heat energy is moved from outside to inside. It's possible to build a system that's reversible – releasing heat to the outdoors in the summer and capturing it in the winter. Harvesting heat energy from the external environment, rather than inefficient burning of fossil fuels, makes heat pumps one of the most efficient forms of heating available. Putting just one unit of electrical energy in will produce up to five units of heat energy. Heat pumps are popular in other parts of Europe – in Germany 43% of homes have one[3], but they're little used in the UK. However, to tackle climate change we need a lot more low-carbon heating to replace gas and oil boilers across the country.

Then we delved even deeper and did some modelling to give us an idea of what a heat pump project on each site could actually look like, allowing us to develop a shortlist.

"As a Council, it's important we take the lead in proactively reducing our reliance on fossil fuels, so I'm proud to be joining forces with experts in the field to investigate such an exciting initiative. The Powering Parks project has the potential to help us unlock sustainable energy and save – or even generate – money for important council services."
Cllr Jon Burke, Cabinet Member for Energy, Waste, Transport and Public Realm, Hackney Council

1. Abney Park Cemetery, Hackney.

2. Abney Park Cemetery, Hackney.
© Paul Lincoln

> **Not only are heat pumps more efficient than gas boilers, they also produce about 6.5 times less CO_2**

We then looked in even more detail at the buildings and who owns them, what the existing heating system is like and how much work would be involved in installing a heat pump and – importantly – what disruption would be caused to the park and its users. After much deliberation we ended up with three exciting sites to take forward into the next stage, including Abney Park Cemetery in Stoke Newington, where there are plans to build a new cafe and education centre as part of a National Lottery Heritage Fund project. We worked with the design team to find out how heat from the space under the paths, where there are no burials, could be used to heat the building. We are delighted that a heat pump system has been specified in the final plans and will be installed, subject to funding being approved for the development.

A major consideration for councils wishing to install heat pumps is the Renewable Heat Incentive (RHI), the government scheme to incentivise low carbon heating tech, such as heat pumps. Combined with potential energy savings, this payment can provide a substantial income, making the business case for new schemes really stack up. The current RHI is due to end in March 2021 and an announcement on its replacement is expected.

The profitability of a scheme is also dependant on the cost of the fuel it is replacing. The relative cheapness of gas compared to electricity is exacerbated by policy that levies greater charges on electricity bills to pay for decarbonisation measures than it does on gas, despite the latter being a fossil fuel. Additionally, councils have various arrangements for buying electricity and gas – meaning some have larger differentials between gas and electricity unit prices than others. This can make a scheme in one local authority profitable, but an equivalent scheme less so in another. However, the future of gas prices are uncertain, and the former chancellor, Philip Hammond, pledged in his 2019 spring statement to 'introduce a Future Homes Standard, mandating the end of fossil-fuel heating systems in all new houses from 2025'.

But it's not all about the money. Councils will also be aware of the importance of the co-benefits heat pumps provide, such as reducing CO_2 emissions and eliminating the air pollution produced by gas boilers. At Abney Park Cemetery, we expect the heat pump to save six tonnes of carbon per year, increasing with time as the electricity grid further decarbonises. There's also the opportunity to provide information panels in the new education space to teach visitors and school groups about how heat pumps work and their contribution to tackling climate change. As one of the 220 councils in the UK that have declared a climate emergency, Hackney recognises that it's vitally important that we implement low carbon tech solutions such as heat pumps to achieve a carbon neutral borough by 2040.

"This is a fantastic opportunity for us to look at ways of making our parks and buildings more sustainable and for us to continue to invest in our beautiful parks and green spaces for our residents to enjoy."
Cllr Feryal Clark, Deputy Mayor and Cabinet Member for Health, Social Care, Leisure and Parks, Hackney Council

This isn't a completely new idea – it's already working in a park in Edinburgh – but there's massive untapped potential around the country. We are publishing a report in November that will show the scale of this potential. Bringing together data from a number of sources, including Ordnance Survey and the British Geological Society, the report will show how the parks, playing fields and other publicly accessible green spaces across Great Britain could supply around 30 GW of heat to nearby buildings. That's about 10% of the country's total peak heat demand and represents about 8.4 million tonnes of CO_2 emissions saved per year. The report will break these estimates down to the level of individual local authorities to show which cities, districts and boroughs have the greatest untapped potential.

"The potential this project has for heat decarbonisation in the UK is really exciting. Looking ahead to 2030 or 2040, the phasing out of fossil fuels will mean that heat from green spaces could be one of the cheapest sources of heat for whole neighbourhoods."
Louise Waters, Senior Consultant at Scene Connect

In 2020, we will produce a toolkit to help other park managers replicate the idea – cutting carbon and creating financial stability for much-loved local parks. At the same time we're talking to people who use the parks and running public events about how heat pumps work in practice in different contexts and the potential for them to benefit us all – whether through our local green spaces or in our own homes, workplaces and schools.

Neil Jones is Project Manager at 10:10 Climate Action

[1] https://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PN-0523 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/790626/2018-provisional-emissions-statistics-report.pdf page 10
[2] https://www.sciencedirect.com/science/article/pii/S1876610217308718
[3] https://www.coolingpost.com/world-news/heat-pumps-overtake-gas-in-germany/ https://www.evergreenenergy.co.uk/heat-pumps/how-efficient-are-heat-pumps/

FEATURE

By Phil Askew

Combating climate change in Thamesmead

Thamesmead in South London is looking at how a landscape-led approach can tackle climate change

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1. A view of Southmere.
© Paul Upward

When the Greater London Council (GLC) decided in the 1960s to reclaim over a thousand acres of marshes in the eastern reaches of the River Thames, it had a utopian plan for its very own New Town. Channelling the spirit of early pioneers, the opportunity was seized to create an entirely different way of living, nine miles from central London.

Innovative concrete design and modern amenities were to be closely integrated with nature and green space. The marshes were channelled to establish a series of large lakes and a network of canals. A 1970 promotional film described 'environmental conditions unmatched by anything that has existed before'. The idea was to punt to the shops. Early residents still love the place for giving them what they describe as the best childhood ever, roaming free.

Affordable, healthy and bright homes were the aim of the GLC. Flood risk required habitable rooms to start at first floor level, so the housing was elevated on concrete platforms. The large-scale forms were designed to hold their own in a monumental landscape, with four avant-garde, now iconic towers flanking one lakeside.

Fast-forward 50 years and Thamesmead remains rich in natural resources but they require significant investment to realise their full potential. Our residents have told us that better outcomes for them would mean a safer environment for their children and improved access to a range of opportunities. Our approach in this area is to work in partnership with residents to respond to the challenges: with a focus on pathways to better economic opportunities and co-designing green spaces. Whilst the population demographic has changed significantly over the years, a strong sense of civic pride remains. With Peabody taking ownership five years ago, Thamesmead's future is once again in the hands of a single organisation. We're responsible for 200 acres of developable land and large 1980s estates to be retrofitted for climate resilience.

We've inherited a mixed legacy with Thamesmead. The glory of the town lies in its natural assets, its expansive river frontage, woods, water bodies, wetlands and Grade 1 heritage. Back in the 1960s, however, 'connectivity'

meant building highways which sever the town and segregating motorists from pedestrians who were confined to 'streets in the sky'. While the town has some fine examples of modernist aesthetic, some of these walkways are characterised by unloved underpasses and garages create long blank frontages to the street. The green open spaces feel curiously empty, because most people drive and few yet walk or cycle.

Regeneration in Thamesmead aims to enable everyone, especially the most vulnerable people, to make the most of their lives. By 2050 the population will have more than doubled to 100,000 and the town must become a place where people are able to live far more sustainably than most of us do today. People will need greater protection from the impacts of the climate crisis, such as the urban heat island effect and torrential summer storms. Success also depends on an abundance of varied places where the established and evolving communities can come together.

Thamesmead presents the biggest and most extraordinary opportunity in London. We believe that the landscape is critical to its future. In fact, the potential of the place will only ever be realised through a landscape-led approach. So, rather than come up with another top-down masterplan for the town, we've commissioned LDA Design to lead a specialist team to develop a green infrastructure and placemaking strategy, to create a holistic approach. The climate crisis is one of the key drivers behind the Strategy. Sea levels are rising in the Thames Estuary: the town will need higher flood defences. But the special opportunity here is for people to become climate aware activists through reconnecting with the extraordinary natural environment on their doorstep.

For this to happen, we need to provide a far richer offer with our public green spaces and make them a safe and inviting place, with an unrivalled range of activities. Like all positive responses to the climate crisis, this brings multiple benefits. Thamesmead will become a much healthier place to live when there is a stronger incentive to get out and get active and meet up

2, 3, 4, 5. Views across Thamesmead.

with others, especially at a time when loneliness is as grave a threat to health as smoking.

LDA Design is mining a broad range of expertise, from hydrologists to economists[1], to ensure that the Strategy (to be published in 2020), makes the most of Thamesmead's natural assets and ensures the town can adapt to global warming. It is exploring how to improve water quality in the lakes, how to fulfil the original vision for the canal network and how to encourage cycling and walking.

We want the streets of Thamesmead to be overpoweringly green, from roof to micro-allotments outside front doors and water in the lakes to be supremely clean. Rainfall should be managed in a visible, playful way that reconnects people to the water cycle. Food growing could be ubiquitous. From parks to tumps, the cultural and play offer needs to delight. We want a well-managed but shaggy network of habitats which strengthen biodiversity. Green infrastructure will be at the heart of emerging technologies for energy and water, minimising investment in traditional 'grey' infrastructure that is not future-proofed.

Thamesmead was originally designed as a flagship pioneer, and that is an ambition worth pursuing still. The Strategy will shape placemaking, giving developers a practical guide to creating somewhere that works for everyone, providing for the right sort of growth in the right place and setting the framework for creating value. The future will rest on ongoing investment and strong maintenance strategies.

I think there is much to learn from the history of Thamesmead. In the 1960s, the vision for the place was imposed on it, with residents treated as a homogenous whole rather than individuals with distinct needs and aspirations who could make the neighbourhood their own. In the 1980s and 1990s, when that coherent had vision dissolved, along with stringent design standards, the town attracted opportunistic development.

To respond convincingly to the climate crisis, we need the highest quality sustainable design and standards for buildings and spaces. But Thamesmead must also become a place where its communities choose to be strong advocates for change, and shape the solutions.

Dr Phil Askew is Director of Landscape & Placemaking at Peabody.

By 2050 the population in Thamesmead will have more than doubled to 100,000

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[1]LDA Design's green infrastructure and placemaking strategy is being created in collaboration with Continuum Sport and Leisure, Green Infrastructure, Land management Services, Project Orange, Robert Bray Associates, SNC-Lavalin Atkins and Vivid.

By Peter Neal and Ben Brown

ENVIRONMENTAL NET GAIN:

capturing the opportunity for the landscape profession

Net Gain will help the landscape profession tackle climate change

If they can see their way through Brexit, climate change historians looking back on Theresa May's government will find two vitally important announcements. Both "net" policies (and no, nothing to do with the Common Fisheries Policy).

The first is **net zero**: the law (passed June 2019) which signs the UK up to a new target of net zero greenhouse gas emissions by 2050. It's a vital step towards halting climate change, currently one of the most ambitious targets in the world.

The second is **net gain**: specifically, the commitment by the government to legislate for *biodiversity* net gain (BNG), as well as seeking to expand this into a broader *environmental* net gain (ENG). Its impact on addressing climate change is subtler, but arguably more profound.

Net gain will make some (admittedly small) contribution to reducing overall carbon emissions by encouraging afforestation, for example, but crucially it will also help us to adapt to the climate changes which we're already too late to stop: higher temperatures in cities, more frequent flood events, etc.

In fact, taken seriously, net gain could profoundly change how cities are designed and how they impact on the environment. It could also represent a major opportunity for landscape professionals.

1. The Floodplain Forest, Milton Keynes, is set within the Oxford-Cambridge Arc and designed to accommodate seasonal flooding from the River Great Ouse, delivering substantial environmental net gain following a decade of sand and gravel extraction.
© Peter Neal

What is net gain?

So far, the commitment from government has mainly focused on *biodiversity net gain* (BNG). BNG is now embedded in the National Planning Policy Framework (NPPF, 2019) as a means to conserve and enhance the natural environment by *'minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures'* (Para 170.d). Significantly the policy seeks to secure 'measurable net gains'.

Going forwards, the government has stated an initial commitment to expand this policy to secure a broader *environmental net gain* (ENG) which is likely to include natural capital benefits, such as flood protection, recreation, and improved water and air quality. In addition, the former Chancellor's Spring Statement included a commitment to making the process mandatory, *'ensuring that the delivery of much-needed infrastructure and housing is not at the expense of vital biodiversity'* . DEFRA has since completed a consultation on Net Gain and the forthcoming Environment Bill is expected to introduce a mandatory approach to BNG, with a few exceptions for certain types of development.

Environmental net gain is the idea that new development must leave the environment in a measurably better state than it was beforehand. Put in the simplest possible terms: if there were 10 trees before development, there must be at least 11 trees afterwards. Ideally, this will be on site.

In principle, net gain seeks to safeguard existing habitats and to ensure that any loss or damage to environmental features is compensated by restoring or creating new features that provide greater value to wildlife and people.

The government's BNG proposals provide a model for how ENG could work but, in its broadest sense, ENG is a mechanism for ensuring that value is not lost. Net gain provides a policy hook for what landscape professionals have been trying to do all along: shape places to be better than they were before.

Put in the simplest possible terms: if there were 10 trees before development, there must be at least 11 trees afterwards

Net gain provides a policy hook for what landscape professionals have been trying to do all along: shape places to be better than they were before

Net gain could profoundly change how cities are designed and how they impact on the environment

[1] https://www.gov.uk/government/publications/national-planning-policy-framework--2
[2] https://www.gov.uk/government/topical-events/spring-statement-2019

Biodiversity net gain

What is the government proposing?

Biodiversity net gain is as it sounds: a partial version of environmental net gain, focussed on biodiversity. It creates a way for developers and Local Planning Authorities in England to ensure that biodiversity is not lost during new development.

Where has it come from?

As an idea it takes influence from a range of places, including "biodiversity banking" schemes in the United States and Australia. It was a component of the 25-year Environment Plan (2018) as part of the ambition to be *'the first generation to leave the environment in a better state than we found it'*. The final details were published this summer (July 2019)[3] and the government is committed to putting it into law in the upcoming Environment Bill. The Bill was introduced to the House of Commons and given its First Reading in the Queen's Speech on 15 October 2019.

What are the details?

Government are proposing a minimum 10% net gain of "biodiversity units". This is measured using *habitats* as a proxy for *species*, using the "Defra Metric 2.0" – a mechanism developed to calculate biodiversity units. It includes various metrics, such as the habitat's distinctiveness, its condition, and how well connected it is.

The system uses the mitigation hierarchy, which means priority must be given to enhancing biodiversity on site, or (less ideally) nearby. If that isn't possible, developers will pay a standardised offsetting fee, which will be used to create biodiverse places elsewhere in the country.

What are its limitations?

For a start, it's England-only. And BNG only applies to certain development (that are within the scope of the Town and Country Planning Act). So, it will not include infrastructure, permitted development rights or anything under marine spatial planning. There will also be some targeted exclusions, for instance on certain unviable brownfield sites. Plus, it will have no real impact for sites with negligible biodiversity: +10% of zero is still zero.

There are also limitations linked to imperfect measurement, particularly around *context* (e.g. a tree line may have an important role in the landscape, which can't be replicated elsewhere). There are also risks that could impede its rollout, such as insufficient skills in local authorities – or that Brexit or an election derails the Environment Bill altogether.

However, biodiversity net gain's main limitation is that it isn't *environmental* net gain. A focus on one aspect of the environment to the exclusion of others may risk unintended consequences.

[3] https://www.gov.uk/government/publications/25-year-environment-plan
[4] https://services.parliament.uk/Bills/2019-20/environment.html
[5] http://publications.naturalengland.org.uk/publication/5850908674228224
[6] HMCLG (2019) The Oxford-Cambridge Arc, see: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/799993/OxCam_Arc_Ambition.pdf

How can biodiversity net gain help address climate change?

This is also a two-way street: the rapidly declining health of global ecosystems due principally to climate change is having a devastating impact on biodiversity. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has argued that the risks posed by biodiversity loss should be considered on the same scale as climate change, and that these need to be tackled simultaneously.

It's obvious that BNG can be a positive force for tackling climate change: after all a biodiverse woodland absorbs more carbon than a sealed car park. It focusses on habitats as a measurable proxy for species is arguably useful in that regard although BNG would probably make a positive contribution either way. The issue is how to maximise that contribution.

The question is actually broader than just climate change: how can we make best use of biodiversity net gain for achieving a wide range of environmental benefits – for nature and for people? For example, if a developer is required to deliver an on-site biodiverse habitat, could that same habitat be used to improve water quality and reduce flood risk, as part of a SuDS scheme? Could it regulate noise pollution, or be used to slow erosion? Could it even create beautiful places for people to live? Of course, some benefits are harder to achieve than others. It can be quite difficult to create biodiverse spaces that also provide open access for recreation: sports fields are not especially wildlife-friendly, for example. But that is the type of problem that can be overcome through good planning and design.

IPBES has argued that the risks posed by biodiversity loss should be considered on the same scale as climate change

Expanding the concept:

Natural capital net gain

When good design is in short supply – for whatever reason – there is no guarantee that new development won't keep doing harm. Whilst BNG might provide guarantees for wildlife, it provides no such reassurance for other things, including a more comprehensive response to climate change.

To guarantee those things, BNG needs expanding into a wider environmental net gain. Or – put another way – *natural capital net gain.* A gain in the amount of *value* that we all receive from the environment: in terms of health, money, culture, etc.

In some areas, this already exists to a limited extent. Positive policies in local plans can create an expectation for net gain, even if this is ultimately part of a qualitative judgment. A few places are emerging as leaders in this process. For example the Greater Manchester's Natural Capital Investment Plan includes biodiversity net gain as a core principle. The new South Downs Local Plan, has already embedded net gain policies for biodiversity and even talks about 'net gains for landscape'. Whilst national and local government policy is starting to embed natural capital within local plans across Oxford-Cambridge Arc growth corridor to set targets and achieve net gains in biodiversity and natural capital.

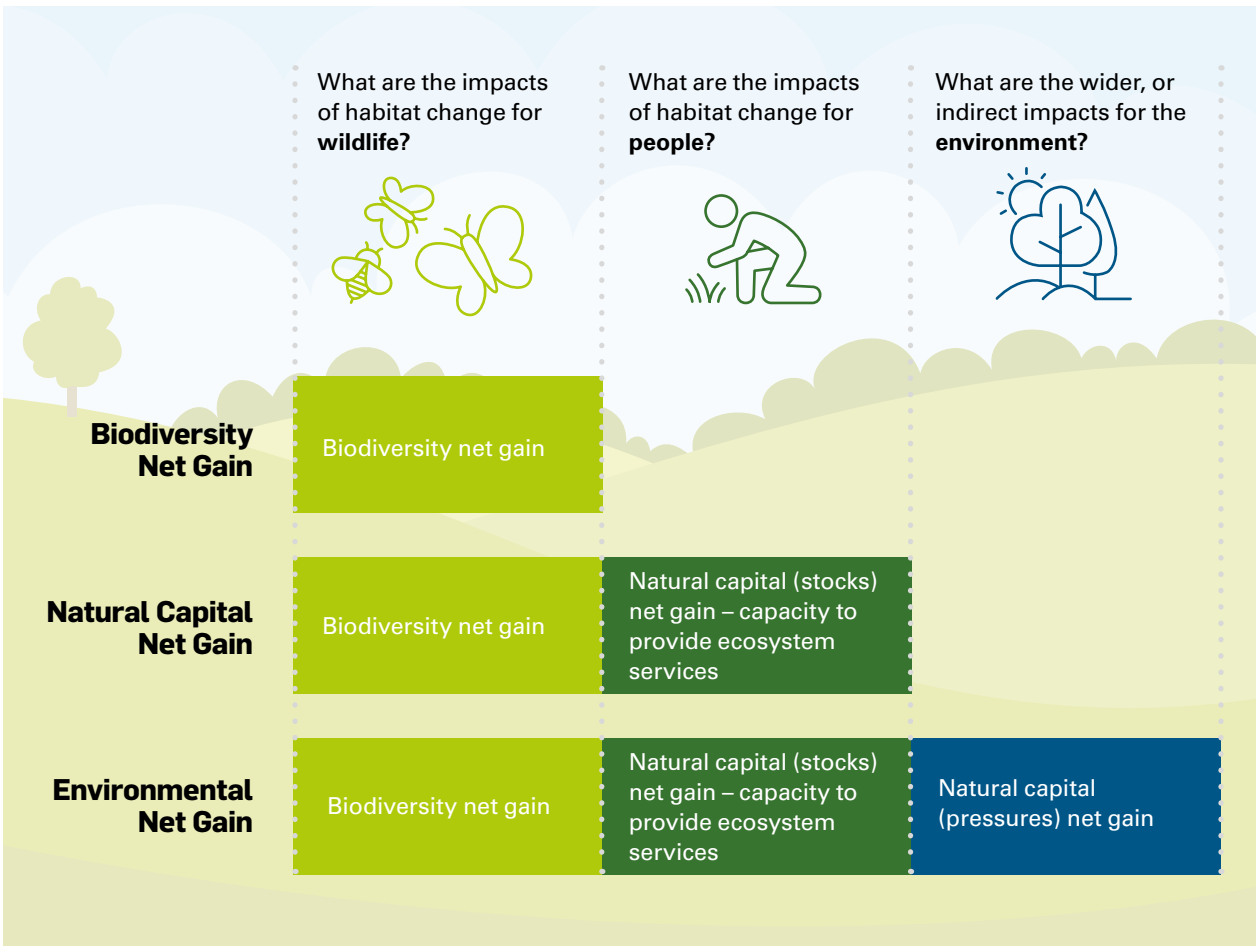
In a stricter *quantitative* sense, there are quasi- "net gain" policies which already exist. SANGS (Suitable Alternative Natural Green Spaces), for instance, is essentially net gain in recreational space. The new GLA London Plan includes an "air quality neutral" policy, which refuses permission for development which would result in a net increase in air pollution. Some things like flood risk are broadly subject to net gain, thanks to complex regulations. What is lacking is a holistic methodology bringing it all together, and a bolder approach to refusing development which is unsustainable which makes things worse rather than better.

The key thing is to ensure that value (in a strict, quantitative sense) is not lost and that requires a natural capital approach. It needs an agreed way of measuring value and a shared "currency" in which to communicate that value.

For many areas, it's the "measurably" part of the net gain definition that is the challenge.

There is a well-known saying in business theory, attributed to Peter Drucker, which says "what gets measured gets managed". It's not profound to suggest that if you want more (or less) of something, you need to a) count how much you have before, and b) count again afterwards. However, when it comes to complex

Priority must be given to enhancing biodiversity on site



2. Green Estate's exotic and native perennial meadow planting has transform the character of Manor Fields Park, Sheffield, and delivered significant biodiversity net gain.
© Peter Neal

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things like the environment (or climate, or landscape, etc) that's not so easy. Quantification – or measurement at all – may not be realistic, let alone undertaken in a way that's helpful to an overstretched planning officer.

In particular, the risk of making trade-offs between easy- and hard-to-measure services can be unpalatable. How do you compare noise pollution against landscape character, for instance? Nonetheless, we should be clear that those trade-offs are already happening, they are just happening with limited evidence and little transparency.

In order to work successfully, natural capital net gain will therefore need some sort of framework for places to set local priorities and targets. Air quality is likely to be a higher priority in London than in Exmoor, for instance.

Conclusion

The climate is changing and so is the way we develop places. The landscape sector will need to be ready and fully engaged. There are some short-term steps government could take to help get us there. The NPPF, for instance, could establish ENG as a principle (at the moment it only talks about "measurable net gains for biodiversity"). More local areas could experiment with broader net gain approaches and be given the help to do so. Greater guidance could be offered for measuring and maximising specific ecosystem services (including climate adaptation) as part of schemes and better reward given to those which do it.

In the meantime, environment net gain remains only an idea. Once BNG is rolled out, we can gauge the extent to which that model can be expanded – or whether other approaches are better.

In responding to the dual environmental crises, we now face biodiversity net gain, or a more comprehensive environmental net gain, has the potential to transform the way we plan and design towns and cities. Clearly the skills and expertise of the landscape profession will be fundamental to this process.

Peter Neal, FLI, is a landscape consultant specialising in green infrastructure frameworks, open space strategies and public park investment plans.

Ben Brown is policy manager at the Landscape Institute.

By Robin Gray and Amanda McDermott

Tackling flooding in the Calder Valley

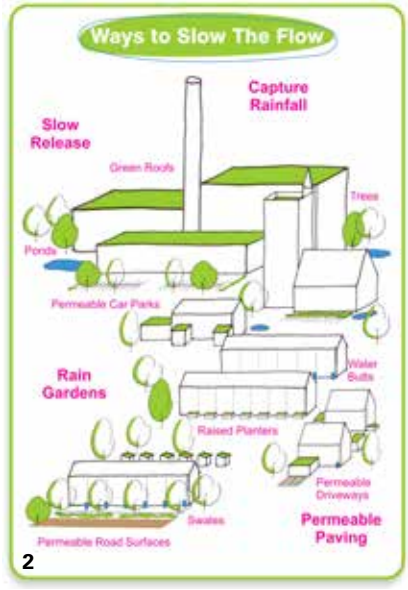
Slow The Flow Calderdale demonstrates a community-led response to tackling flooding

On Boxing Day 2015, 2,781 homes and 4,416 businesses in Calderdale were flooded, causing significant damage. The economic and social implications are still ongoing.

Part of the community-led response to the dramatic impact of December 2015 was the formation by the authors and professional colleagues of *Slow The Flow Calderdale* (STFC), an unincorporated charitable organisation (www.slowtheflow.net). Led by volunteers; the organisation works alongside statutory services to address flood events and works on practical solutions, including Sustainable Drainage Systems (SuDS) and Natural Flood Management (NFM).

Amanda McDermott explains; "I was personally affected by the Boxing Day floods when our house in Mytholmroyd was flooded. I was one of the lucky ones as we were not living there at the time, so our tenant had to cope with waking up on Boxing Day to sirens; rescuing her belongings from the flood waters and living on a building site for months whilst remedial work took place. Meanwhile, we dealt with organising the property renovation and the financial impact. I became aware of other qualified individuals in the valley interested in investigating how NFM solutions might be able to help and we came together as Slow The Flow Calderdale. I have been able to use my experience in SuDS to influence council policy in their emerging Local Plan (and Flooding SPG) policy. I have led the work which encourages the local community to implement SuDS by providing information and demonstration projects on the subject."

Robin Gray observes, "I was aware of so many theories and myths generated on social media as a result of the Boxing Day floods. Through my academic work, I was aware of the great wealth of knowledge in our universities that I knew could address risk and resilience. As a result, I organised a 'Science of Floods' workshop in town. Stuart Bradshaw, a geotechnical engineer living in the valley, had already set up a monitoring project based on a series of weirs where he lived. Stuart was able to upscale this proposal for the ancient semi natural woodland in the Hebden Water catchment owned by the National Trust (NT) at Hardcastle Crags. Working together with the NT, our proposal was taken up by the Environment Agency (EA)."



1. Amanda McDermott carrying out river surveys on Hebden Water.
© Robin Gray

2. Ways to Slow The Flow diagram.
© Amanda McDermott

The impact of December 2015 was felt in communities up and down the valley, whether it was surface water impacting on highways or highways collapsing. As a result of this there was an appetite to take a catchment approach. Evidence from the NFM DEFRA Pilot Projects '*Making Space for Water*' including the Slow the Flow Project in Pickering, alongside the Stroud Rural Sustainable Drainage Scheme inspired our approach in Calderdale.

Addressing flooding in the Upper Calder Valley is a major EA priority with two significant engineered schemes at design or under construction for the communities in Hebden Bridge and Mytholmroyd. However, encouraging wider catchment initiatives and specifically NFM, with its additional Green Infrastructure benefits, to complement these hard-engineered schemes, has motivated our voluntary work.

Through my academic work, I was aware of the great wealth of knowledge in our universities that I knew could address risk and resilience
Robin Gray

3, 4. Volunteers at Hardcastle Crags, Hebden Bridge.

Hundreds of volunteers from STFC have been working to implement flood prevention initiatives across the Calder Valley.

Since November 2016, hundreds of volunteers from STFC have been working with the NT, EA, Calderdale Council and other members of the SOURCE partnership, to implement flood prevention initiatives across the Calder Valley.

A lot has happened as a result of this volunteer-led work.

- More than 400 leaky woody debris dams have been installed at Hardcastle Crags developed in partnership with the NT and EA. These were built by local volunteers using naturally found materials
- The EA 'pilot project' enabled the NT to secure £2.6m for a programme of NFM in several rapid-response catchments throughout Leeds City Region
- Calderdale Council has been one of the first authorities to appoint an NFM Officer
- Monitoring to measure the success of our schemes has included time lapse photography, fixed point photography, and ultrasonic river level monitors
- The 'You Can Slow The Flow' suite of information has facilitated demonstration sites
- Working with the Mayor of Hebden Royd Council has enabled us to fund workshops to introduce schools to the science and technology relating to flooding
- New grant funding has been secured to identify opportunities for SuDS and NFM interventions. Mapping to be made publicly available online

The first dams have been monitored now for over two years using time-lapse cameras, pressure transducers and a supplementary network of stage monitors. Initial analysis work shows that the dams allow watercourses to behave normally when there is no threat, and act to slow the flow when there is risk of flooding.

Bespoke monitoring of rain garden planters has proven that they work, with the outlet clearly displaying a lower peak, and more gradual release of water, than the inlet.

This has provided valuable and encouraging information – but it is at the wider catchment scale, particularly in a catchment as complicated as the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Calder Valley, that more work needs to be done. Several factors have kept the momentum – not least a number of potentially damaging flooding events as recently as August 2019.

Not only has there been real public support, but STFC has been able to channel this into positive action. The publicity generated by the Hardcastle Crags scheme has been important, including Radio 4 and Countryfile. We have worked from the principle that we will not solve the valley's flooding problems solely through the physical works of our small voluntary organisation. Our pilot and demonstration projects are designed as robust interventions in their own right, but also as vehicles to inspire others to take up the battle.

The fact that we are professionals has meant that we have been taken seriously by agencies and the local authority, who have worked with us as true partners and have valued the community's input.

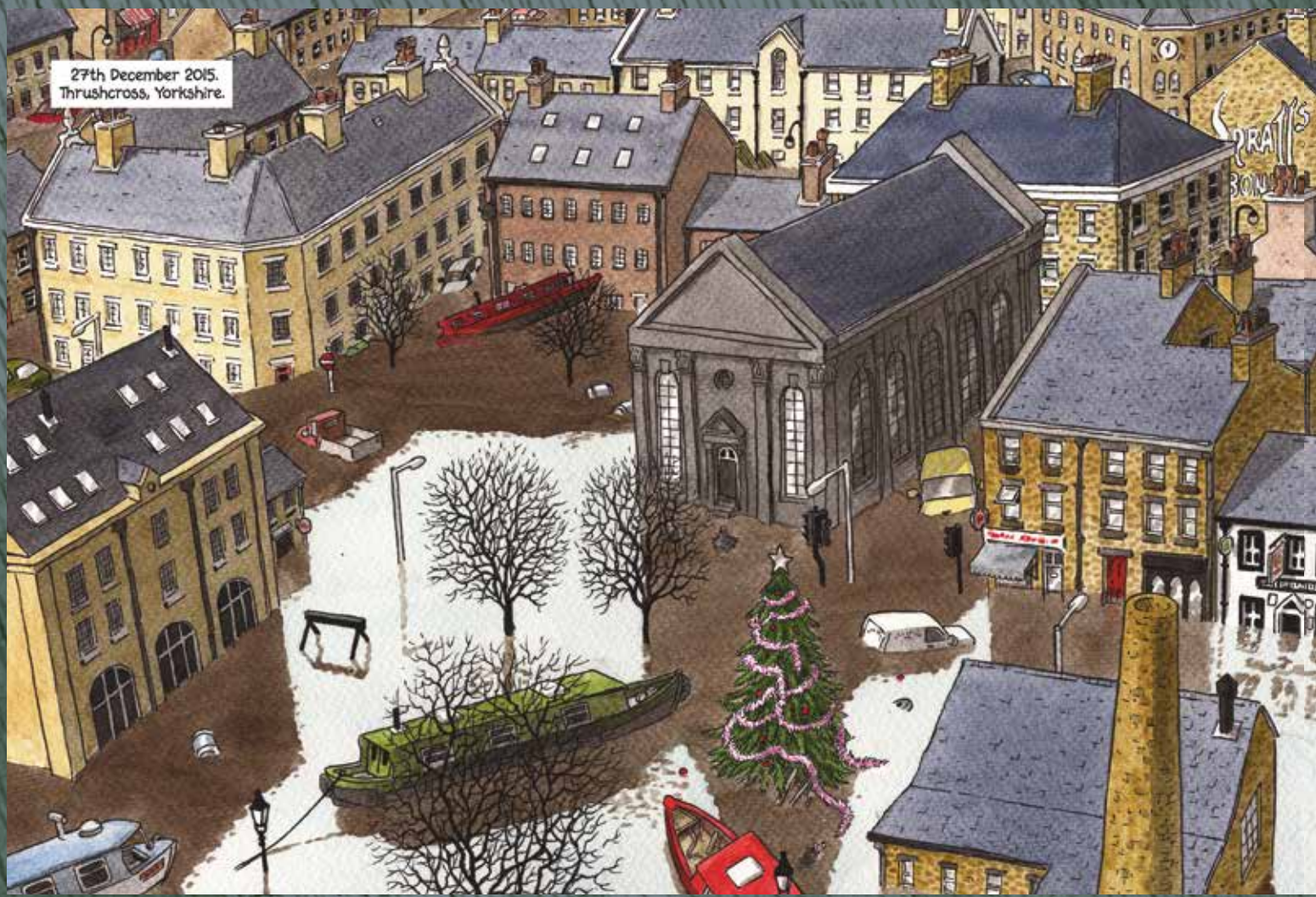
Ultimately this is a story about community resilience. The end point may not be clear at the start – or even still – but having the courage to use our professional knowledge and engage with residents and politicians on important climate change related topics where we can offer informed solutions, can reap rich benefits.

Amanda McDermott is a chartered landscape architect working for 2B Landscape Consultancy.

Robin Gray is a chartered landscape architect currently working for the Forest of Bowland AONB/ Lancashire County Council. He worked on the DEFRA Community Resilience Pathfinder Scheme 2014-15 whilst employed at Pennine Prospects. He qualified with a Post Graduate Certificate in Flood Risk Management at the University of Lancaster through a bursary from the JBA Trust.

RAIN

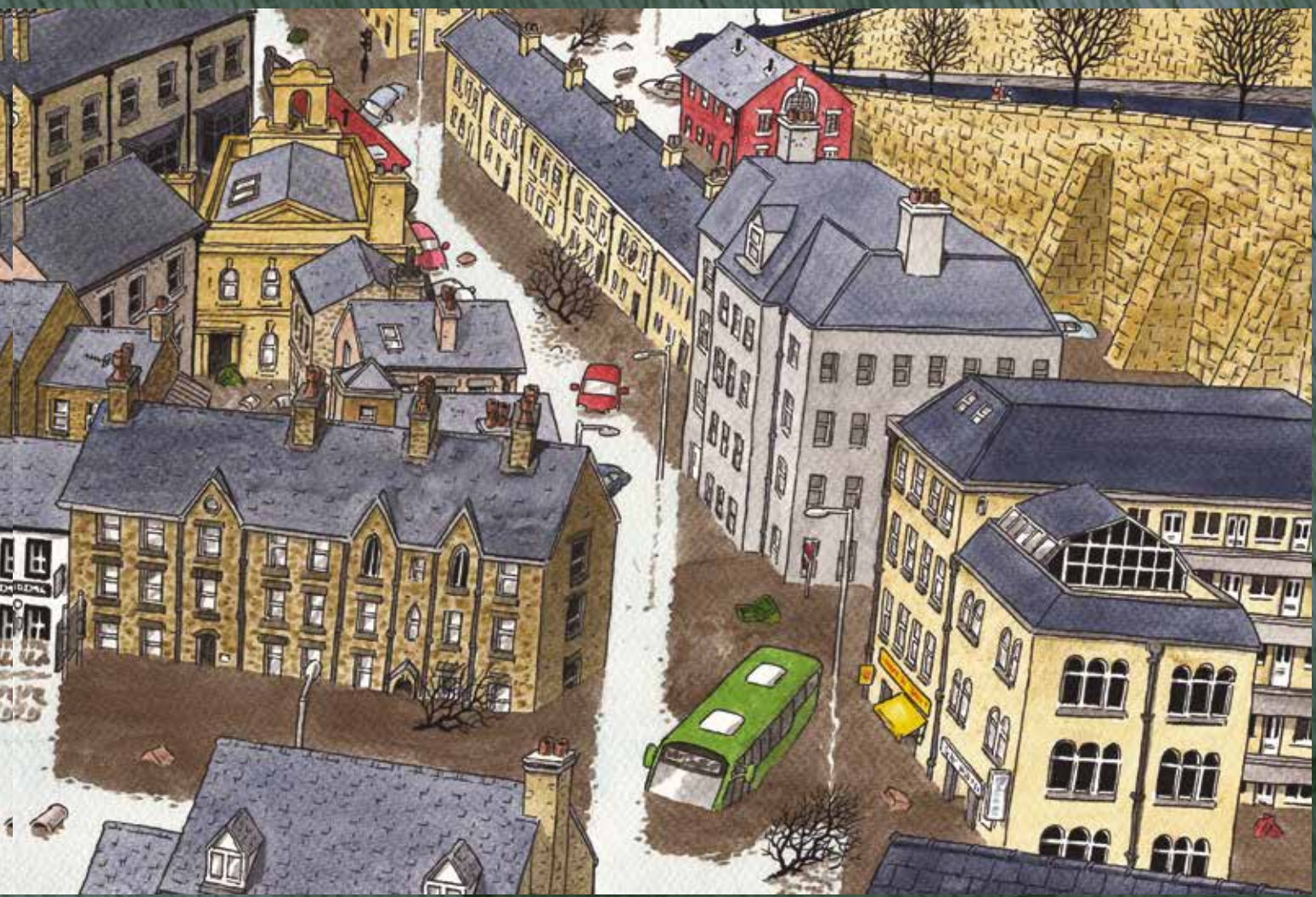
One response to climate change and emergency is to look for different ways of depicting its impact. RAIN is inspired by the flooding in the North of England in 2015. It addresses climate emergency and shows how the moorland is being mismanaged, birds and animals are being slaughtered and crops are being systematically poisoned.

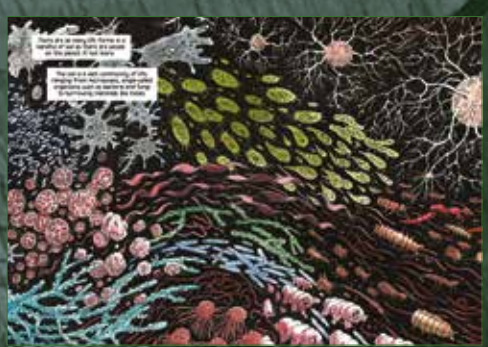


Mary Talbot is a scholar of gender and language. Her first graphic novel, *Dotter of her Father's Eyes,* won the Costa Biography Award with Bryan Talbot. Bryan Talbot is the winner of many comic awards and has been working in this medium for forty years.

Images reproduced courtesy of the authors.

RAIN is published by Jonathan Cape.



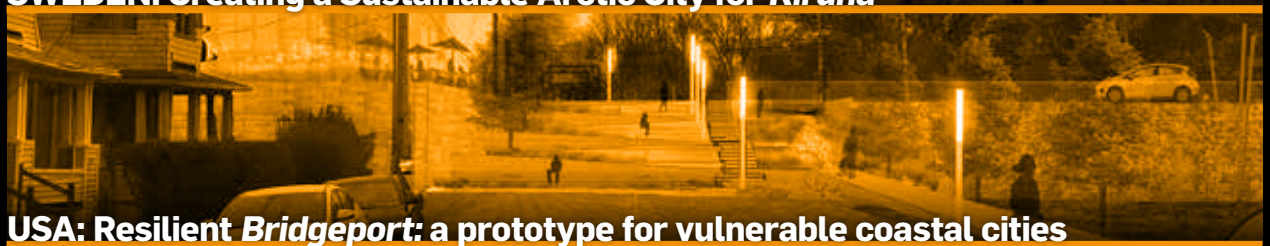


International showcase

Each quarter Landscape is planning to invite readers to submit their most inspiring ideas for addressing climate emergency. To start this new series, we present five projects.

DENMARK: *Tåsinge Plads* – Copenhagen's first climate-adapted urban space

SWEDEN: Creating a Sustainable Arctic City for *Kiruna*



USA: Resilient *Bridgeport:* a prototype for vulnerable coastal cities

NEW ZEALAND: *Scott Point:* setting the standards for a sustainable sports park

ITALY: TECLA – a 3D printed global habitat for sustainable living

To contribute your ideas, contact the commissioning editor: Paul Lincoln, **paul.lincoln@landscapeinstitute.org**

1.Tåsinge Plads.

2. Bølgen, the wave, is both a play element and a piece of furniture.

Denmark

Tåsinge Plads – Copenhagen's first climate-adapted urban space

WSP | Orbicon with the City of Copenhagen, HOFOR, GHB Landscape Architects, P.Malmos, Feld & Via Traffic Developer: City of Copenhagen

By Fiona Hurse
Landscape Architect Orbicon | WSP

Tåsinge Plads is one of more than 300 planned Cloudburst Projects in Copenhagen, designed to manage predicted increases in extreme rainfall events due to climate change, as well as set the scene for urban nature, play and social interaction. Tåsinge Plads (*'plads' = 'square'*) is located in Sankt Kjelds Kvarter, the City of Copenhagen's first climate resilient neighbourhood. The square tells the story of a neighbourhood: communicating both the water cycle and the life of an urban community, combining the technical requirements of stormwater management with the neighbourhood's desire for a green local meeting space.

Tåsinge Plads was developed in close dialogue with the surrounding residents, the local municipality and key stakeholders. Residents actively participated in public meetings, including testing and relocating pieces of furniture including *bølgen,* the wave, now permanently installed in the square for children to play on. At the official opening, 16,000 people gathered to experience the new urban oasis, which demonstrates the significant public interest in this new approach to social and spatial planning.

More than 1000m^2 of asphalt and an unused grass area have been transformed into Tåsinge Plads, as it's known today. The square comprises three parts; *solskrænten*, the south facing slope, a warm, sunny and inviting lawn area; *torvet*, the plaza, located in the middle which receives the best climatic conditions; and *regnskoven*, the rainforest, which is the lowest part of the site and incorporates a bioretention basin. Tåsinge Plads is also an urban habitat, representing a cross section of the Danish countryside, with various plant biotopes including a hillside, lakeside, wet and urban biotopes. This green oasis is framed by beloved Copenhagen urban icons: the Copenhagen lamppost, the Copenhagen bench and the Copenhagen footpath. These features not only frame the space but reflect the site's history and ensure the square complements and blends seamlessly into its surrounding context.

Tåsinge Plads separates more than 7000m^3 of rainwater per year from the previously combined sewage network via three integrated stormwater management systems. This provides increased capacity and design life for the existing sewage system and reduces the risk and potential damage associated with extreme storm events. The stormwater management solutions take into consideration where the stormwater falls e.g. on the square, road or roof surfaces,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which then determines what it can be used for. Whilst these solutions have an important technical function, they also have an important social and environmental value, since the solutions make the water cycle visible and increase education and awareness of climate issues and adaption to the end users.

Tåsinge Plads demonstrates the success of using public spaces to solve the problem of more frequent extreme rainfall events in Copenhagen. The square has also become a local landmark, leading the way for other national and international climate adaptation projects due to its integrated approach to water management solutions, social and spatial planning.


1

Sweden

Creating a Sustainable Arctic City for Kiruna

White Arkitekter with Ghilardi + Hellsten Arkitekter

3, 4. Kiruna.

Kiruna, Sweden's northernmost city, is home to the largest iron ore mine in the world; an equivalent of six Eiffel towers worth of high-grade ore is extracted every 24 hours. Run by the state-owned company LKAB, two thirds of Kiruna's population are dependent upon the mine for employment. But, in one of the largest urban transformations of our time, the Arctic city must move. Land deformation from iron ore extraction on the city's western border is gradually swallowing the land the town is built on.

In February 2013 White Arkitekter working with Ghilardi + Hellsten Arkitekter won an international competition for a 20-year masterplan of Kiruna's phased relocation by 2033. In their pitch White challenged the brief and has taken a much longer view, initiating a 100-year masterplan with the aim of creating a sustainable model city, a city with a diverse economy that is less dependent on the world market for iron ore.

As part of this new masterplan, the entire city will move two miles eastwards. This is a huge challenge. It is also a unique opportunity to transform the city for the better – the relocation presents an unparalleled opportunity for Kiruna to transform itself into a more environmentally, socially and economically sustainable city. It required careful strategic planning and close consultation with the entire community. Through listening and creating an ongoing dialogue with the city's 20,000 citizens, their emotions, ideas and ambitions have informed and shaped the strategic plan, as well as helping the citizens plan for their own futures.

The New Urban Plan

The new development is designed to a carbon neutral agenda. A new central strip running west to east through the existing city centre will be incrementally extended on one side, while buildings at the other end will be gradually dismantled.

The first phase includes a new civic square, as well as a travel centre, city hall, library and swimming pool. Extending out from the central civic square, neighbourhoods will form prongs or 'urban fingers' into the surrounding Arctic landscape so that residents are never more than three blocks away from nature.

This denser, more intelligent plan is equipped with meeting places and cultural amenities to promote public life, broadening the male dominated demographic of Kiruna's past, allowing a more diverse community to settle and thrive.

The masterplan utilises existing resources, harnessing the enormous amounts of waste heat generated by the mining activity, combined with wind turbines to generate energy and a new recycling infrastructure to reduce freight and waste. An extra-large communal shop, 'build it yourself' facility and construction recycling depot have been built, so that remnants of the old city can be reused, recycled and retrofitted into the new.

Around the world, it is now inevitable that rising sea levels will lead to the relocation of millions of people by the end of the century. In the future, moving large numbers of people may become commonplace. Kiruna serves as a real-world example of how to tackle the very real prospect of relocating towns and cities. The key to its success is community consultation, open communication and the seriousness with which the urban planners have attempted to continue the town's legacy, while also providing high-quality new facilities for its current and future generations.

5. University entrance.

6. Seaside Park.

USA

Resilient Bridgeport: a prototype for vulnerable coastal cities

WSP

By Miranda Zhang
Lead Planner, WSP

Bridgeport is an historic seaport city sitting at the junction of the Pequonnock River and Long Island Sound in the northeastern United States. The city is facing significant environmental challenges that require it to redefine the relationship between the city and the water for a stronger, responsive future. Resilient Bridgeport comprises a comprehensive resilience strategy and pilot projects focused on protecting homes, businesses and infrastructure from chronic and acute flooding, to foster long-term prosperity in the neighbourhood.

Situated between the Long Island Sound and downtown, the South End is Bridgeport's most vulnerable coastal neighbourhood. Today, it is adversely affected by regular storm events and hurricanes and with ongoing climate change and sea level rise, impacts from these events will be amplified, causing ever-more damage. It is home to over 6,000 residents in historic houses, many of whom are low-income, along with the University of Bridgeport's campus, regional power generation & distribution facilities and the historic Frederick Law Olmsted-designed Seaside Park, which provides sweeping views of the Long Island Sound.

Building a seawall at the water's edge in the South End to mitigate the risk of storm surge proved unfeasible for a variety of reasons. Instead, a structural flood protection barrier up to 4m tall threads through the middle of a mature urban neighbourhood. Rather than deploy standard engineering solutions, a multidisciplinary consulting team led by WSP USA is integrating the flood protection barrier and storm water management into a new public landscape network. It weaves together the heritage park, university campus and the historic neighbourhood, while setting a new elevated datum for future developments and providing dry egress during storm events.

This landscape begins in the core of the University of Bridgeport with a dynamic, iconic, elevated, blue-green landscape introducing an organic, curvilinear design inspired by Olmsted's language at Seaside Park. The new landscape will integrate existing buildings and paths into a visually cohesive system and, importantly, produce an exciting new identity for the campus between the park and the city.

At the east end of University Avenue, an elevated crescent plaza will literally and metaphorically connect the campus to the park head, forming a new gateway node where the park was historically connected to the city, as well as providing views into the park and of Long Island sound. Stormwater collected from inside the surge barrier will be pumped to this plaza, where it will dramatically spill into the park and through it, eventually flowing out to Long Island Sound. The fresh water introduced into the historic park through this system will help to alleviate some of the salinization of the soil occurring due to repeated storm surge events, while reconnecting visitors and residents to the hydrological cycle.

At the end of Main Street, a terraced pocket park will allow pedestrians and cyclists to connect to the elevated plaza, creating another attractive neighbourhood amenity. Through traffic will be directed up and over one of a number of new elevated streets, enabling new connections to formerly industrial waterfront sites which have stood empty for many years because they have no dry egress, opening their potential for new uses.


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New Zealand

Scott Point: setting the standards for a sustainable sports park

WSP Opus

By Catherine Hamilton
Principal Landscape Architect,
WSP Opus, New Zealand

Auckland City will undergo significant urban growth over the next 30 years. New communities will be established on the fringes of the City's existing urban areas, where land to accommodate 137,000 homes and 67,000 jobs has been identified as suitable for urban development.

Expansion in the north west part of the City includes a new community of 20,000 residents at Scott Point. At the centre of this community will be New Zealand's first fully sustainable sports park, covering 16.4ha. Identified as a pilot for future parks across the City, it will help steer the future course of design, development, management and governance of parks across Auckland in a way that responds to the urgent needs of the planet for sustainable custodianship.

Collaborative design approach

WSP worked closely with Tangata Whenua (first nations people) and community stakeholders to develop a robust, design-led masterplan. The collaborative ideology ensured a balanced response that addressed climate change issues and adaptation, whilst contributing to a vibrant sense of place and focal point for the Scott Point community.

Themes that underpin the masterplan include: people and place; consideration of resource reuse and consumption efficiencies; minimising pollution, waste and emissions; regenerative ecology; innovation and management and governance.

For the first time in New Zealand, the Infrastructure Sustainability Council of Australia (ISCA) Infrastructure Sustainability rating tool[1] was used on a park project to guide and measure the sustainability of the scheme. Auckland Council's aim is to achieve the highest ISCA:IS rating, which underpins the potential benefits and application of this approach to future schemes.

Sustainable masterplan

A sustainable programme for the site was envisioned, with an emphasis on restorative ecology, biophilia and multi-use facilities. The resulting masterplan comprises three main areas: a sports zone (23%), an informal recreation area (23%) and an area of ecological restoration (54%). Natural landforms have been retained and earthworks minimised: a major departure from a 'business as usual' approach that commonly emphasises maximising land coverage for sports provision. Leading edge innovation and technology has enabled the scheme to optimise activity within the site, delivering higher levels of provision within the relatively smaller sports area footprint.

Sustainable technologies have been embraced to promote renewable energy, minimise waste, reduce reliance on potable water, minimise carbon emissions and optimise carbon sequestration. Harvesting renewable energy on site will provide a 'closed energy loop' through use of solar panels and wind turbines for the park. Provision for sustainable transportation to, from and around the site has been woven into the scheme and promoted externally. Establishing an integrated design approach and sustainable strategy for irrigation was critical to the success of the design. To meet the demands, innovative products for stormwater capture, treatment and reuse have been identified that will minimise maintenance and use of potable water.

Once complete, the park will be an abundant living landscape and, hopefully, the highly treasured heart of the community. It will showcase a flagship approach to providing sustainable community facilities by demonstrating adaptive, resilient design ready for the future.

7. View to harbour.

8. ISCA rating tool.

[1] https://www.isca.org.au/IS-International

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9. TECLA.
© WASP

Italy

TECLA- a 3D printed global habitat for sustainable living

Mario Cucinella Architects and WASP

It is currently estimated that 150 million people are homeless around the world, equating to 2% of the world's population (Habitat for Humanity, 2015)[1], whilst 1.6 billion people (20%) lack adequate housing for their psychological, social, physical and economic needs. The reasons are many – from poverty to housing shortages and from war to an increasing number of environmental emergencies – often in the poorest countries. A United Nations report, published in 2017, states that the current global population of 7.6 billion people is expected to reach 11.2 billion in 2100 and in 2030 nearly 5 billion people are expected to live in cities. Consequently, governments are faced with substantial challenges related to housing solutions.

To respond to this challenge, WASP, Italy's pioneering specialists in 3D printing, inspired by potter wasps which build their nests using locally sourced materials, has been developing viable construction processes based on the principles of circular economy. WASP create 3D printed houses in the shortest period of time and in the most sustainable way possible.

Mario Cucinella Architects has teamed up with WASP to embark on the development of an innovative model for a 3D printed habitat, just outside of Bologna in Italy. The intention was to create a fast-build, low-cost, flexible model that could then be applied in numerous different contexts around the world.

Their model has been named Tecla, after an imaginary city described by Italo Calvino in The Invisible Cities as a 'continuous urban evolution'. It is representative of both companies' efforts to combine technological innovation with a respect for the environment and an understanding of natural processes.

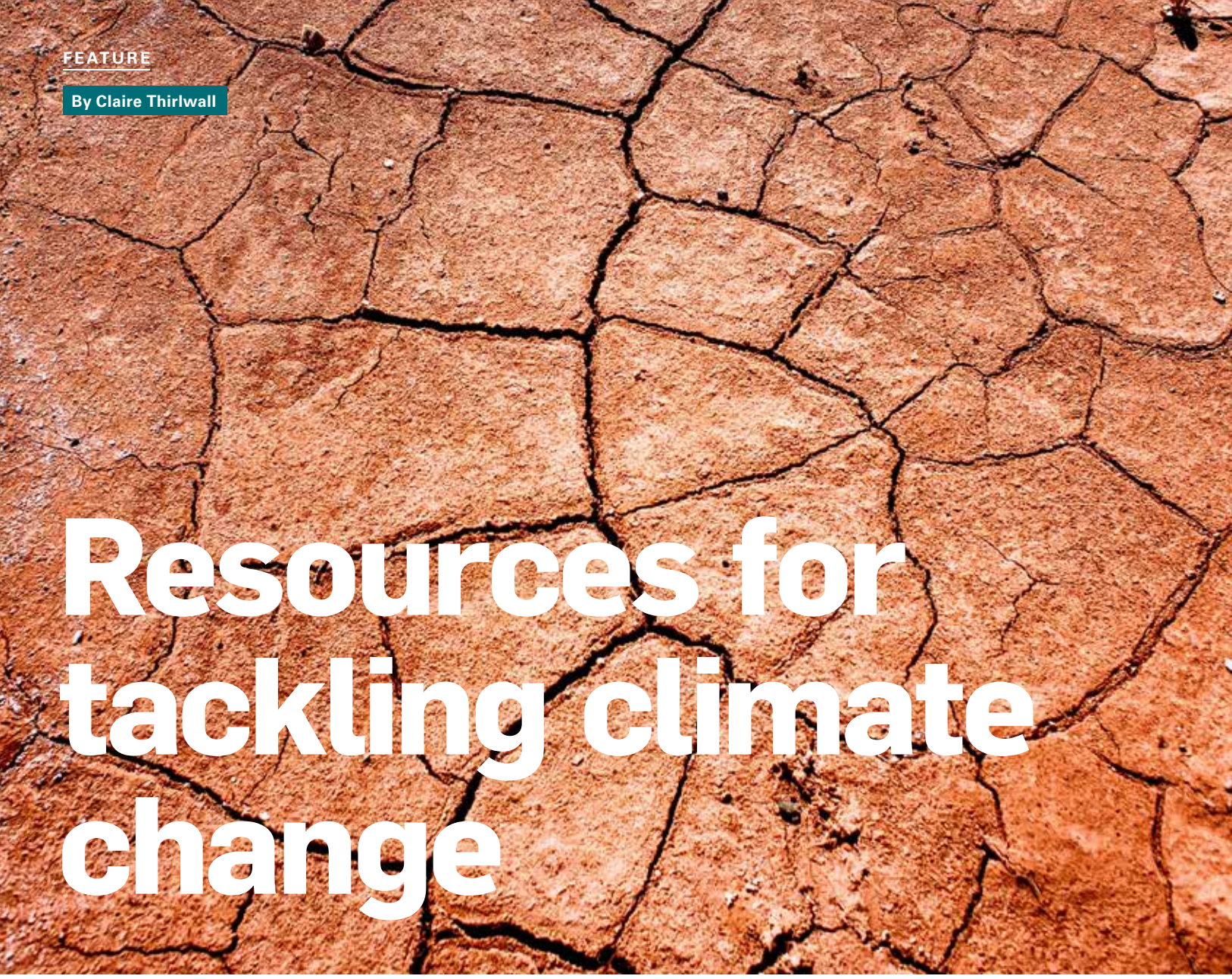
Borne from their collective vision to provide a home for everyone at a time of exponential population increase and an associated lack of affordable housing around the world, it is a new circular housing model, created using entirely reusable, recyclable materials taken from the local terrain. Tecla will be the first house to be entirely 3D printed using locally sourced clay – a biodegradable and recyclable 'km 0 natural' material which will effectively make the building zero-waste. It will be built to adapt to multiple environments and it will be suitable for self-production through the use of WASP's innovative Maker Economy Starter Kit. Built using Crane WASP, the latest innovation in on-site 3D construction, Tecla represents a step-change in the move towards eco-housing. It will be the first habitat to be built using multiple collaborative 3D printers, offering a greater scope of scale than ever before. The prototype is now in development and should be complete by the end of the year.

Tecla was developed using in-depth research undertaken by the School of Sustainability – a professional school founded by Mario Cucinella that combines education, research and practice. The research, conducted with the support of MA students from the Sustainable Environmental Design programme at the Architectural Association School of Architecture in London, explored the cause and effects of homelessness. It interrogated the use of technological advances to enable a solution, based on case studies in locations with different climates.

[1] Habitat for Humanity estimated in 2015 that 1.6 billion people around the world live in "inadequate shelter" https://en.wikipedia.org/wiki/List_of_countries_by_homeless_population#cite_note-2

FEATURE

By Claire Thirlwall



Resources for tackling climate change

LI members will soon be obliged to do five hours of CPD per year on climate change, Claire Thirlwall explores some of the tools and guidance available to help the professional understanding of the topic.

As landscape architects we are well placed to act to reduce carbon emission and reduce the impacts of climate change. The LI declaration calls for "a minimum 5 hours' climate, sustainability and resilience-related CPD per year for all members" but with such a pressing and wide-ranging issue it can be difficult to find sources relevant to our profession.

Many of the best sources are online, as they allow for constant updating as new data emerges. Blog posts, podcasts and academic studies are useful, although it is worth questioning the credibility of any source and the agenda of the person creating the content – always question the purpose of the article and find the source material where possible. I've seen facts cited at landscape events where the original source was a company selling washing powder, demonstrating how important it is to scrutinise the motives as well as the data.[1] As a profession, we need to ensure that the environmental information we present to clients is accurate and relevant. Referring to dubious data undermines rather than strengthens our argument. Using **Google Scholar** for web searches means that your results will be drawn from peer reviewed scholarly literature, including academic journals, conference papers and technical reports rather than tabloid articles or blog posts. **www.scholar.google.co.uk**

Dried soils.
© Donald Giannatti on Unsplash

[1] 'Free the kids', in *OMO Global*, <https://www.persil.com/uk/free-the-kids.html> [accessed 18 September 2019].

1. Sustainable Development Goals.

2. Information is Beautiful – how do we get to zero Greenhouse Gas Emissions?
https://informationisbeautiful.net/visualizations/how-to-reduce-the-worlds-carbon-footprint-by-2050/

3. Sustainable Development Goals.

1

United Nations Sustainable Development Goals

is a list of 17 goals that are "a call for action by all countries – poor, rich and middle-income – to promote prosperity while protecting the planet." Many of the goals relate to our work, such as avoiding wasting water, planting trees and creating sustainable cities and communities. The website has an interactive list and a mobile app which includes links to events and actions. Working through the goals, identifying aspects of our work where action can be taken, would be an excellent in-house CPD exercise. For example Goal 11 – Sustainable Cities and Communities sets the target of "by 2030 provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities."[4]

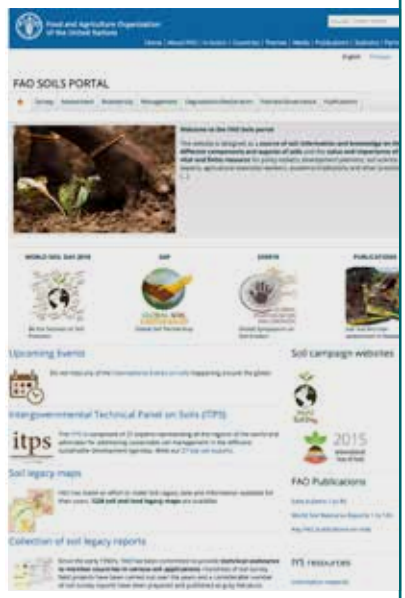
Interestingly a World Health Organisation review of evidence supporting urban green spaces and health states the importance of our role in meeting the goals, "The informed work of landscape architects, planners and urban designers is important in contributing professional expertise to ensure that health benefits as well as environmental and economic co-benefits of green spaces are maximized and future opportunities are not lost through short-sighted urban development decisions."[5]

www.un.org/sustainabledevelopment/sustainable-development-goals/[2]
Mobile app at
www.sdgsinaction.com/[3]

3

Food and Agriculture Organizations of the United Nations

Soil is a finite resource that is being eroded faster than it is created. Healthy soil is essential for the success of our planting schemes but it is also an important store for carbon, supports biodiversity and plays a role in the quality and availability of our water supply. The FAO Soils Portal has information on soil management practices.



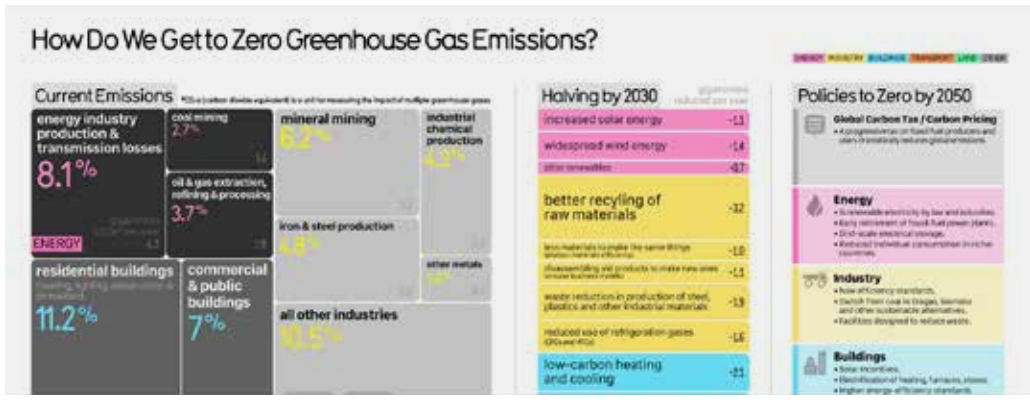
www.fao.org/soils-portal/en/

2

Information is Beautiful

This website visualisation helps show the balance of current emissions using the size of each box to show ratios and then the steps needed to achieve zero emissions by 2050. For landscape architects the emissions from deforestation and soils may be a topic we feel we can help address, but it is worth considering the impacts of transport and residential buildings. In the UK cars account for 79% of all traffic on roads, so our transport decisions may be far more important than our food choices. The data supporting the visualisation can be found at bit.ly/CarbonZero

www.informationisbeautiful.net



[2] 'Cities – United Nations Sustainable Development Action 2015', in *United Nations Sustainable Development*, <https://www.un.org/sustainabledevelopment/cities/> [accessed 19 September 2019].

[3] 'Urban green spaces and health – a review of evidence (2016)', , 2019, , p. 40, <http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/publications/2016/urban-green-spaces-and-health-a-review-of-evidence-2016> [accessed 19 September 2019].

[4] 'Sustainable Development Goals: 17 Goals to Transform Our World', in *United Nations Sustainable Development*, <https://www.un.org/sustainabledevelopment/> [accessed 28 August 2018].

[5] 'SDGs in Action', <https://sdgsinaction.com/> [accessed 18 September 2019].

4

ELLEN MACARTHUR FOUNDATION

Ellen MacArthur Foundation

The foundation promotes the circular economy, a concept where products and materials are kept in use for as long as possible, either by being repaired, reused or recycled. The initial outlay may be higher but whole life cost and environmental impact is often greatly reduced.

It is worth remembering the refuse, reduce, reuse, repair, recycle mantra. Recycling, often seen as a positive step, is still the second worst option. Street furniture is a candidate for the circular economy – the manufacturer would supply and maintain the product, the client would pay a fee throughout the product's life and the manufacturer would remove the product for either repair or remanufacture, with all components reused in some way. Specifying items that can be repaired, or can be reused if the site is redeveloped, helps reduce the impact of our work.

www.ellenmacarthurfoundation.org

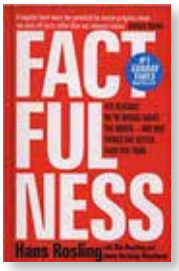
5

Factfulness: ten reasons we're wrong about the world – and why things are better than you think

by Hans Rosling. Not a book specifically about climate change, though it is covered, but a wonderful book that will improve your understanding of the world and the progress that has been made.

Barack Obama described it as "a hopeful book about the potential for human progress when we work off facts rather than our inherent biases." Rosling was a health adviser to the World Health Organisation and UNICEF who worked throughout the world, including during the 2014 African ebola outbreak. His advice on interpreting data is invaluable, as is the message that humanity has the ability and the will to solve global problems.

www.amazon.co.uk/Factfulness-Reasons-Wrong-Things-Better/dp/1473637465



6

The Living Building Challenge

Described as "the world's most rigorous proven performance standard for buildings." The Challenge also covers landscape and infrastructure projects. Many of the aspects of the Challenge are relevant to landscape architecture, and worth considering even if you don't want to apply for accreditation. The components of the standard are Place, Water, Energy, Health + Happiness, Materials, Equity and Beauty.

The Challenge requires projects to be self sufficient, producing more energy than they use and collecting and treating all water on site. Certification is based on actual rather than anticipated performance – sites have to demonstrate 12 months performance before they gain certification.

The latest standard Living Building Challenge 4.0, issued in 2019, can be downloaded for free at www.living-future.org/lbc

LIVING BUILDING CHALLENGE™

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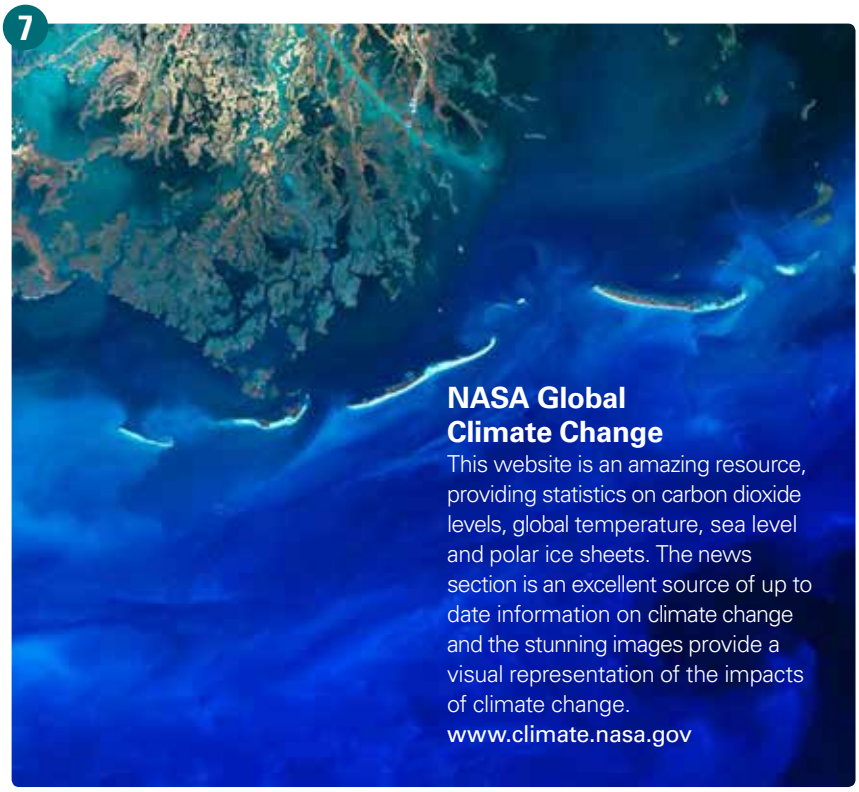


NASA Global Climate Change

This website is an amazing resource, providing statistics on carbon dioxide levels, global temperature, sea level and polar ice sheets. The news section is an excellent source of up to date information on climate change and the stunning images provide a visual representation of the impacts of climate change.

www.climate.nasa.gov

4. Linear v Circular economy diagram.
Based on https://www.mfe.govt.nz/waste/we-all-have-role-play/responsible-product-management/about-product-stewardship

5. Factfulness.

6. The Living Building Challenge.

7. Image taken by the Enhanced Thematic Mapper instrument onboard the Landsat-7 satellite.
Source: U.S. Geological Survey (USGS) Landsat Missions Gallery, "Louisiana Silt," U.S. Department of the Interior / USGS.[6]

[6] 'Louisiana silt', in Climate Change: Vital Signs of the Planet, <https://climate.nasa.gov/climate_resources/64/louisiana-silt> [accessed 18 September 2019].

8. Climate Positive Design Toolkit.[7]
9. CNN Climate Quiz.
10. After the Blue Planet II episode showing the impact of plastics on marine life, paper straws have gained in popularity.
Photo by Meghan Rodgers on Unsplash

8

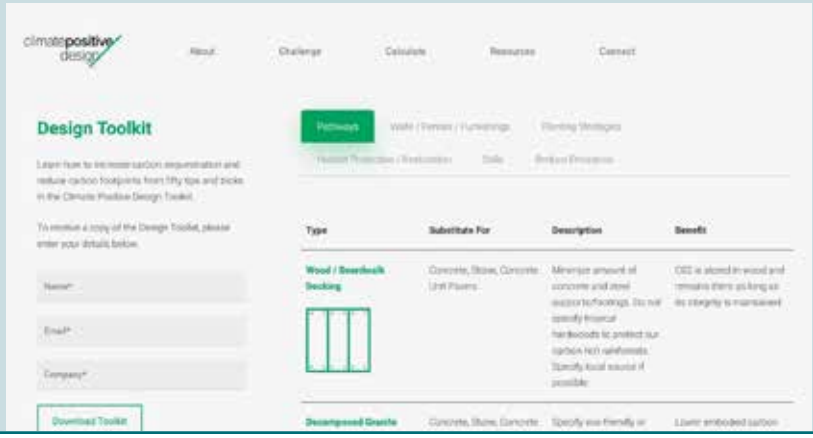
Climate Positive Design Challenge

Launched in late September 2019 by Pamela Conrad, Principal at San Francisco based practice CMG Landscape Architecture, the challenge is "a call to action for landscape architects, municipalities, property owners, developers, and associated professionals around the world to reduce carbon footprints and increase carbon sequestration."

The target is for landscape architecture projects to sequester more CO_2 than they emit by 2030 and to remove one gigaton of CO_2 from the atmosphere by 2050.

Using the Pathfinder Tool landscape architects will be able to reduce their carbon footprint and actively contribute to climate change solutions as part of their professional practice. The app looks at materials, planting strategies, habitat protection/restoration and soils and how traditional practices can be substituted with techniques that reduce the environmental impact. As a newly released tool it has no track record, but having a tool specifically for our profession is a great step.

www.climatepositivedesign.com



9

CNN Climate Change Quiz

This quiz from the US news channel asks you to rank different solutions to climate change and comes up with some priorities that may surprise you.[9] The quiz is based on data provided by the research organisation Project Drawdown, which provides 80 climate change solutions by rank.[10]

10

Podcasts – BBC Global Business Plastic backlash: The business response[8]

This excellent and well-researched programme looks at the facts behind the use and impact of plastic. The programme debunks some of the myths, talks to brands including Lego and Iceland, and looks at how in some circumstances plastics can reduce wider environmental impact such as food waste – in carbon terms the impact of food waste can be up to 10 times that of the packaging – and why we need to consider the entire lifecycle of an item.

www.bbc.co.uk/programmes/w3csy81j

The tools suggested are a first step, but to reduce our impact we need to look at all aspects of our work and personal lives. We need to consider the impact of our computer use, such as file sharing, servers, music streaming and web searches; the food we eat and how much of it we waste; how we travel to site and the way we light and heat our offices, amongst others. Understanding the impacts is the first step, but that knowledge is only of value if we then take action.

We will be extending and reviewing this list of resources for future publications. You can also check our climate resources web page at https://www.landscapeinstitute.org/policy/climate-change/

Please send your feedback and further suggestions to the commissioning editor, Paul Lincoln: paul.lincoln@landscapeinstitute.org

Claire Thirlwall is director of Oxfordshire based landscape practice Thirlwall Associates. Her book "From Idea to Site: a project guide to creating better landscapes" is due for publication in January 2020.

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FEATURE

By Jill Bullen

Landscape Character and the impact of climate change

Communicating change through landscape character can empower planners, decision makers and communities to be proactive argues Jill Bullen

The risks of climate change often feel far removed from where we live, and from where we visit. The media communicate extreme events such as wildfires, coastal storm surges and fluvial flooding affecting settlements. But climate change is becoming more pervasive and evident on everyone's doorstep, affecting where we live, how we get to places, the designated, special and everyday landscapes.

At a scientific and policy level we are equipped to understand the risks for the UK from a changing climate, they are explained in evidence reports such as the UK Government's Climate Change Risk Assessment (CCRA) and in the 2018 UK Climate Projections. Based on the recommendations from the Committee on Climate Change the UK has committed to reducing net carbon emissions to zero by 2050. Governments, towns, organisations and Institutes in the UK, including the Landscape Institute, have declared a Climate Emergency. Such evidence and policy directions help decision makers shape our future mitigation and adaptation actions in response to climate change.

The changing climate and the outcomes of these decisions and actions will directly and indirectly impact on the landscapes in which we live, work and experience life, with implications for landscape character, local distinctiveness and quality. Yet, do we really understand how landscapes may change? What qualities would we want to conserve if we had a choice? What landscape changes must we be prepared to accept and how extensive are these changes likely to be if we are to realise our commitments to emissions targets?

Flooding and drought events, more frequent extreme weather, coastal erosion, wildfires, diseases affecting tree cover, changing land cover, habitats and species ranges are examples of how the landscape may change to a greater or lesser degree, in the short or long term. Landscape changes may also be evident from mitigation measures, such as renewable energy generation, water resource management and adaptation through the planned expansion of woodland.

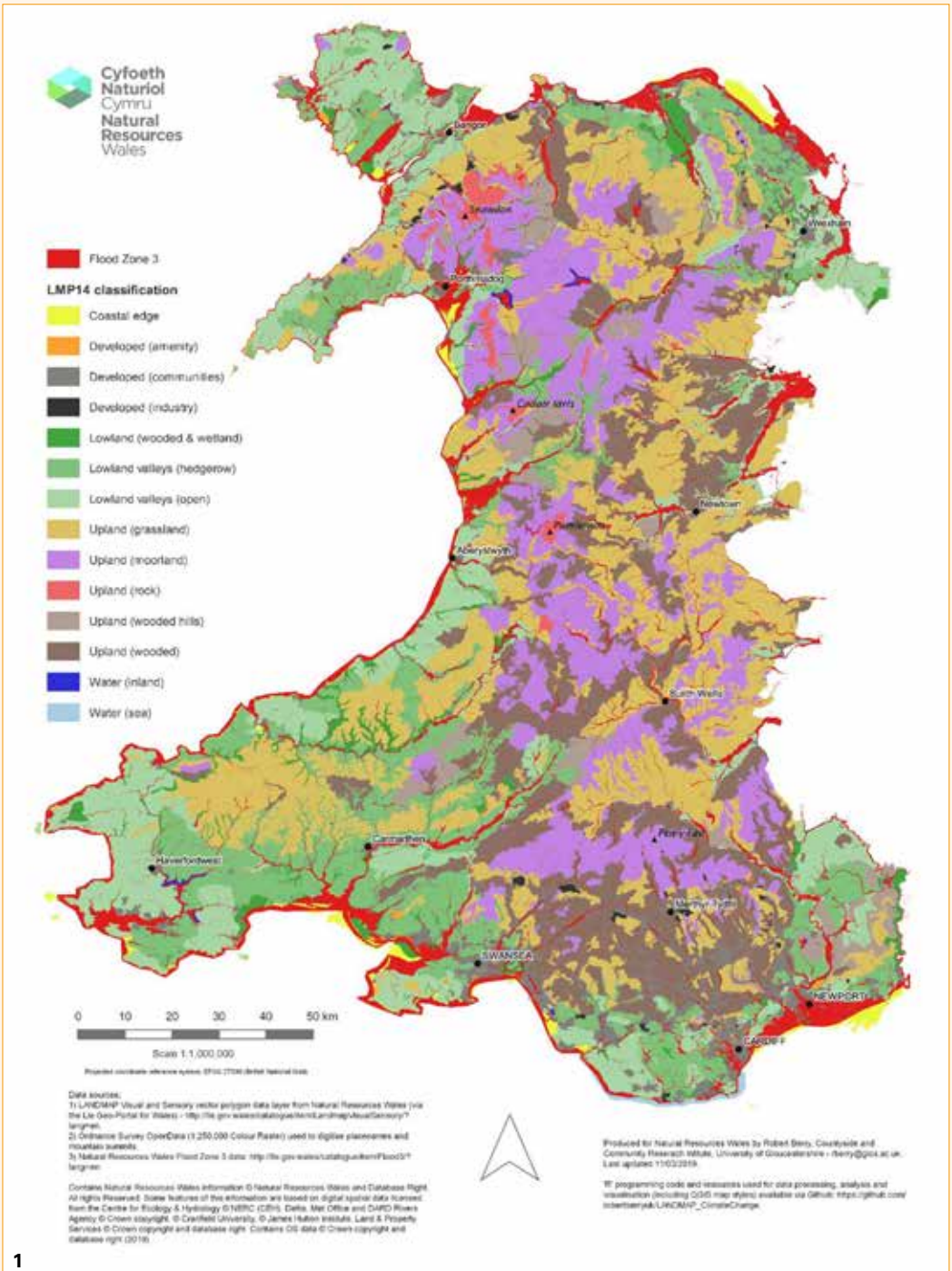
Landscape character can be used to convey these changes and the fact that the future will look different; climate change will affect the landscapes we live in and the landscapes that are important to us as individuals or as a nation. Change, whether ephemeral, short-lived or long lasting, is inevitable and landscapes will need to adapt. Visualisations and descriptions of changing landscape character can be used to portray, explain and raise the profile of actions that may be in response to climate change, such as

The UK has committed to reducing net carbon emissions to zero by 2050

1. Spatial distribution of 14 landscape types in Wales with Flood zone 3.

new woodland planting as a response to our emissions targets. This has been done in the Clwydian Range and Dee Valley AONB where visualisations of adaptation linked to landscape types has been very effective. Landscape character can also be used to make the connections and interrelationships between landscape types too. For example, targeted new woodland planting in upland grassland landscapes to slow the flow of catchment water may be in response to a flood risk associated with open lowland valley and developed landscapes.

National landscape character assessments provide us not only with a readily available landscape evidence base to assess potential impacts against, they also provide a unique communication tool. Through the lens of landscape character, the public and decision makers can picture and rationalise the implications of future climate change and the management scenarios we might want to test, before committing to particular actions. This process can raise awareness and understanding of the risks and opportunities of climate change for people now and for future generations.



The landscape risks for Wales from a changing climate

In Wales, under a medium emissions scenario, temperatures and winter rainfall are projected to increase and summer rainfall decrease; sea levels are predicted to rise by 22cm by 2050. Whilst there may be some small benefits from warmer mean temperatures, overall impacts will have a negative effect on the landscape. The exceptionally hot, dry weather in the summer of 2018 is a good example, the widespread drought conditions revealed new archaeological sites through cropmarks, but large wildfires on the moorland of Moel y Gamelin near Llangollen (within the Clwydian Range and Dee Valley AONB) and the woodland in Cwm Rheidol near Aberystwyth (Image 1) were adverse impacts, with the risks of these events exacerbated by the drought. If we can understand the nature of these risks and their long-term impacts on landscape, then as landscape practitioners we can not only convey this using character assessment, but we can also have a role to play in proactively steering mitigation and adaptation actions towards more beneficial outcomes for landscape.

The Welsh landscape evidence base LANDMAP provides an opportune resource to develop as a planning for climate change tool, from which awareness, risks and opportunities for planners, land managers, people and communities can be explored and decision makers can justify their plans and actions. A programme of work based on LANDMAP was initiated in 2018 to identify the direct and indirect impacts of the projected climate changes by 2050 on the landscape characteristics

and qualities that we recognise today in Wales.

We used the LANDMAP Visual & Sensory spatial database which divides Wales into 1,991-character areas. This was simplified down to 14 landscape types categorised by landform and principal land cover type. It thus provided a framework within which climate change issues for landscape elements like woodland cover, habitats, boundaries and hedgerows, increased pest and disease risks, wild fires, drying out of grasslands and coastal flooding could be explored.

Summary landscape and climate change narratives were written for each landscape type, explaining the potential risks and opportunities arising from climate change and highlighting the potential impacts on the key landscape characteristics and qualities. The approach also linked flood risk zones and landscapes below the 1 metre contour to landscape types that may experience flooding and storm surges (Figure 1 and Table 1). Summary statistics and thematic maps were also produced to highlight variations and vulnerabilities associated with different landscape types. These were prepared at a national, regional and local level to align with a range of planning and decision-making scales. For example, the maps and statistics can provide context and focus for the collaborative 'Climate Ready Gwent' work which covers five local authorities in Wales, through to the national scale of the Draft Climate Change Adaptation Plan for Wales.

2

3

Valleys and rolling lowland characterise 15% of Wales, a landscape type that has between 20-50% woodland cover and a fieldscape that is dominated by hedged boundaries, referred to as 'Lowland valleys (hedgerow)'. 47% of this landscape type in Wales is evaluated in Visual & Sensory terms as nationally important (outstanding and high) for its scenic character and quality. Any changes in the landscape mosaic, woodland cover and/or hedgerows from extreme storm events (Image 3), stress and disease may have marked effects upon the key characteristics and qualities that define that distinctive landscape.

Further work in 2019 will build upon the information already prepared and go on to identify the landscape and visual changes from potential mitigation and adaptation measures. Landscape character will again be the mechanism to convey landscape change. Photographs of changes and events associated with climate change will be a key element to communicate the risks, with the message that we may experience more of them and more frequently.

The landscape character and climate change work we have done could be applied to climate change plans outside of Wales. The use of generic landscape types and the high-level approach provides context and headline issues without overwhelming detail for clients and plan makers. Furthermore, landscape monitoring programmes linked to landscape character assessments provide landscape evidence of change. With evidence, we are in a better position

2. Hot, dry landscape and remnants of a 3 day wildfire in the Rheidol Valley (2018).

3. Storm flattened woodland on the Trawsgoed Estate (2018).

Wales by 2050:*

temperatures and winter rainfall will increase

... summer rainfall will decrease

sea levels will rise by 22cm

*Predictions under a medium emissions scenario.

LMP14 Landscape Type	Area (% Total Wales)	<=1m ASL % total area within each LMP14 Type	Flood Zone 2 % total area within each LMP14 Type	Flood Zone 3 % total area within each LMP14 Type	Landscape Value (% total area within each LMP14 Type)			
					Low	Moderate	High	Out-standing
Coastal edge	2.45	50.94	60.32	59.22	0	8.45	56.44	35.12
Developed (amenity)	0.24	1.28	25.26	20.96	20.29	68.27	8.50	2.93
Developed (communities)	4.47	0.5	16.80	12.75	0	0	0	0
Developed (industry)	0.43	0.31	5.07	4.02	78.7	5.75	13.72	1.83
Lowland (wooded and wetland)	2.37	3.53	19.50	17.24	2.01	16.81	71.31	9.88
Lowland valleys (hedgerow)	15.03	0.06	5.28	4.38	0.27	52.72	40.55	6.46
Lowland valleys (open)	16.59	0.34	17.82	16.24	1.11	66.16	28.16	4.58
Upland (grassland)	23.17	0.01	2.44	2.11	0.59	62.29	35.30	1.82
Upland (moorland)	14.44	0	0.54	0.48	2.85	10	52.85	34.31
Upland (rock)	0.81	0	0.34	0.28	0	0.66	0.06	99.28
Upland (wooded hills)	3.26	0	1.11	0.96	6.14	34.73	55.09	4.05
Upland (wooded)	15.73	0.01	2.26	1.91	2.97	45.32	45.96	5.75
Water (inland)	0.5	13.83	78.08	75.57	0	29.46	29.27	41.27
Water (sea)	0.51	44.59	64.39	64.26	0	0	19.52	80.48

Summary table of national-level statistics for LMP14 landscapes

to present emerging trends, risks and opportunities to decision makers. For example, the effects of Dutch Elm disease and the impact of the loss of millions of mature English elms from the landscape enables us to relate to the effects of ash dieback and its projected landscape impact. Climate change alone may not be the instigator, but it can be a multiplier, magnifying change in the landscape. Combining climate change assessment with landscape monitoring assessments enables a broader consideration of landscape trends and the likely direction of change.

We have the tools to convey landscape change and be part of the climate change discussion. Landscape practitioners are adept at bringing together multiple facts, possibilities and perspectives: they are used to analysing and visualising change. Through understanding landscape character and quality, they are able to influence good design positively and integrate change, whilst also enhancing resilience. Communicating change through landscape character can empower planners, decision makers and communities to be proactive. Improving awareness and engagement in the risks of climate change and the potential impact on our local landscapes may lead to further behaviour changes and acceptance of mitigation and adaptation interventions that make our homes and our landscapes more resilient.

We need more practitioners to use and advocate the use of landscape character to communicate climate change. The *'risks and opportunities from changes in landscape character'* was recognised in the Climate Change Risk Assessment (CCRA) Summary for Wales; the work in Wales has been submitted as evidence for the next CCRA and landscape character is now positioned for inclusion in landscape scale place-based climate change planning. Evolving landscapes may deliver different characteristics, qualities and functions, but these may be just as valuable to our future resilience, wellbeing and prosperity.

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Jill Bullen is a Fellow of the Landscape Institute and a member of the Landscape Institute Landscape Management Leadership Forum. She has worked and taught in the landscape and historic environment for over 25 years and is currently the Lead Specialist Advisor on Landscape at Natural Resources Wales.

FEATURE

By Zac Tudor and Nigel Dunnett

Turning Sheffield from Grey to Green

1

Sheffield plans to be a carbon neutral city by 2030, aided by one of the largest SuDS retrofit projects in the UK

Sheffield has long laid claim to the title of the UK's greenest city, due to the sheer amount of woodlands, parks and green spaces within the city limits.

This legacy is largely the result of a city plan (the Abercrombie Plan, 1924) from the early 20th century that established a network of linked parks and protected spaces running from the city's rural hinterland through the suburbs to the edge of the city centre: what in today's terms would be called visionary large-scale urban green infrastructure planning. Now, nearly one hundred years later, the city is seeking to redefine contemporary concepts of green infrastructure by extending this vision into the very heart of the city and applying it on a truly transformational scale, in the context of climate change adaptation. Crucially, the Sheffield approach seeks to switch the dominant green infrastructure focus from achieving ecological function to one where aesthetic considerations, beauty and public acceptance are given at least equal weighting. Furthermore, it is doing this through the use of innovative, sustainable and research-based horticulture, within a strong landscape design framework. It's an attempt to give new meaning to the Garden City, or City in a Garden idea: creating a 'Sheffield City Garden' that seeks to infiltrate multifunctional and beautiful greening at every opportunity to future proof the urban and human environment against climate and weather extremes.

The current strategy has its roots in the 1990s, when a landscape-led approach was taken to regenerating Sheffield City Centre. The 'Gold Route' from Sheffield Station concourse through to the city centre and on to the University of Sheffield has won much acclaim for its high-quality definition as a civic route, with its high profile horticulture and craftsmanship. The much-loved Peace Gardens sit at the core of this route and set a benchmark for a civic garden with year-round interest, as a setting for a wide range of activities and for a high standard of maintenance. However, what were then seen purely as attractive and enjoyable spaces, or used as high quality settings for regeneration, now need to be something much more whilst still achieving these important goals.

As a result, Sheffield's new approach to city centre public realm aims to contribute to a healthier city by concentrating on the climate change resilient benefits from its urban spaces and this in turn places renewed attention on the exciting potential of the public realm. A major impetus for this was the catastrophic flooding that parts of the city centre suffered in June 2007, following three days of continuous heavy rain, causing the

The Sheffield approach seeks to switch the dominant green infrastructure focus from achieving ecological function to one where aesthetic considerations, beauty and public acceptance are given at least equal weighting

1, 2, 3, 4. Sheffield Grey to Green project.
© Nigel Dunnett


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water level in the River Don to rise by at least five metres and subsequently burst its banks into the city. Millions of pounds worth of damage resulted and two fatalities. Subsequent investigations identified the amount of built development and hard surface within the urban catchment of the Don as being a major cause of this flooding following extreme weather. As a result, a raft of new measures were implemented to prevent this happening again, including a renewed focus on urban SuDS and water-sensitive design.

The most visible expression of this is the city's Grey to Green scheme. This is the UK's largest retrofit SuDS project and also one of the UK's largest inner city 'Green Streets'. Design work started in 2014, with Phase 1 of the 1.6-kilometre scheme installed in 2016 and Phase 2 is currently under construction. The scheme took advantage of a transport restructure that enabled the narrowing of part of the former dual carriageway inner city ring road from four lanes to two. The associated liberated space was given over to extensive areas of rain gardens and bioswales, and widened pavement spaces for pedestrians. Phase 2 fully integrates a cycle network in addition. This is a truly multifunctional project, aiming to increase urban biodiversity and create a green corridor, protect pedestrians from air pollution though multi-layered planting, achieve urban cooling through increased tree planting, treat contaminated water, contain potential micro plastics and promote health and wellbeing. But, in addition, a key aspect was that this inspirational landscape scheme would also provide a stimulus and catalyst for further inward investment in the area – a real economic benefit too. Research conducted by the University of Sheffield has indicated great public support for this naturalistic urban scheme in Phase 1 and a significant change in daily walking patterns by a proportion of users.

The planting scheme in Grey to Green has been created through a collaboration with Sheffield City Council and Professor Nigel Dunnett of the Department of Landscape Architecture, University of Sheffield, and is a manifestation of a long-term relationship between the city and the University. Nigel and colleagues have defined contemporary approaches to sustainable planting design on a wider basis and this is apparent in the city through the development of 'Pictorial Meadows' and through the use of specialist landscape contractors 'Green Estate Ltd'. Indeed, this is a great example of how innovation in horticulture can lead to new enterprises, which in themselves allow new approaches to be implemented and maintained. It's a genuinely holistic approach, involving wider partnerships with the Universities and businesses and it cuts across and brings together different sections within the council.

We are now setting out a statement for the Sheffield's future as the city starts to understand what is required of it to achieve its target of being carbon neutral by 2030. The challenge is to investigate how we can expand these ideas. The recent decline in the country's retail offer on the high street presents a new and real opportunity to reimagine this traditionally retail-dominated space as a new city centre garden for retail, leisure, enjoyment, climate-resilience and healthy living. How to create and retrofit transformational green infrastructure in city centres is one of our greatest challenges, but by creating beautiful, sustainable, ecologically-functioning *green* public realm, we believe we have hit on a formula that mainstreams innovative green infrastructure in a way that is practical, cost-effective *and* popular.

Nigel Dunnett is Professor of Planting Design and Urban Horticulture, Department of Landscape, University of Sheffield
Zac Tudor is Principal Landscape Architect, Urban and Environmental Design, Sheffield City Council


4

FEATURE

By Ciara Hanson

Public Practice member

Public Practice: Impact of the Collective

Public Practice is a new way of bringing built environment back skills into the public sector – a member of the collective explains the approach

1

1. Members of Public Practice.
© Timothy Chase

Landscape architects in local government may be scarce, but they are needed now more than ever. Local authorities have seen their spending on planning and development cut by 55% over the last decade[1] and landscape architecture has been one of the hardest hit disciplines. A recent GLA survey found that over a quarter of London boroughs have no in-house landscape expertise.[2]

Many authorities are taking bold steps to bring built environment experts back in-house. Public Practice, a not-for-profit social enterprise with a mission for proactive planning, is supporting this movement by placing experts in 12-month contracts within these authorities.

We are a collective of these individuals who have formed the Climate Response Working Group. Our common cause is tackling the climate crisis through planning, placemaking and policy. As Public Practice associates, 10% of our time is dedicated to collective research and development and 90% is spent in our day jobs in local authorities across London and the South East.

Our roles range from an urban designer in a planning department, a landscape architect for a garden community, a sustainability and environmental advisor in corporate policy to a design manager in council-led housing delivery. We are asked to tackle the big issues of the housing crisis, delivering sustainable growth and shaping healthier placemaking. But the question is, over the short period of one year, what impact can we actually make as individuals?

We know the housing crisis cannot be separated from environmental issues: air pollution and extreme weather events are all fundamental threats to healthy placemaking. These challenges cannot be addressed in isolation. As members of teams and as associates within a wider network, we can build momentum towards collective action. Our working group is producing an action plan for local authorities to achieve tangible carbon reduction targets in response to climate declarations or carbon pledges. This explores political challenges, what 'carbon neutrality' means and how to achieve it. The action plan will inform a public practice panel discussion at the Design Museum on how local authorities are taking action in response to the climate crisis in October 2019.

We are working to counter the deficit of natural environment expertise in the public sector and to rebalance strategies in favour of environmental and social sustainability. Within six months we've already made real progress: One associate has championed their authority produce a Climate Declaration; an associate in an outer London borough has engaged landscape architects in training development management officers to secure high quality public realm through the planning process and multiple associates are promoting a landscape-led approach to master planning.

There are opportunities for landscape architects today, but to find them we need to sift through the baffling array of public sector job descriptions and look beyond the dwindling traditional roles. If we do this, landscape architects can embrace roles to strategically shape future development and contribute to a more sustainable public sector, from within.

Public Practice is open for applications for the next cohort from October-November 2019. www.publicpractice.org.uk/associates/

Our common cause is tackling the climate crisis through planning, placemaking and policy

[1] ifs.org.uk/publications/14133

[2] london.gov.uk/what-we-do/regeneration/advice-and-guidance/helping-london-local-authorities-deliver-good-growth

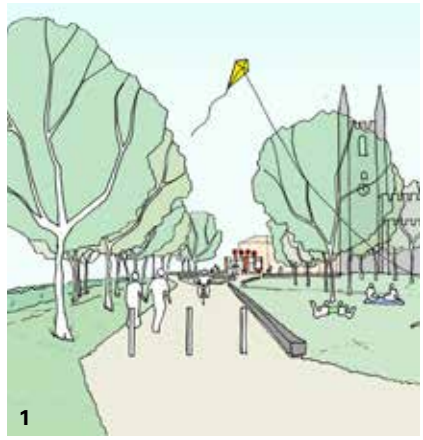
FEATURE

By Meaghan Kombol

Senior Project Officer at Croydon Council

Climate emergency in Croydon

Croydon Council has declared a climate emergency, Meaghan Kombol explores the impact of this decision



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1. Croydon Minster's proposed public realm is set to transform a car park into a revitalized public realm with sustainable drainage features and new and improved cycle routes.

In July 2019 Croydon Council declared a climate emergency. This declaration reinforces the urgent need for sustainability to be at the forefront of local policy in Croydon. With a housing need target of nearly 46,000 new homes by 2039 and an obesity health crisis (according to Public Health England, over 1/3 of children aged 2 to 15 are overweight or obese), the demand for healthier and greener public spaces and developments which are appealing, sustainable and maintainable is mounting. Planning departments, policy makers and – in our case – designers, are being tested in their ability to both deliver and review schemes with a more critical and forward-thinking eye, to respond to this emergency.

In Croydon's Spatial Planning Service, alongside other Council departments, we're tackling climate change in two ways: through the application of healthy street principles, such as improving pedestrian and cyclist infrastructure as outlined in our Public Realm Design Guide and by pushing for a multidisciplinary approach to developing projects – both in-house and externally. These approaches are championed through our council-led schemes and the council's planning process. Our in-house design team, not dissimilar to the post-war Greater London Corporation's team of architects, takes a proactive approach to development by setting up strategic planning frameworks developed in partnership with the local community, partners and developers. This method of delivery allows our team of landscape architects, urban designers, architects, conservation experts and planners to develop and learn from one another about creating better quality, more sustainable developments.

An example of this method can be seen with the development of one of five of Croydon's masterplans – the Old Town Masterplan. This document was developed in collaboration with our partners and included extensive engagement with the existing residential and business community. The process ensured the masterplan was informed by local knowledge that identified Old Town's strengths and issues; in this way, it was developed for and by its community. This approach to coordinated masterplans creates a robust strategy for significant positive change in Croydon which is all about delivery.

A product of this masterplan can be seen with our in-house designs for the public realm improvements surrounding Croydon's Grade I listed Minster in Old Town. Set to be delivered in 2020, the Minster's public realm is currently a car park surrounded by an underutilised memorial garden. Delivering schemes in-house has enabled fluid cross-departmental relationships, with long term maintenance requirements addressed at the beginning to ensure the project's longevity. We also plan on future proofing sustainable urban drainage systems (SuDS) strategies so that these systems can develop beyond the Minster's project boundary. This extension will be achieved working with strategic transport colleagues in the delivery of Transport for London's Liveable Neighbourhoods programme, which sees the reduction of cars and the creation of greener, healthier streets and spaces that encourage healthy street principles.

Our multidisciplinary approach is not limited to the projects we design, but also the projects we review as a part of the planning application determination process. It's imperative that, at the earliest stage, new developments are considered in a way that apportions the same level of scrutiny to the built form as to the landscape in which it will be placed. In this way, the importance given to a building's height, façades and windows must also be given to the project's impact on natural resources, such as the management of surface water or improving green infrastructure. To do this, planning departments supported by policy must be empowered to ask developers the right questions up front and strongly advocate for design teams to include a mix of specialists dependant on the project requirements, such as landscape architects, ecologists and rainwater specialists.

Looking at the quantity of homes set to be delivered over the next two decades, I believe this early-stage, multidisciplinary team approach to designing and reviewing is crucial in order to avoid filling our towns and cities with seas of tarmac, concrete, unsustainable drainage solutions and substandard, poorly-maintained planting. From our experience in Croydon, it is clear that to achieve this all new developments must be constructed with the least impact, respond to the site's inherent character and be designed in the most sustainable and appealing ways – led by teams with the necessary expertise.

FEATURE

By Harriet Bourne

Landscape architect and director of BBUK Studio

Norwich Council Housing wins Stirling Prize

1

This year's Stirling Prize is exceptional. Goldsmith Street in Norwich was commissioned by the council, it is the first council housing ever to win the prize and its landscape has played a major part in creating a safe, sustainable environment

Working with Mikhail Riches Architects, BBUK designed all areas of public realm, communal amenity spaces and private rear and front gardens for 105 new homes in Norwich, all built to passivhaus standards and all for social rent. Each house has a private front and back garden, with rear gardens connecting to a gated shared space so that opportunities for informal play and community cohesion are nurtured. Play space is provided between the new site and existing houses to help embed the development within the existing community.

2

1. In the foreground is a stripped tree, felled from the original site.
© BBUK Studio

2. Goldsmith St also won the inaugural Neave Brown Award for Housing.
© Tim Crocker

3. The central playspace is essential in bringing the community together.
© Tim Crocker

4. Crabapple is planted at the house entrances.
© BBUK Studio

5. Plan by BBUK Studio, depicting the central private, secure walkway between the rows of houses, planted with Hawthorn.
© BBUK Studio

The scheme is designed to encourage walking and safe cycling, however, there are a limited number of parking spaces. Two mature existing Catalpa superfluous trees were protected through the works and these are set in open space that forms the beginning of a welcoming green route that runs through the centre of the scheme. The trees have been underplanted with swathes of spring-flowering bulbs and the open grassed areas forms an informal kickabout area.

The streets are narrow for tree-planting at just 14m wide, so to compensate for this, front garden boundaries are planted with climbers. Standard security fencing is supplied in the same colour as window and door frames and this has been planted with ivy to create maximum greening to the streetscape.

Every home has its own front door and all south facing homes have front gardens. The brief was, unusually, to specify planting for all the private gardens so from day one the streetscape was enlivened. The design team were delighted to find residents immediately occupying these spaces some with their own patio furniture, others have supplemented the planting palette with bedding plants and several have infilled the spaces between plants with garden statues.


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The ginnels between the rears of the terraced housing provide safe spaces for younger children to play and for residents to meet their neighbours. These are accessed from the private rear gardens and gated at either end with keypad locks. They are planted with trees; low level shrubs and back garden boundary fences are planted with climbers to maximise greening.

Several mature trees on the adjacent public open space were felled by Norwich City Council and one of these was chosen by the design team to be bark stripped and placed as a centre piece of the play area.

The planting palette was devised with a strong emphasis on seasonal flowering and berrying species that provide maximum wildlife benefit; a large proportion of the planting comprises UK natives. In fact, all the shrubs specified, with one exception, are UK native or classified as wildlife beneficial.

The tight budget of £14.7 million was achieved through a collaborative value engineering process where savings were made by innovative use of materials. For example front garden treatments, reducing pot sizes for plants and specifying economic hard paving materials.

The combination of individual front doors, narrow streets and ginnels has created a strong sense of community within a very short time. The neighbourhood is living up to it sustainable reputation already.

LI life:

By Sarah Jones-Morris

Director at Landsmith Associates, Chair of Landscape Institute South West

Experiencing the expanse of Norway

Sarah Jones-Morris spoke at the IFLA World Congress held in Oslo this September. Here are her top ten memories.

1

Seeing **1400+ Landscape architects in one place**. We are a rare breed, so it is inspiring when we temporarily migrate to one place together.

Same, same but different – versions of **the future of landscape architecture**. Seeing important international projects of note, common themes, challenges of the climate change, biodiversity crisis – past, present and future.

1400 people declaring '**We are working on Common Ground'** presentation lead by provocative speaker Zoe Banks Gross, Bristol Approach, Knowle West Media Centre on environmental and social justice.

Being part of the conversation about the future of the landscape profession with legendary Hal Moggridge, James Hayter, Gisle Løkken.

Eating, drinking and admiring **Vestre *After Party*** and its beautiful party location on the waterfront.

Geoffrey Jellicoe medal winner **Kathryn Gustafsson** – 'slow down, work slowly' and 'Design in layers'.

Having a respite in the woods and by the lakes only a 20 minutes bus from the centre of Oslo – into the wild.

Seeing landscape architects trying something new, getting involved with different skills and learning in **community engagement workshops** led by President Adam White and others.

Warming up and having a chilled dip from the **public floating sauna**

Experiencing the geometric designs, forms, styles of **Norwegian landscape and architecture** reflecting the fjords and wilderness.

2

3

4

1. Panoramic view towards Forsand.
© Sarah Jones-Morris

2. Sculpture created from waste during the conference outside the Congress Hall, Oslo.
© Zoe Banks Gross

3. Vestre After-party.
© Zoe Banks Gross

4. Traditional grass roofs and blackened timber buildings at the Preikestolen Visitor Centre, Jørpeland, Norway.
© Sarah Jones-Morris

LI life: Visualisation of Development Proposals

By Bill Blackledge

Landscape architect, director of B2B

New LI publication on visualisation of development proposals

1. Lens image taken from cover of the new publication.

Anyone who recalls Father Ted trying to explain the difference between "small" and "far away" with the help of a toy cow, will have some inkling of the challenge that faced us in updating the 2011 "Photography and Photomontage" guidance.

Times have changed a great deal since 2011, with significant research and debate on the topic, particularly in respect of wind farms in Scotland, resulting in the 2016 standards from The Highland Council (THC) and the 2017 guidance from Scottish Natural Heritage (SNH).

The LI Technical Committee established a working group which produced a consultation draft, released in June 2018. It relied heavily upon SNH's 2017 Visual Representation of Wind Farms and was both welcomed for setting more rigorous standards and criticised for having one 'setting' for all visualisation work that landscape professionals may be involved with: 'high'. This did not accord with the principles of proportionality in GLVIA3 or those in LI 2017 guidance on Visualisation of Development Proposals (TGN 02/17).

The working group determined that integration of TGN 02/17 into the new guidance would avoid potential conflict, providing one source of LI guidance for visualisations. It also confirmed that GLVIA 3 contains much relevant guidance in respect of visualisations relating to the LVIA process. Consequently, the title of TGN 02/17 was adopted for the new guidance, with 'Visualisation of Development Proposals' reflecting the fact that visualisation covers a wider range than photomontage.

Core to the new guidance are the principles that visualisation should:

- be fit for purpose
- be proportionate to the task in hand and
- fairly and appropriately represent the development in relation to the stage in the planning process, from concept to detailed planning applications, showing the development 'as if built'

Based on these principles the landscape professional can use four main 'types' of visualisation, ranging from the simplest to the most sophisticated. The selection of these will be determined by reaching an initial judgment on likely Purpose / Users of the visualisations, combined with an indicative overall Degree or Level of Effect.

Different types of visualisations (Types 1–4) are described and the guidance sets out an approach as to how to select a 'Type' but without providing definitive formulas – professional judgement is still required! Having selected a Type, the guidance also sets out in some detail the technical specification of equipment (for example camera equipment) and the production process (camera settings, projection, print size etc.).

It is hoped that the guidance will contribute to improved and reliable visual communication of development proposals and that planning officers and applicants alike will find the guidance useful in reaching agreement regarding requirements for visualisations to be used in the planning process.

No doubt further development of visualisation guidance will be required to cover emerging topics such as augmented and virtual reality, and the use of 'digital viewers' – although it remains to be seen how their role will play out compared to their established counterparts: "small" or "far away"?

Visualisation of Development Proposals is available for download here: https://www.landscapeinstitute.org/visualisation/

By David Hackett

Technical Director, Biora Group

Specification for Performance Parameters and Test Methods for Green Roof Substrates

1. Green roof covered with sedum.
© Shutterstock

This standard is the latest in a line of new standards and revisions from the British Standards Institution (BSI), directed at growing media produced to support the landscape industry.

The output has been driven largely by the perceived needs of the industry, as well as wider environmental concerns for sustainable design and climate change. The standard should give confidence in the growing media through rigorous testing and knowledge of how the specified parameters are likely to affect performance.

Whether intentional or not, all landscapes are habitats; small changes in specification can make significant differences in the flora or fauna that may find a home or are excluded. The nature of the growing media used in green roofs will largely determine not only what plants can be grown as well as the effort required to maintain them, but the potential for life that could be supported – including within the growing media. The contribution of the Landscape Architect is increasingly recognised as vital for maintaining and enhancing biodiversity (which is now codified within the planning process) and in helping to mitigate and arrest climate change. Urban situations in particular, where there is limited scope for 'green space'. Small patches of urban green often represent significantly biodiverse islands and can be particularly challenging. The sustainable solution requires relevant knowledge of diverse subjects such as edaphology and pedology, hydrology and engineering applied through design to resolve the complex challenges. The BS 8616:2019 is provided as a design tool to help simplify the choice of growing media, across the range of extensive to intensive green roofs. Other complementary publications for those seeking relevant guidance include the Green Roof Code of Practice (2014) https://livingroofs.org/wp-content/uploads/2016/03/grocode2014.pdf an EU-funded best practice manual and the Foundation for Water Research's Surface Water Management and Urban Green Infrastructure: A review of potential benefits and UK and international practices (2011) http://www.fwr.org/greeninf.pdf

Our first challenge in writing the standard was in defining what exactly was meant by a 'green roof': does the surface have to be elevated, and what about when the surface is pitched – ie when does a roof become a wall? We, hopefully, resolved the first question with: 'an intentionally vegetated roof or platform disconnected from the underlying ground' and we avoided the latter for the time being in the belief that there would be a common-sense approach. It is understood and intended that the standard will evolve, using feedback from members of the Landscape Institute and other users, which we hope will be forthcoming. This could include (amongst others) perhaps a measure of biodiversity, when a practical methodology and/or assessment process is available.

LI life: LVIA in practice

By Chris Bolton

Landscape Specialist, Services and Programmes, Natural England

LVIA in practice, a view from Natural England

1. Artist's impression of the completed Woodsmith Mine, part of the potash mining development in the North Yorkshire Moors National Park and currently under construction. The LVIA identified significant construction phase landscape and visual effects, allowing design-based mitigation to be thoroughly and openly explored. The scheme was eventually approved by the National Park Authority on the grounds that the long term economic benefits outweighed the effects.

Following its publication in 2013, the Guidelines for Landscape and Visual Impact Assessment (GLVIA) are now well established as the industry standard for assessing the effects of development schemes on landscape character and visual amenity.

As the Government's adviser on landscape and a statutory consultee on land use planning, Natural England has a detailed knowledge of LVIA in practice. Although the quality of LVIAs has increased steadily since 2013, our experience indicates that the profession needs to do more to build and secure confidence in the evidence presented through the assessment process.

Natural England's main focus is to provide statutory advice to the Secretary of State, local planning authorities and other relevant authorities on whether a development is likely to be prejudicial to the statutory purposes of National Parks or AONBs. LVIA is crucial to decision-making in the planning process and required for an Environmental Impact Assessment (EIA). The provision of sound and impartial evidence via an LVIA is essential for the determination of whether the exceptional circumstances justifying major development in a designated landscape have been demonstrated . Natural England informed the recently issued Planning Practice Guidance on Landscape, which now includes references to LVIA with clarifications on development within designated landscapes including the importance of management plans.

An LVIA also provides evidence to shape the design of the scheme and a full set of mitigation measures. Through its Discretionary Advice Service, Natural England aims to focus more on working with developers and their consultants to improve development proposals and avoid significant adverse effects. Nationally Significant Infrastructure Projects, which require pre-application engagement with all relevant parties, illustrate that early engagement with us on the detailed scope and structure of an LVIA can help secure greater consensus and general agreement on the significance of potential effects and realistic mitigation measures. In this way it can better inform decision making.

There is a demand for further training on LVIA (and Landscape Character Assessment, Landscape Sensitivity Assessment and techniques for visualisations), particularly for local planning authority staff. Many authorities have lost experienced 'in-house' landscape architects in recent years, often leaving a shortfall in the requisite knowledge and skills, to review LVIAs submitted with planning applications. There is also scope to share best practice in specific aspects of LVIA to further build and maintain confidence in the method, its application and the final documents. Key aspects to consider include:

- Reviewing LVIAs and validating effects in the field
- Understanding the statutory purposes of designated landscapes, their settings and assessing potential impacts of developments
- Ensuring equal attention is paid to assessing landscape impacts and visual impacts, taking account of effects on people and cultural values associated with landscape
- Objectively assessing the overall significance of effects, with appropriate consideration of timescales and reversibility
- Considering realistic mitigation measures and their associated timescales
- Presenting, understanding and interpreting photographic visualisations

Natural England is keen to work with all parties involved in LVIA –both to enhance standards, and to meet the challenges associated with increasing development pressures on our landscapes.

Acknowledgements: Chris Bolton CMLI (Principal Specialist, Natural England) with contributions from Andrew Baker and Andy Gale (Senior Advisers, Natural England).

LI life: CPD training and events

EVENTS AND TRAINING

Join us at the LI Conference 2020 – Birmingham, UK – July 2020

Building on the success of our 2018 Valuing Landscape conference, the LI Conference 2020 will debate key themes around 'Landscape at Scale'. Join delegates and high profile speakers from around the world, network with experts and engage in panel discussions during this exciting two day event. **www.landscapeinstitute.org/events**

Keep your skills sharp with #LICPD

The LI's programme of CPD events across the UK is designed to give landscape practitioners the professional skills they need in a rapidly changing world.

7 November 2019, Leicester

The new NPPF: Landscape-led planning in practice

Join industry leaders in discussing changes to the National Planning Policy Framework (NPPF) and how they affect our professional practice.

28 January 2020, Bristol

Digital Integration and Transformation

Digital technology is transforming the landscape and placemaking profession. Join us for a day of digital training, learning and discussions.

26 March 2020, London

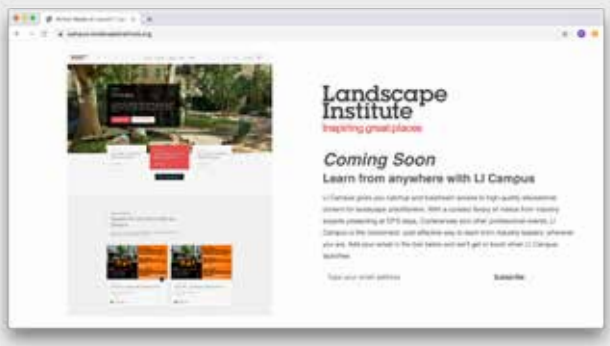
Health, Wellbeing and Place

Explore the impact of placemaking on health and wellbeing.

DIGITAL NEWS

Explore the work of LI members on our new Case Study Directory

We've redesigned the LI Case Study Directory to make it easier to find exciting work by our members. Explore the library of LI Awards winners and work by LI Registered Practices.



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By Romy Rawlings and Mike Shilton

How to make the most of BIM to reduce carbon emissions

The LI published BIM for Landscape in 2016. In July the LI's Digital Group brought together people from across the industry to look at the current state of play. A report of this wide-ranging discussion will be published shortly. Part of the discussion was devoted to BIM and climate change. Digital Group members Romy Rawlings and Mike Shilton argue that we could be making far better use of BIM as a way of collaborating to achieve lower carbon goals.

1. Visualisation of a street in New York.

BIM has had the potential to bring about 20% savings of cost, time and waste over the whole life of a construction project

An estimated 40-50% of global carbon emissions are linked to the activities of the built environment industry – those of us working in the sector therefore have the potential to make a positive impact to reduce this[1]. If we have any hope of achieving this, we must start thinking differently about the impact of our action as professionals and, in particular, we need to look at the impact of how we specify our work.

From its inception Building Information Modelling (BIM) has had the potential to bring about 20% savings[2] of cost, time and waste over the whole life of a construction project.

The key words here are *whole life* of a project. We cannot continue to focus only on the construction phase, with barely a thought given to long-term management. This is particularly relevant for landscape, where ongoing use has the greatest potential for carbon savings compared to the construction phase.

LI life: BIM and climate change

BIM enables the management of project-related information throughout the entire life cycle of an asset. A digital database allows a project team to analyse data relating to each aspect of specification and management. This includes resource use, energy consumption and the resilience of the completed landscape. Every environmental impact of a project can be modelled and fully considered at its inception, so that whole life carbon is minimised and the impact of any substitutions can be fully assessed. This process maintains key asset data across the life cycle to be passed to relevant parties as a project progresses.

For the benefits to be fully exploited, we must start to consider landscape management at the beginning of the process and give it the focus it demands. Maintenance needs to be fully explored during the design and construction phases, so that the implications for sustainability can be understood, specified and modelled. This shift in thinking – from reactive maintenance to proactive asset management – is urgently required and has the power to bring about improvements in every aspect of the landscape, especially carbon.

The climate emergency declared by the Landscape Institute presents an opportunity to bring about a move away from the damaging, short term thinking that has for so long governed our industry, in favour of a more considered, lifetime design approach. As much as we need to see meaningful action to reduce carbon emissions right now, a shift away from the price versus value focus and 'value engineering' is urgently needed. Perhaps the greatest challenge (and opportunity) lies in client awareness and education, as good design decisions can have significant benefits – both cost and carbon – over the lifetime of a project.

The potential benefits of BIM go beyond the most commonly understood – for instance, improved work efficiencies and reduced site rework due to clashes. BIM has great potential to be employed at the feasibility stage for major infrastructure projects, to maximise environmental benefits. The exchange of accurate information between stakeholders makes for greater collaboration and an improved outcome for any project, at any scale.

As we understand more about the value of landscape assets – in terms of ecosystem services, amenity, health and wellbeing and natural capital – BIM offers a compelling argument for longer term thinking around carbon analysis. Once the whole life carbon emissions of a project can be modelled and assessed, the data can then be used to drive specifications, bringing about the lowest possible emissions (or highest possible sequestration) at the outset as well as throughout the life of the asset. It should be possible to model, measure and plan carbon in order to meet targets.

It is important to remember that landscapes, particularly the 'greenest' ones, have great potential to sequester carbon. This means that, unlike almost every other built environment asset, a well-designed and managed landscape will accrue value over its lifetime and can continue to make a meaningful contribution to climate change mitigation.

Every aspect of a landscape project has an impact – whether from the extraction of raw materials, manufacturing processes, transportation, management or ultimate disposal. Through BIM, accurate models facilitate the minimisation of waste through accurate take offs for procurement; detecting conflicts that would otherwise lead to errors and rework on site (thereby reducing waste) and timely sequencing and planning of construction to allow accurate procurement.

For the landscape profession to meaningfully address the climate emergency, we must adopt a global approach, with greater collaboration than ever before. This will require a fundamental shift in behaviour. The open sharing of data is facilitated through BIM. This will be crucial if we are to make the most of the opportunities for change. Data sharing of aspects such as biodiversity, biosecurity, landscape connections and corridors, storm water management will enable a holistic view of sustainability.

A key deliverable of a BIM project is a 'digital twin' – a virtual representation of the real-world facility. As on-site feedback from sensors and drones becomes more cost effective and common place, issues on site can be flagged up in the virtual model and a response coordinated in a focussed, timely manner. In addition to the aspects that data can highlight around carbon, there are many very tangible benefits that digital design and construction can bring.

- The use of drone surveys and 3D scanning means the need for site visits could be reduced as a digital model can be made available to all
- The reduced need for design team meetings and last-minute consultations
- 3D printing is now commonly used in prototyping by furniture manufacturers and stone/concrete suppliers to test bespoke designs: sign off is straightforward and waste is minimised
- Off site construction is another important means of minimising waste and re-work, as well as ensuring high build quality; fewer errors mean building once, with minimal waste

BIM offers the profession a measured and effective way of tackling carbon reduction in collaboration with other built environment professionals. It is important that this process accelerates.

Romy Rawlings is a Chartered Landscape Architect, UK Business Development Manager for Vestre and serves on the LI Board of Trustees as the Honorary Secretary

Mike Shilton is director at Keysoft Solutions and chair of the LI Digital Group

For the landscape profession to meaningfully address the climate emergency, we must adopt a global approach, with greater collaboration than ever before

[1] https://www.worldgbc.org/sites/default/files/UNEP%20188_GABC_en%20%28web%29.pdf/

[2] https://constructionclimatechallenge.com/2018/09/24/construction-sector-must-reduce-carbon-emissions-soon/

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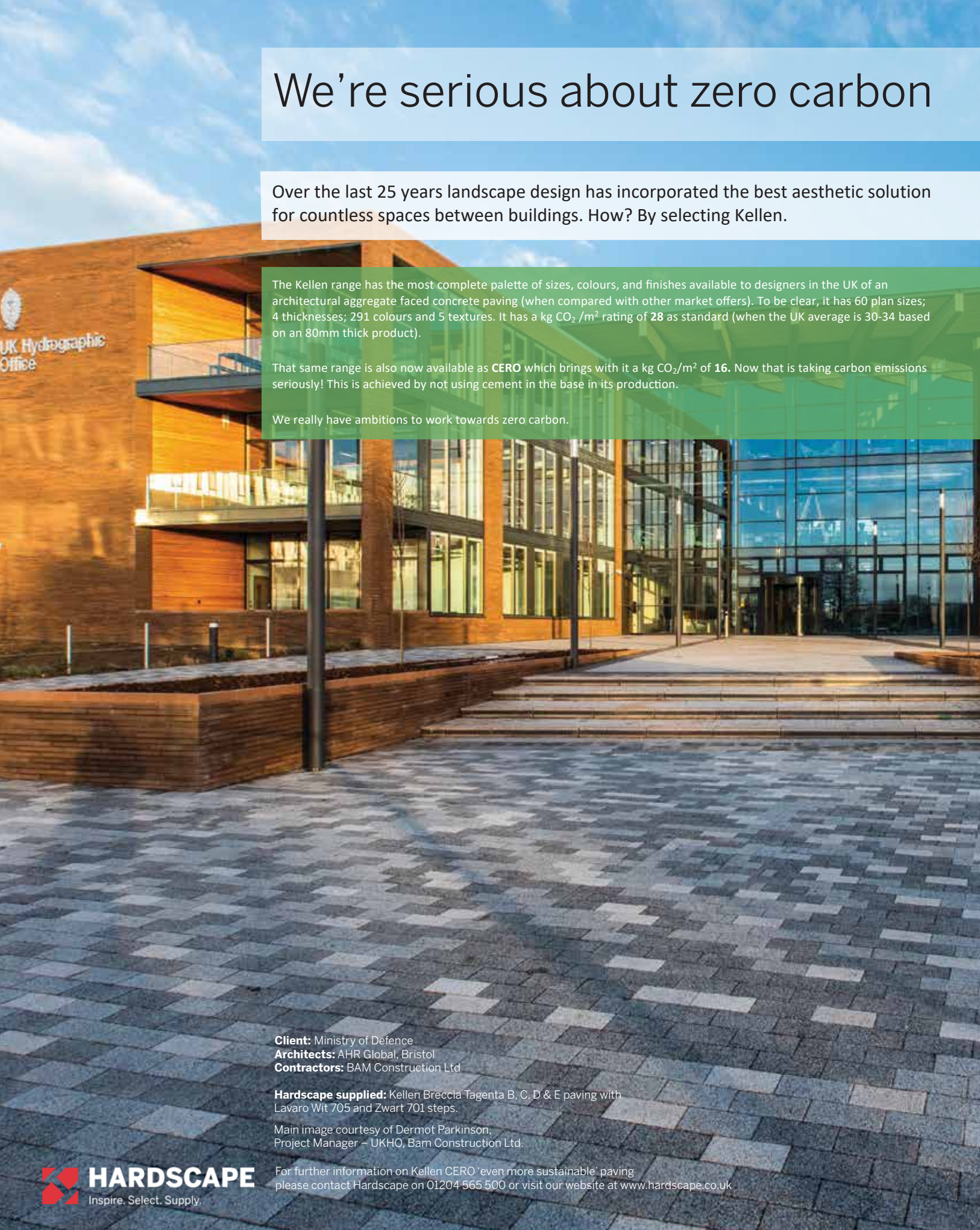

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