

BIOPHILIC CITIES

A Global Journal of Innovation in Urban Nature Vol. 4, No. 2 May 2022



THE NATUREFUL CITY [Nature in the New Normal / Tim Beatley](#)

FEATURE [The 3-30-300 Rule for Urban Forestry / Cecil Konijnendijk](#)

ECOLOGICAL WONDER [Nature as a Classroom / Annie Keil](#)

PROJECT PROFILE [Fastidious Slowness: Re-naturalising Creeks / Tom Rivard](#)

The Biophilic Cities Journal is produced by Biophilic Cities, which partners with cities, scholars and advocates from across the globe to build an understanding of the value and contribution of nature in cities to the lives of urban residents. As a central element of its work, Biophilic Cities facilitates a global network of partner cities, organizations and individuals working collectively to pursue the vision of a natureful city within their unique and diverse environments and cultures. The participants in the network are working in concert to conserve and celebrate nature in all its forms and the many important ways in which cities and their inhabitants benefit from the biodiversity and wild urban spaces present in cities.

Many individuals and organizations are due thanks for helping to produce the journal. We owe special thanks to the Robert Wood Johnson Foundation and the Summit Foundation for their generous and financial support for Biophilic Cities. We also thank the University of Virginia School of Architecture for hosting and supporting Biophilic Cities in many ways.

For more information on Biophilic Cities, and to learn about ways to become involved in this global movement, please visit us at BiophilicCities.org.

Founder and Executive Director
Tim Beatley

Program Director
JD Brown

Director of Partner Cities
Carla Jones-Harrell

Research Assistants
Emily Thomas
Mae Hovland

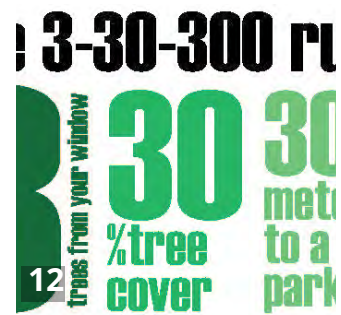
BIOPHILIC CITIES ADVISORY BOARD

Julian Agyeman (Tufts University); Bill Browning (Terrapin Bright Green); Lena Chan (National Parks Board of Singapore); Nina-Marie Lister (Ryerson University); Richard Louv (Journalist, Author); Peter Newman (Curtin University); Wallace J. Nichols (Blue Mind Fund); Richard Piacentini (Phipps Conservancy and Botanical Gardens); Fritz Steiner (University of Pennsylvania School of Design); Amanda Sturgeon (Mott Macdonald); Catherine Werner (City of St. Louis); Celia Wade-Brown (Wellington City, New Zealand); Jennifer R. Wolch (UC Berkeley College of Environmental Design).

BIOPHILIC CITIES STEERING COMMITTEE

Julia Africa (Boston, Massachusetts); Peter Brastow (San Francisco Department of the Environment); Matt Burlin (Portland, Oregon, Bureau of Environmental Services); Scott Edmondson (San Francisco Planning Department); Nick Grayson (Birmingham, U.K.); Cecilia Herzog (Inverde Institute); Mike Houck (Urban Greenspaces Institute); David Maddox (The Nature of Cities); Luis Orive (Vitoria-Gasteiz, Spain); Jana Soderlund (Biophilic Cities Australia); Stella Tarnay (Capital Nature); Helena van Vliet (BioPhilly); Maria Wheeler-Dubas (Phipps Conservatory).





THE NATUREFUL CITY: 6
NATURE IN THE NEW NORMAL
BY TIM BEATLEY

FEATURE: 12
THE 3-30-300 RULE FOR URBAN FORESTRY AND GREENER CITIES
BY CECIL KONIJNENDIJK



ECOLOGICAL WONDER: 16
NATURE AS A CLASSROOM
BY ANNIE KEIL

BIODIVERSITY: 20
RESILIENCE BY THE BAY: NORFOLK'S BIOPHILIC STRATEGIES
BY TIM BEATLEY

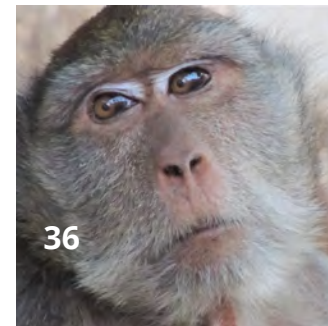


PROJECT PROFILE: 24
FASTIDIOUS SLOWNESS: RE-NATURALISING CREEKS AND RE-INTEGRATING
ECOLOGIES
BY TOM RIVARD

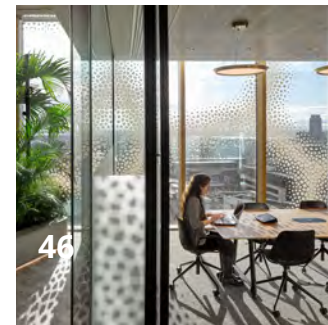
PARTNER CITY FEATURE: 30
VSPCA'S KINDNESS FARM: A FOOD SMART ANIMAL SANCTUARY
BY PRIYA TALLAM AND PREDEEP KUMAR NATH

Front Cover: Burrowing Owls
Image Credit: Audubon of the Western Everglades

Back Cover: Grass tracks, Barcelona
Image Credit: wikimedia/addshore (CC BY-SA 3.0)



FEATURE: 36
LAND USE-INDUCED SPILLOVER: CONSIDERATIONS
FOR URBAN MITIGATION PLANNING
BY JAMIE K. REASER AND GARY TABOR



PROJECT PROFILE: 40
GREEN TRACKING OF LIGHT RAIL: CREATING FUTURE-FOCUSED BIOPHILIC
TRANSPORT INFRASTRUCTURE
BY ED CLAYTON

PROJECT PROFILE: 46
BIOPHILIC BUILDING FOR HUMAN RESILIENCE:
THE SPINE LIVERPOOL, THE ROYAL COLLEGE OF PHYSICIANS NEW HQ
BY ROB HOPKINS AND STEVE EDGE



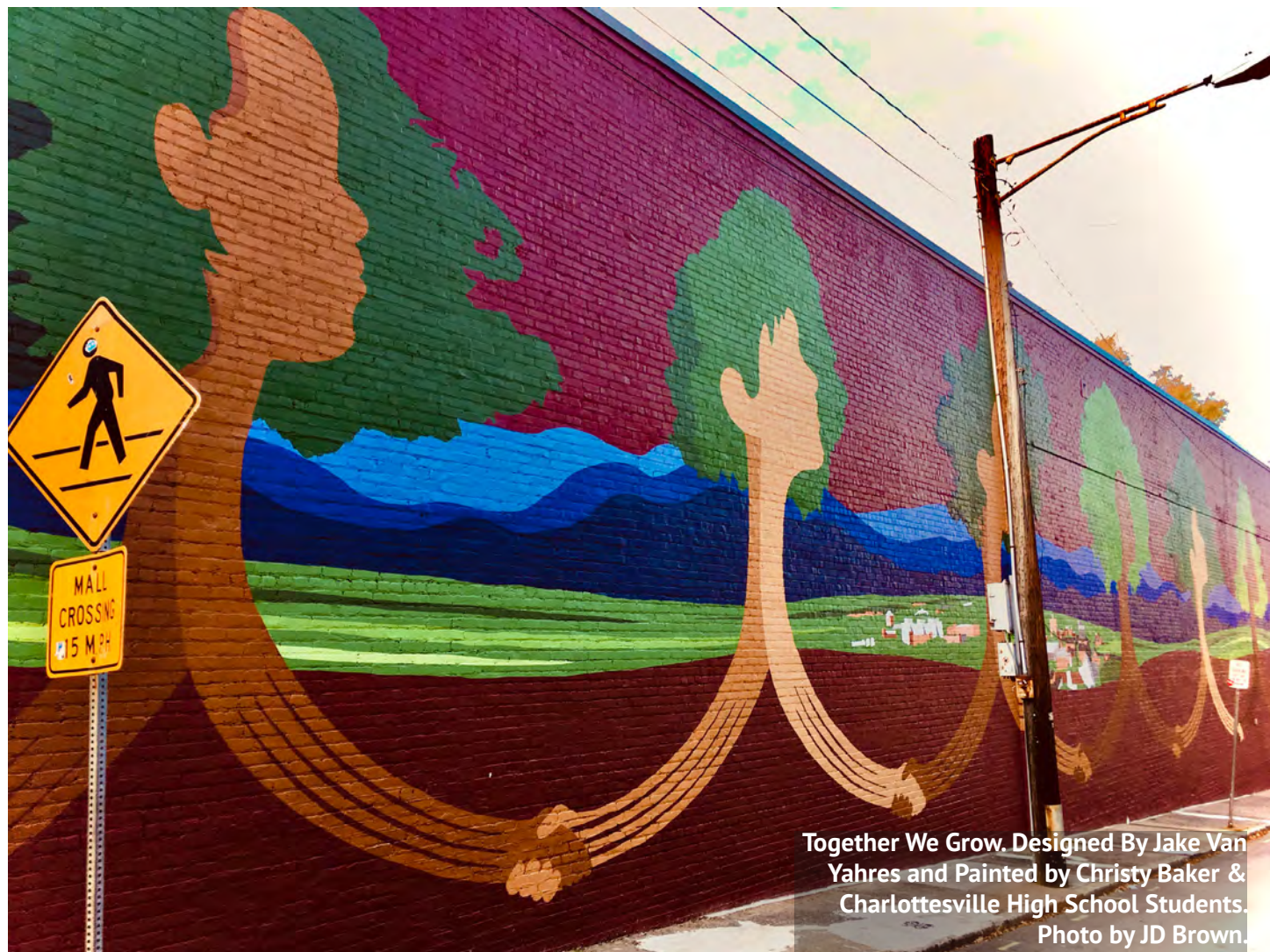
THE BOOKSHELF: 50
THE MAJESTY OF TREES: A REVIEW OF A TRIO OF BOOKS BY TIMOTHY BEATLEY
+ FINDING THE MOTHER TREE: DISCOVERING THE WISDOM OF THE FOREST,
BY SUZANNE SIMARD
+ THE NATURE OF OAKS: THE RICH ECOLOGY OF OUR MOST ESSENTIAL NATIVE
TREES, BY DOUGLAS TALLAMY
+ THE OAK PAPERS, BY JAMES CANTON

PARTNER CITY PROFILE: 54
ARLINGTON OWLS
PHOTOGRAPHS AND REFLECTION BY DAVID HOWELL

BECOME A JOURNAL SPONSOR!

Help to disseminate the wonderful contributions to the Biophilic Cities Journal
to a growing community in cities around the globe.
To explore potential sponsorship, contact the journal at info@biophiliccities.org.





The Natureful City: Nature in the New Normal

By Tim Beatley

More than two years into the COVID-19 global pandemic, it is a good chance to take stock of the role of nature in our lives. Anecdotally anyway, nature seems as important as ever in keeping our emotional balance and in steadying us during this continuing tumult. Walks outside, listening and watching birds, and paying close attention to the signals of seasonal change continue, for many of us, to provide solace and comfort as few other things can. Two-years

out, we also see that many of the improvised efforts to make outdoor spaces more available and accommodating are leading to permanent changes. This is a good sign. As we transition from the phase of global crisis, to perhaps the management of a more chronic and endemic threat, I hope we will find ourselves on a different, higher plane when it comes to the importance of nature in our lives and the commitments we make (and follow-through on) when it

comes to nature in cities.

We continue to be engaged in a wide variety of interesting efforts to incorporate nature in new ways into cities. These include serving on advisory boards for the large European-based ECOLOPES research project, the innovative Southwestern Medical District Urban Streetscape and Park Project, near Dallas, and Nature Canada's new Bird-Friendly Cities certification program, among many others.

These kinds of collaborations define much of the work we do as we try to extend and expand the impact of the biophilic cities' vision.

Most meetings and conferences continue online, and although we all have a heavy dose of Zoom fatigue, it has allowed us to participate in a variety of different events and communities, perhaps more than would have been possible if full travel was necessary. These have included a wonderful several days of our Biophilic Leadership Summit in November, an event we have collaborated in organizing this with our friends at the Biophilic Institute in the community of Serenbe. We are happy to be collaborating with the Biophilic Institute and to see them expand their impact and reach. One way they have been doing that is through a wonderful podcast called Biophilic Solutions, peaking at number 17 among Apple nature podcasts; the list of guests is impressive.

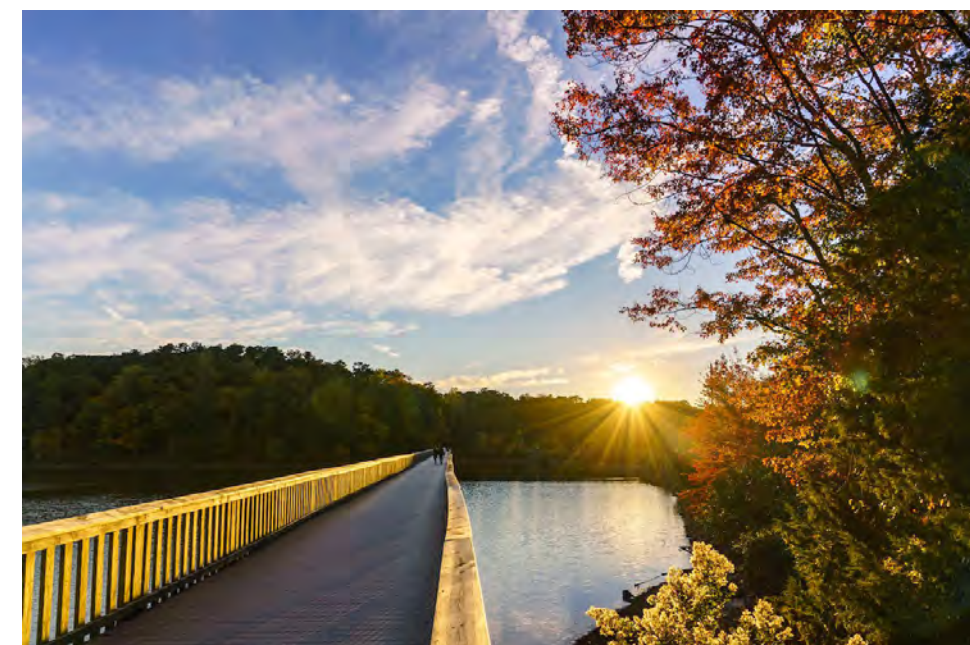
In the run-up to COP 26, we were asked by the World Bank to organize a webinar around biophilic city planning and design, part of their Bringing Nature to Cities. It was a wonderful panel, with presentations from Jane Weninger from partner city Toronto, Huberth Méndez Hernández from partner city Curridabat, Costa Rica, and conservation photographer Tamara Blazquez Haik from Mexico City. This was an important public event and one of many during this busy year.

With the publication of *The Bird-Friendly City* (Island Press, 2020), I have had the pleasure of presenting to audiences of bird lovers through major national venues (such as a webinar for the National Audubon Society) and many local bird clubs. I have been impressed that, as a rule, participants in these virtual events have been highly engaged and highly committed to birds, enjoying them yes, but also doing what they can to be a force on behalf of bird conservation. It has been an honor to be asked to speak to so many of these very locally-based groups, as a kind of honorary birder (I often say I can't claim the "birder" moniker, but I am a life-long bird lover!).

We have also created a Bird-Friendly City page on the main Biophilic Cities website, which will be a place for putting resources of many kinds for those working on behalf of birds. At the same time, we have begun to take steps to make our own University of Virginia School of Architecture campus more bird-friendly. In November, for

example, we hosted a visit by ornithologist and bird-building strike expert John Swaddle from the College of William and Mary. He walked with a group of UVA officials around our own Campbell Hall providing insights and suggestions for how we can retrofit the structure to reduce bird strikes. It has convinced me of the value and importance of undertaking this kind of bird-safe audit for all existing structures.

We continue to grow the Biophilic Cities Network in a number of ways. We are pleased that Miami-Dade County and the City of Raleigh have now officially joined as partners, in addition to an ever growing number of individual and organizational members of the network community. For partner cities, our monthly calls have become ever more interesting and engaging, with recent presentations ranging from the rights of nature (the story and lessons from the campaign to enact the Lake Erie Bill of Rights from Markie Miller), to the development of new tools





cities are using to support urban nature, including, for instance, Libby Phillips' presentation on Melbourne's Green Factor Tool.

These monthly partner calls are exceptionally stimulating and give the chance to gain exposure to different ways of thinking about biophilic cities. One of the most stimulating of presentations was one by Katie Patrick, consultant and author, who has written the popular (and highly readable) book *How to Save the World* (Blurb, 2019). One of the really important messages for me (from her talk and the book) was that education is simply not enough to generate change. This is a shocking realization for an academician who has spent multiple decades endeavoring to change the world

through teaching! As Patrick encourages, we must enlist what we know about behavioral psychology to bring about change.

A critical step in supporting positive change is thinking carefully about how we measure and define success? What are the most important metrics? When it comes to things like climate change, perhaps the metrics of success may be obvious: we want to see measurable reductions in greenhouse gas emissions and, ultimately, we want to creep back from the precipice of 420 parts per millions of carbon in the atmosphere, a remarkable place to be now (atmospheric carbon levels not seen in 4 million years). But what about biophilic cities? How will we know we

have made discernible progress? It is an excellent question. At the level of the Network, of course, we tend to view success in terms of how many cities have joined (something easy to measure), and then in turn, how much progress these cities are making in protecting, growing and celebrating nature as a result of joining and participating in the activities of the Network (which is much harder to measure).

With these reservations in mind, we nevertheless continue to extend and expand our efforts at educating about biophilic planning and design. As imperfect as this is as a way of changing the world, it is a special province of our university base. In the last few months such new teaching

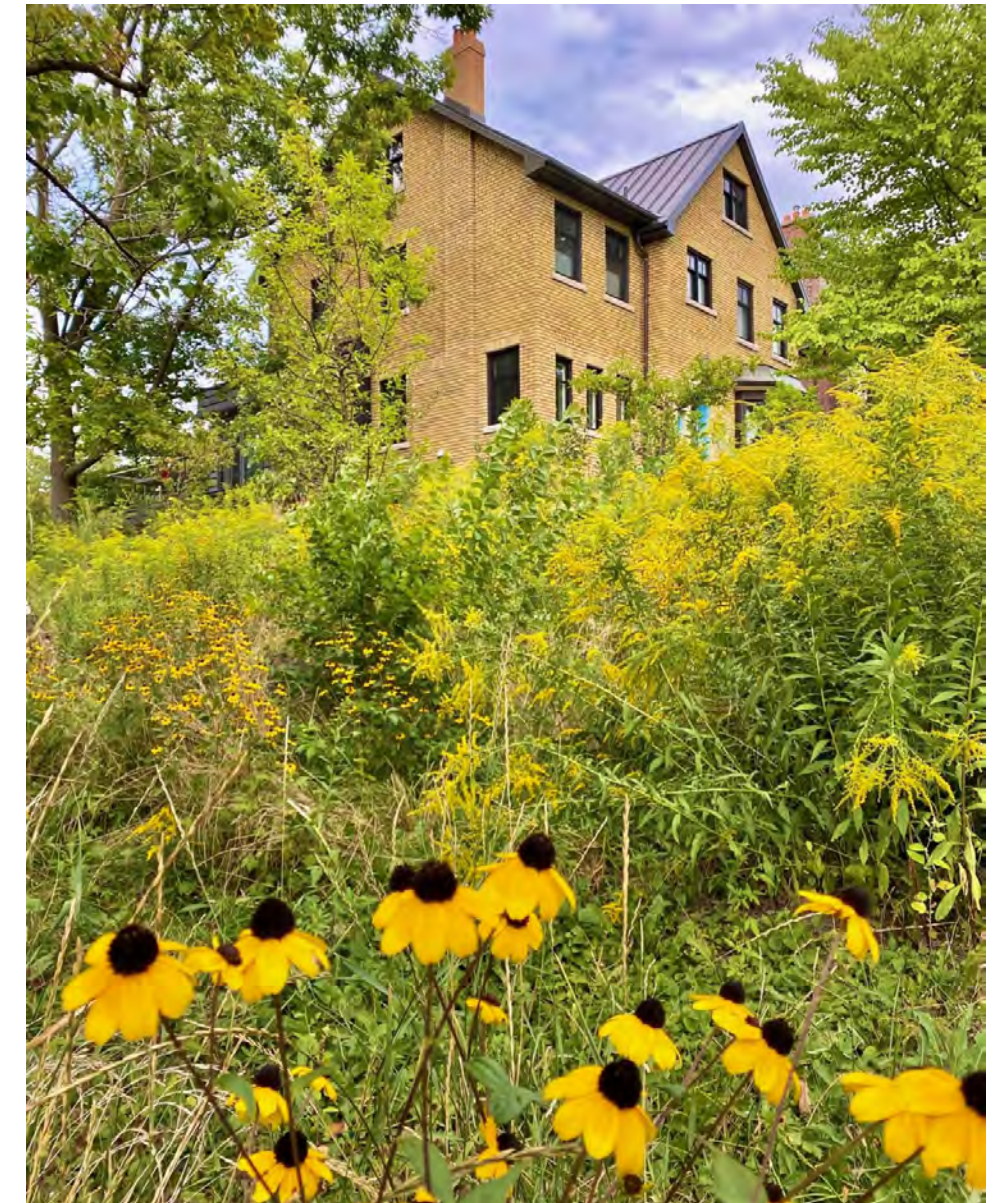
has included the offering (for the first time) of a Biophilic Cities Research Seminar at UVA (an in-person class co-taught with JD Brown) and a positive acknowledgement of the happy fact that graduate students are now drawn here in part because of our biophilic work. During the same period, we launched our first ever online Biophilic Cities short course (*Seeding the Biophilic City*), with an inaugural class of more 20 participants from a diverse range of global cities. We had an impressive list of guest presenters, including Vivek Shandas, Jacqueline Scott, Wolfgang Weisser, Helena van Vliet, and Nina Marie Lister, among others.

We had the pleasure as well of interacting with one of Nina Marie Lister's planning studios at Ryerson University, and serving as the client for a study of the codes and bylaws that govern what residents can plant in their yards. Born from the personal experience of bumping directly up against Toronto's Tall Grass and Weeds Bylaw, Lister has been an advocate for the right of homeowners to plant native gardens and an instrumental part in the city's decision to change its bylaw to better support this right. Lister's students have produced a highly informative study of Network cities, comparing their codes and approaches to the issue of native landscaping (and we will soon be making the class's final report available on the BC web page).

There is a growing desire on the part of young people around the world to stand up for nature, and

we are beginning to see this in the biophilic cities movement. An exciting case in point is a group of Miami area high school students who have become advocates and activists, calling for the greening of Miami-Dade schools. It is early in the process but impressively this group already organized a major Zoom event to discuss these ideas, which was attended by the City's new Heat Officer, Jane Gilbert, as well as Erick Laventure, Administrative Director of the Miami-Dade Schools.

We continue to look for ways to support expanded and more inclusive views of nature, especially marine nature. My book *Blue Urbanism* has now been translated into Korean, and in early January, I was happy to participate in a major conference that highlighted some of the key ideas for how coastal cities can advance this expanded view of the marine nature around them. There is a growing interest in ways that cities perched on the edge of the sea can be more fully engaged with and work on behalf of the remarkable



marine world nearby but often forgotten. As an example of this interest, I participated (again remotely) in a class called Semester by the Salish Sea, at Simon Fraser University in Vancouver. Through a series of student-led discussions about how to effectively engage with the marine world, the students generated an extensive set of ideas for future action.

In January, we participated for the second year in the Waterfront Alliance's WEDG certification program. WEDG (standing for Waterfront Edge Design Guidelines) is an innovative set of voluntary design standards for coastal development, with an emphasis on resilient design, but that also includes biophilic ideas and principles. This year, the course was the largest ever cohort, some 200 participants taking the class and seeking WEDG credentials. This is a positive sign. As the WEDG standards begin to be applied beyond New York, we will likely see their influence expand. We are happy to be part of this growing movement for resilient and nature-centric coastal development.

I close with the very sad news at the end of 2021 of the deaths of EO Wilson and Tom Lovejoy. Wilson passed away the day after Christmas, and Lovejoy Christmas day. Wilson's death was for me especially shocking news; I think I had gotten used to the idea that Wilson, at 91, had someone eluded the process of aging and would continue (indefinitely) to author brilliant book after brilliant book. Wilson's ideas and

pioneering work of course lay the very foundation for our Network, and he was a strong supporter of biophilic design and planning (even writing the forward to my 2011 book *Biophilic Cities*). We owe him so much; especially in challenging us to care deeply about the natural world and the many "masterpieces" of life it contains, as well as his foresight and courage to advocate for world-changing conservation actions like Half-Earth that to some may have seemed fanciful. We will miss his defense of the small nature "that makes the world go round" and the big visions and bold steps that will be necessary to save the earth (and us). I cherish the times I had the chance to hear him speak. I regret one missed opportunity, when he visited UVA as the recipient of the Jefferson Medal in Architecture, in 2010. I had a speaking engagement myself that took me away, but my friend and colleague Landscape Architect Rueben Rainey made sure Wilson signed copies of several of the books of his that I owned. I will forever covet my copy of his Pulitzer Prize winning book, *The Ants*, (with Bert Hölldobler), signed in his distinctive way—a signature along with a small drawing above it of an ant.

Tom Lovejoy will be equally missed in the conservation world. I have one very vivid memory of sitting around a table at Maya Lin's New York City studio, along with Eric Sanderson, discussing the role of architects and planners in the protection of biodiversity. Later, at the height of the Amazonian fires

in 2019, we had a remarkable phone conversation, where he speculated broadly on what would be necessary ultimately to tackle this problem and the potential role of cities. "There will be no sustainable Amazon," Lovejoy told me that day, "until there are sustainable cities where people can get an adequate quality of life." Developing alternative livelihoods to the illegal harvesting of wood he thought was a critical step and he speculated about the unusual opportunities the region has to develop sustainable forms of aquaculture (many species of fish there are vegetarian), value-added forestry, and ecotourism, among others. And we need to do a better job monetizing the potential medical and health benefits of immense biodiversity found in Amazonia. ACE inhibitors, critical for many to lower blood pressure, he reminded me derive from the venom of local snakes like the Fer-de-lance. "No country with the Fer-de-Lance has ever gotten a penny in return," unfortunately, and so there is often little incentive for these countries to ensure the preservation of this biodiversity.

We will continue our work on behalf of nature truly inspired and guided by the legacies of Wilson and Lovejoy. Their deaths were shocking, coming so close together in time. But their lives and work are reminders of the remarkable roles each of us can play in speaking out for nature and in calling attention to the remarkable diversity and beauty of the natural world and the

many other lifeforms deserving of the space to grow and thrive.

Resources:

Bird Friendly City: A Certification Program. Nature Canada. <https://naturecanada.ca/defend-nature/how-you-help-us-take-action/bfc>.

Bringing Nature to Cities: Pathways to Integrated Urban Solutions for Climate Change & Biodiversity Loss. World Bank. <https://www.worldbank.org/en/events/2021/09/01/Series-Bringing-Nature-2-Cities>.

ECOLOPES. ECOlogical building enveLOPES: a game-changing design approach for regenerative urban ecosystems. <https://www.ecolopes.org>.

Katie Patrick. 2021. How to Use Gamification and Behavioral Design to Grow Biophilic Cities. Presentation to Biophilic Cities Network. <https://www.biophiliccities.org/katie-patrick>.

Libby Phillips. 2022. Melbourne Green Factor Tool. Presentation to Biophilic Cities Network. <https://www.biophiliccities.org/melbourne-green-factor>.

Markie Miller. 2021. Lake Erie Bill of Rights. Presentation to Biophilic Cities Network. <https://www.biophiliccities.org/markie-miller-lebor>.

Miami-Dade County. Biophilic Cities Network Partner Page. <https://www.biophiliccities.org/miami-dade-county>.

Raleigh, North Carolina. Biophilic Cities Network Partner Page. <https://www.biophiliccities.org/raleigh>.

Southwestern Medical District Urban Streetscape and Park Project. <https://www.texastrees.org/projects/southwestern-medical-district>.

<https://www.biophiliccities.org/projects/southwestern-medical-district>.

The Biophilic Institute. <https://www.biophilicinstitute.com>. The Biophilic Leadership Summit. <https://biophilicsummit.com>.

The Bird-Friendly City. Biophilic Cities. <https://www.biophiliccities.org/bird-friendly-city>.

Tim Beatley. 2021. Planning for the Bird-Friendly City. Presentation to the National Audubon Society. <https://www.biophiliccities.org/beatley-the-bird-friendly-city>.

Waterfront Edge Design Guidelines. Waterfront Alliance. <https://wedg.waterfrontalliance.org>.





Barcelona Building Block
Image Credit: Erwan Hersy on unSplash

The 3-30-300 Rule for Urban Forestry and Greener Cities

By Cecil Konijnendijk

Crucial Urban Forests

Urban forests provide a wide range of essential benefits. Current global challenges, such as climate change, environmental degradation, and the COVID-19 pandemic, have resulted in increased awareness of the importance of urban trees and green spaces. We have all experienced the importance of our local trees and green

spaces during times of restricted movements, and when lock-down restrictions were eased in Spain, many people flocked to parks and other green spaces. Many studies from across the world have demonstrated the importance and increased use of urban nature during the pandemic. Even indoor plants have become more appreciated, as preliminary findings from a study at the University of British Columbia

show.

When working with cities, national governments, and international organisations, experts like me are often asked for specific guidelines for developing successful urban forestry programs. We have mostly declined, because every city is different, which makes it difficult to set transferable targets (such as tree canopy

cover) across various contexts and settings. The situation in Barcelona, for example, is very different from that in Vancouver, and Beijing is a world away from Lagos, even though these are both megacities.

Introducing a New Guiding Rule of Thumb

Although it is difficult to generalise, there are arguments for developing simplified, easy-to-remember rules and guidelines, especially when these are grounded in evidence. Many of us working in this field are familiar with [Frank Santamour's 10-20-30](#) rule for ensuring species diversity in the urban forest. The rule states that no tree species should make up more than 10% of a municipality's urban forest, no genus should have a share larger than 20%, and no single family should make up more than 30% of the urban forest. Although this rule has been debated, it has become widely known and adopted, most likely having a positive effect on urban forest structure and diversity.

The 10-20-30 rule, however, does not have a specific focus on the benefits provided by urban forests. Given the current climate and public health urgencies, as well as a range of other challenges we face, it would be useful to introduce a guiding principle for urban forest programmes, and city greening across the world, that ensures that all residents have access to trees and green – and the benefits these provide.

Based on some of the most up-to-date research on the links between urban forests and health, wellbeing, and climate change, and the work of influential global organisations like the World Health Organization, we would like to introduce a new (guiding) rule for urban forestry: the 3-30-300 rule. We'll explain this rule below and are of course aware that its application will be more challenging – and perhaps less relevant – in some contexts. The rule recognises that we need to bring trees and nature all the way into people's neighbourhoods, streets, and on their doorsteps in order to capitalise on their many benefits. It is not sufficient to strive for a city-wide tree canopy cover of 30%, because typically the urban forestry will not be evenly distributed and more marginalised populations usually will have less trees and green in their neighbourhoods. Also, putting most efforts into developing and managing large, high-profile city parks is only one part of the story, as we really have to integrate green infrastructure into all places where we live and work, so that nature is always within sight and easy access.

3 Trees from Every Home

The first element of the rule is that every citizen should be able to see at least three trees (of a decent size) from their home. [Recent research](#) demonstrates the importance of nearby, especially [visible](#), green for mental health and wellbeing. During the COVID-19

pandemic, people have often been bound to their homes or direct neighbourhoods, placing even greater importance on nearby trees and other green in gardens and along streets. Seeing green from our windows helps us keep in touch with nature and its rhythms. It provides important breaks from our work and can inspire us and make us more creative. The Danish municipality of Frederiksberg has a [tree policy](#) that calls for every citizen to see at least one tree from their house or apartment. We should take this one step further and ensure that everybody has multiple trees in sight.

30 Percent Tree Canopy Cover in Every Neighbourhood

Recent studies have shown an association between urban forest canopy and [cooling](#), [better microclimates](#), [mental](#) and [physical health](#) and possibly also reducing [air pollution](#) and [noise](#). The work of Prof. Thomas Astell-Burt and his team in Australia has repeatedly found that 30% is an important threshold – a minimum canopy cover percentage that ensures that residents benefit in terms of their health and wellbeing. By creating more leafy neighbourhoods, we also encourage people to spend more time outdoors and to interact with their neighbourhoods (which in turn promotes social health). Many of the most ambitious cities in the world in terms of greening, including [Barcelona](#), [Bristol](#), [Canberra](#), [Seattle](#) and [Vancouver](#) have set a target of achieving 30% canopy cover. At the neighbourhood level, 30 percent

should be a minimum, and cities should strive for even higher canopy cover when possible. Where it is difficult for trees to grow and thrive, e.g., in arid climates, the target should be 30% of vegetation.

300 Metres from the Nearest Park or Green Space

Many studies have highlighted the importance of proximity and easy access to high-quality green space that can be used for recreation. A safe [5-minute walk or 10-minute stroll](#) is often mentioned. The [European Regional Office of the World Health Organization recommends a maximum distance of 300 metres to the nearest green space](#) (of at least 1 hectare). This encourages the recreational use of green space with positive impacts for both physical and mental health. Of course, it will be important to work within the local context. For example, the needs in lower-density suburban areas will be different from those in denser urban areas. But, in all locales efforts need to be made to provide access to high-quality urban green space, such as in the form of linear green spaces that double as cycle corridors and walking paths. It could be difficult to create new public green spaces of 1 ha in size, especially in existing neighbourhoods where “retrofitting” is needed. In these cases, a decent size of 0.5 ha should be a minimum. Moreover, we don’t have to always think of park-like green spaces. Linear spaces like green avenues have substantial vegetation, seating, and areas to play and exercise.

Spanish cities offer some really good examples of this type of integration of public space and mobility.

Implementing the 3-30-300 Rule

There has been some initial interest in the rule from cities and organisations in different countries. Using the 3-30-300 rule will allow for benchmarking (nationally and internationally) as well as easy monitoring of progress. The rule is also easy to communicate and can generate interest and support among residents, politicians, businesses, and other key stakeholders. Applying the 3-30-300 rule will help improve and expand the local urban forest in many cities, and with that promote health, wellbeing, and resilience. It will help us create greener, better, and more biophilic cities.

Resources:

Annerstedt van den Bosch, Matilida et al. 2016. Development of an urban green space indicator and the public health rationale. *Scandinavian Journal of Public Health* 44, 159-167. <https://www.jstor.org/stable/48512637>.

Astell-Burt, Thomas and Xiaoqi Feng. 2019. “Does sleep grow on trees? A longitudinal study to investigate potential prevention of insufficient sleep with different types of urban green space.” *SSM Population Health*. 10: 100497. [doi:10.1016/j.ssmph.2019.100497](https://doi.org/10.1016/j.ssmph.2019.100497).

Astell-Burt, Thomas and Xiaoqi Feng. 2020. Urban green space, tree canopy and prevention of cardiometabolic diseases: a

multilevel longitudinal study of 46 786 Australians. *International Journal of Epidemiology*. 49(3), 926-933. [doi:10.1093/ije/dyz239](https://doi.org/10.1093/ije/dyz239).

Canberra’s Living Infrastructure Plan: Cooling the City. ACT Government, Canberra. https://www.environment.act.gov.au/_data/assets/pdf_file/0005/1413770/Canberras-Living-Infrastructure-Plan.pdf.

Devisscher, Tahia. 2020. “Finding solace, resilience and connection in nature during the pandemic.” CLEARING HOUSE blog. <http://clearinghouseproject.eu/2020/07/30/solace-nature-resilience-connection-pandemic>.

Frederiksberg Kommune. 2018. Frederiksberg Kommunens Traepolitik. <https://www.frederiksberg.dk/sites/default/files/2018-10/traepolitik.pdf>.

New ambitious target launched to double city tree canopy cover by 2050. Bristol Green Capital Partnership. <https://bristolgreencapital.org/new-ambitious-target-launched-double-city-tree-canopy-cover-2050>.

Park Board achieves target to plant 150,000 trees by 2020, directs staff to increase tree canopy to 30% by 2050. December 2018. City of Vancouver. <https://vancouver.ca/news-calendar/park-board-achieves-target-to-plant-150000-trees-by-2020.aspx>.

Rahman, Mohammad A., Astrid Moser, Thomas Rötzer and Stephan Pauleit. 2019. “Comparing the transpirational and shading effects of two contrasting urban tree species.” *Urban Ecosystems*. 22, 683–697. <https://link.springer.com/article/10.1007/s11252-019-00853-x>.

Resources: Noise Abatement. Forest Research. <https://www.forestresearch.gov.uk/tools-and-resources/fthr/urban-regeneration-and-greenspace-partnership/greenspace-in-practice/benefits-of-greenspace/noise-abatement>.

Rugel, Emily J. 2019. “Connecting natural space exposure to mental health outcomes across Vancouver, Canada.” PhD dissertation. The School of Population and Public Health, University of British Columbia, Vancouver. [doi:10.14288/1.0377727](https://doi.org/10.14288/1.0377727).

Santamour, Frank. 1990. “Trees for Urban Planting: Diversity, Uniformity and Common Sense.” Proceedings of the 7th Conference of the Metropolitan Tree Improvement Alliance. 7:57-65.

Seattle’s Canopy Cover. City of Seattle. <https://www.seattle.gov/>

trees/management/canopy-cover. Traverso, Vittoria. 2020. “Which trees reduce air pollution best?” BBC Future Planet. <https://www.bbc.com/future/article/20200504-which-trees-reduce-air-pollution-best>.

Trees for Life: Master Plan for Barcelona’s Trees 2017 – 2037. C40 Knowledge Hub. <https://www.c40knowledgehub.org/s/article/Trees-for-Life-Master-Plan-for-Barcelona-s-Trees-2017-2037>.

“Urban green spaces and health.” 2016. Copenhagen: WHO Regional Office for Europe. https://www.euro.who.int/_data/assets/pdf_file/0005/321971/Urban-green-spaces-and-health-review-evidence.pdf.

Velarde, Maria D., G. Fry, and M. Tveit. 2007. “Health effects of viewing landscapes – Landscape types in environmental psychology.”

Urban Forestry & Urban Greening. 6(4), 199-212. [doi:10.1016/j.ufug.2007.07.001](https://doi.org/10.1016/j.ufug.2007.07.001).

Ziter, Carly D., Eric J. Pedersen, Christopher J. Kucharik, and Monica G. Turner. 2019. “Scale-dependent interactions between tree canopy cover and impervious surfaces reduce daytime urban heat during summer.” *Proceedings of the National Academy of Sciences*. 116(15), 7575-7580. [doi:10.1073/pnas.1817561116](https://doi.org/10.1073/pnas.1817561116).

Cecil Konijnendijk is a co-founder of the Nature Based Solutions Institute (<https://nbsi.eu>).

the 3-30-300 rule:





Photos by Annie Keil

Nature as a Classroom

By Annie Keil

It's Monday after a snowstorm. The sky is blue, the sun is shining again, and all around me is a blanket of glistening snow. It's quiet and peaceful except for the gleeful delight of my two children. On the trail before us are animal tracks, running back and forth, round and round, as if they too were joyfully playing after the storm. We are the first to walk the trail this morning, and while the trek feels like stepping into a magical scene from a story book it is simply another day of school at the [Schuylkill Center for Environmental Education](#).

I love the hike into the woods to drop my children off at their

outdoor classroom nestled among the trees - especially in the winter. The more extreme weather conditions affirm for me that there is so much to be gained from exposure to all elements, for all of us. I, too, must come prepared in my winter gear to take them to school. I don't take for granted that this is an opportunity available to few children, and that I also get a dose of nature out of this experience.

I get many questions about outdoor education and nature-based learning, particularly about this time of year. People are always curious: What do they do when it's cold? My

answer: they are outside! Of course, there are particular wind and temperature conditions that necessitate taking breaks from the elements. But the children come equipped in snow gear with warm thermoses of hot lunch and tea. They, at times, get to build fires and in the afternoon, they rest inside sleeping bags on cots under the tree canopy, serenaded by the sounds of Mother Nature. They eat more in the winter and come home tired from the extra exertion, but they are oh so happy. Never have I heard the question from my children: "It's cold! What will we do?" They are experts at finding pleasure in their experience.

I've learned that one of the foundations of nature-based learning is the opportunity to connect deeply with a place as it changes across seasons and evolves over time. To watch a pond habitat go from teeming with activity to frozen begs the questions: What is going on here? Where did the animals go? Are they alive? Curiosity unfolds effortlessly in the rich environment of the outdoors, where emergent learning holds endless possibility. Yet, I hear the overarching themes that weave their learning together. They are getting an experiential sense of the interrelatedness of nature and ecosystems, of which they understand themselves to be a part.

In connecting with a place in this way, children become intimate with the passage of time. They have the experiential learning of the impermanence of states, seasons, things. The icicles they played with yesterday have melted. The white snow is now a muddy puddle to stomp in. Even the moment-to-moment shifting of the appearance and disappearance of wildlife or the sight and feel of sunlight as it warms the body and then hides behind a passing cloud. The sensory input available in a natural world is wondrously plentiful and children are continuously developing their skills of observation and awareness. My heart smiles when my kids share "I notice..." followed by whatever they are aware of in the moment. I notice that I, too, experience a stronger connection with the rhythms of the earth and a greater sense of

ease and wellbeing when I have regular, daily contact with nature. This solid foundation of awareness and an understanding of impermanence is, in my opinion, an essential component for developing resilience. In a nature-based learning setting, children have regular opportunities to practice dealing with discomfort. There are of course inherent risks to being outdoors. Indeed, my children have experienced their share of cuts, bruises, wasp stings, insect bites and poison ivy. Children are encouraged to take appropriate risks through play and grow as these challenges

empower them. I've watched firsthand as my own reserved and cautious children have developed confidence and self-mastery this way. Furthermore, kids develop autonomy and practice self-regulation through their self-care. It can be a frustrating feat for small children to learn to manage multiple layers, manipulate zippers and snaps with mittened hands, and hike with a backpack while wearing a snowsuit. In a classroom without walls, there is so much more space for children to express the full range of their emotions with ready access to co-regulation from teachers and from the environment.



Perhaps it goes without saying that it takes uniquely special educators to make nature-based learning possible, and I am inspired by the skill, commitment and character of the teachers I have encountered in my children's education. Outdoor educators bring their unique knowledge and life experience in disciplines like ornithology, mycology, entomology, outdoor

recreation, and the arts into the classroom in such a way that children internalize the message: *teachers are everywhere*, and Mother Nature is perhaps that greatest of them all.

Nature-based learning has provided my children with the opportunity not only to develop physically, cognitively, emotionally and socially, but to

do so in a context that embraces their place in the web of all life. Out of this experience they've grown a respect and admiration for the earth, an empowering sense of stewardship, and a biophilic-minded understanding of reciprocity. This is a truly special education, one that I think all people, and our planet, deserves.

Annie Keil is a parent of Henry (6) and Johanna (4) and has been part of the nature-based learning community at the Schuylkill Center for Environmental Education for 4 years. Located in Philadelphia and comprising 340 acres, the Schuylkill Center is one of the first urban environmental education centers established in the country.

The center offers nature-immersion learning for mixed-age (3-5 year old) preschool and kindergarten.

Schuylkill Center Nature Preschool.
<https://www.schuylkillcenter.org/preschool>.





Blind Creek - social infrastructure reconnects the community
Image Credit: Rory Gardiner

Fastidious Slowness: Re-naturalising Creeks and Re-integrating Ecologies

By Tom Rivard

Preface

Re-imagining your Creek is an interrelated body of work carried out by [REALMstudios](#) and collaborators across an interconnected landscape in Wurundjeri Country, in the ring suburbs of Melbourne, Australia. Working with local authority Melbourne Water, REALM investigated the potential for naturalisation of drainage channels to also deliver social, economic and environmental benefits. Arnolds Creek and Blind

Creek are now built outcomes, with Stony Creek in concept design and Moonee Ponds Creek at the masterplan stage. All four projects share the ambition to reintegrate human and natural ecologies, using water as the catalyst. The project, recently recognised with an Award of Excellence from the Australian Institute of Landscape Architects Victoria, was a collaborative endeavour between Melbourne Water, REALMstudios, Alluvium Consulting and E2DesignLab.

Conditions

For much of the world, and for most of global history, Australia was at the end of the world. Now, as an exceedingly dry continent with the majority of its contemporary population aggregated along the coasts, it is at the leading edge of climate change.

It is now also one of the world's most urbanised countries - since colonisation, its cities and towns have been sited squarely within

that territory between seemingly existential forces: economic development and environmental deterioration.

As design practitioners, it is the reconciliation of these forces, rather than the delivery of luxury goods, that we understand to be our most enduring civic legacy. Cities are the engines of climate change, as well the source of the capital, consensus and community needed to combat it. With national governments crippled by inaction, cities, through their density and diversity, remain centres of creativity and compromise, necessarily sharing resources, infrastructure, open space and culture.

As urban designers, our challenge is this: to start thinking about a city not made exclusively by human activities, nor measured only by human values. As landscape architects, we recognise a transformation in our role from designers to facilitators for broader systems, networks and ecologies

And finally, as relative newcomers to the lands of the oldest cultures on earth, we acknowledge not only the possibility, but now the absolute necessity of reintegrating human and natural systems and operations into a holistic and mutually supportive totality. In order to move forward, we need to look back.

Country

Despite colonisation, settlement, development and the seemingly

endless expansion of the suburbs of metropolitan Melbourne, it nevertheless remains an interconnected landscape.

It is still Wurundjeri Country. It has always been.

For millennia, the lands of the Birrarung (Yarra River) Valley were home to the Wurundjeri people of the Yulin Nation. Their Country extends from the bay north to the Great Dividing Range, and east and west to the Yarra and Macedon Ranges. The Birrarung Valley was traversed by many clans, benefitting from the riparian

ecosystems and surrounding woodlands, travelling throughout the valley to hunt game, fish and gather plants. Importantly, the area's protected creeks and sheltered clearings provided the spaces for shared events held by the Wurundjeri people and neighbouring clans: tribal celebrations, ritual ceremonies, family events and seasonal happenings.

While the creeks in the Valley experienced periodic flooding, they were also, during drought and climatic stress, sources of food and water – humans and animals alike would gather



Arnolds Creek - rain event during construction
Image Credit: Rory Gardiner

around clearings in the forest along creeks, where vegetation continued to flourish. The Wurundjeri have been custodians of this Country for thousands of years, managing the land and its ecosystems. Both the richness of the landscape for which they cared, and this deep knowledge, endure today.

This project is founded in recovering some of this richness, and restoring some of this knowledge, by re-evaluating our approach to water, and its “management.” Central to our approach is an appreciation of the significance of water to its surroundings - it shapes the landscape, nurtures it, and creates the framework for human interaction with the environment.

Context

The territory of Melbourne’s eastern suburbs is flat and, like much of coastal Australia, alternates between being very wet, or extremely dry. Once a complex and dynamic network of rivers, creeks and wetlands, 20th century engineering has reduced the regional catchment to a series of concrete channels and drains. Coupled with this deracination of the landscape, the surrounding communities have traditionally been deprived of much-needed open space.

The challenges were clear from the outset: regular flood events, posing significant environmental and safety risks, needed to be balanced against the ambitions of Melbourne Water to engender greater

waterway access, driven by community health and amenity. This complex set of operational parameters demanded a collaborative design-led response, one merging many disciplines: engineering, ecology, social planning and community engagement.

Considerations

The project initially demanded a cultural evolution within Melbourne Water, the agency responsible for water management across Melbourne. The agency is now reviewing how it can continue to adapt its previously sequestered infrastructure to improve environmental performance while also providing new cultural and ecological frameworks.

To satisfy these demands, instead of restoration, a process of naturalisation was applied. This is a practical methodology to reintroduce ecologies to the city, negotiating a shared territory between urban structures and natural systems. The approach required concessions to engineering efficiencies; instead of moving water as fast as possible to the bay, its movement is slowed down with natural meanders and riffles, resulting in gentler flows, holding water in the landscape.

This slowing down of water begins to recover natural processes by allowing the introduction of a range of secondary habitats and ecologies - within the complex systems that collect, store and reuse water in the landscape. The resulting permeable framework also creates spaces for absent species to be re-established within the landscape, contributing to its ongoing operations and ecologies - this is especially true of human ecologies.

Community

Community engagement was at the heart of the projects, with individuals, groups, institutions and organisations fully invested in the process, and the outcomes. Community input identified opportunities for education, recreation and communality - importantly, these aims were associated with improved water performance within the recovered parklands. The community wanted to experience water, in all its manifestations, as part of nature returned to the



Blind Creek-Elevated and cantilevering platforms
Image Credit: Rory Gardiner

city.

As the water slowed down, so could people - the renewed creeklands offered the opportunity to pause, to reflect and to reconnect with nature. The designs established flood-proof elements allowing the community to connect with water and with each other: benches, tables, bridges, platforms, lookouts, stepping stones. These elements lead people into the parks and down into the creek beds, across it and along it, where the movement of water creates an audible, visual and tactile experience.

The Australian idea of the “park”, a distinctive phenomenon as it has developed over decades, conflates many disparate things: the local community, their strong attachment to landscape, social and recreational activities, food and drink, and shared civic rituals of performances, celebrations and events. Within communities, these environmental places become

critical civic assets, dense and multi-faceted operational landscapes, capable of containing disparate multitudes of events and activities and entertaining and accommodating countless thousands. The key community challenge with the creeks was to retain the hydrological function of the creeklands, while expanding, enhancing and adapting their ecological, social and cultural performance for an increasingly diverse 21st century community, in a rapidly changing world.

Continuation

Life and activity of many types have returned to the waterways, with humans and non-humans alike finding their place in the transformed landscape. From a silent landscape devoid even of birdsong, the parks now buzz with activity and its resonance: frog croaks, insect buzzing, the rhythmic pattern of joggers and the irregular tones of deep conversations.



Arnolds Creek - Connective threads link social, terrestrial and aquatic ecologies
Image Credit: Rory Gardiner

The persistence of seemingly long-absent ecologies was a continued surprise: cessation of routine close-cut mowing saw native grass species return in abundance. The underlying ecological structures were released by this work. Project director and REALMstudios founder Jon Shinkfield offers “there are deep lines of ecology that reside around waterways, under the surface of the built landscape, that keep wanting to come to the surface.”

One of the more rewarding

aspects of these projects is their ongoing dynamism once water is released from its completely managed state. Although the framework is fixed by engineering, the design approach recognises the movement of water and the attendant change it will bring over time, particularly with engagement within the landscape from new constituents, both human and natural.

Congruencies

These new parklands have

become community collectors and connectors, encouraging activity and occupation through their extensive social infrastructure, but also through the continuously evolving habitats and ecologies that are growing throughout the transformed landscapes. Plantings are intentionally complex mosaics, with arrangements intended to continue evolving over the coming years, without the need for external intervention. Species and populations will shift annually and seasonally,

responding to broader climate, weather and water patterns - short-term and local events will connect places to larger ecosystems. The connectivity in these creeks is as much about time and space as it is about water.

Through deep knowledge of landscape and the logic of ecosystems, these creek corridors were transformed to become responsive environments within traditionally static urban areas. In these fluidic and permeable landscapes, surfaces, spaces and

activity all contribute to the management of movement, and the re-introduction of time: water slows down, plants, animals and people congregate, linger and participate in the continued evolution of the land.

These transformed creeks accommodate emerging and revitalised operations and ecologies – importantly, they allow the re-integration of human and natural constituents and activities to realign within a natural landscape. As Shinkfield says, “There is

latent power and possibility within the Australian landscape; we just need to rediscover and release it.”

Tom Rivard is an urbanist, artist and educator, engaged in speculative city making, re-imagining the productive relationships between cultural acts and the environments in which they thrive. He is a Practice Principal with REALMstudios (realmstudios.com).



Blind Creek- A robust prototypical material and furniture palette
Image Credit: Rory Gardiner



Photo Credits Audubon of the Western Everglades

The Burrowing Owls of Marco Island

By Tim Beatley

It is hard to imagine a more charismatic and charming bird than a burrowing owl. Not very large, with big eyes and a fascinating biology (including, most notably, living and raising their young in underground burrows). They are beloved by many in communities lucky enough to have them around. I became familiar with them several years ago when making a film about efforts in Phoenix to install artificial underground burrows; an effort to actively relocate the owls from places (including as a result of highway

projects) where they have been displaced.

A subspecies of the burrowing owl is also endemic to the grasslands of Florida. Over multiple decades, the subspecies has been displaced and is now listed as a threatened species there. Some communities have been the beneficiaries of this displacement and have embraced the owls wholeheartedly; working to make room for their burrows in vacant lots and on the lawns of homes.

Marco Island, a barrier island in the southwest corner of Florida, is one such place and there a community is taking an interesting approach to coexisting with the owls. Conservation efforts have been spearheaded by the Audubon of the Western Everglades (AWE) in partnership with the City of Marco Island. I spoke with Brad Cornell of AWE about the efforts there, and the threats faced by the owls. While Marco Island has an abundance of the owls, currently there are fears that the island's booming growth

and development will leave little room for them. Especially concerning is the prospect of losing so many of the currently vacant lots where most of the owls nest. "What we all recognize is that we're going to lose this population as Marco Island builds out," notes Cornell.

The Burrow Starter Program is a direct response to these fears, hoping that at least some of the nesting pairs can find a home in the front yards of willing homeowners. In Florida, the Burrowing Owls actually dig their own burrows (unlike their western cousins who have mostly relied on prairie dog burrows). But they need a start, and this is where AWE volunteers come in, especially homeowners on the island willing to host owls in their front yards. For interested homeowners, AWE staff will scope out the yard and find the best spot for a burrow, then excavate around eight inches in an angled burrow (a starter burrow!) that hopefully the owls will discover and choose to further excavate and make a nesting site. If the burrow extends to 18 inches and beyond, Florida Fish and Wildlife Conservation Commission considers it a viable, active nesting burrow.

While still in the beginning stages, the program is off to a good start. Around 110 starter burrows were installed in 2020, with about 13 landowners who had recruited owls. So, the majority of these starter burrows end up unoccupied. Those homeowners who are lucky enough to find themselves

with a nesting pair of owls are, Cornell tells me, "elated." And unfortunately, many more are likely disappointed when owls do not arrive.

Several days later I caught up with Jean Hall, a professional wildlife photographer who coordinates the volunteers who work with AWE on behalf of the owls. She, along with field biologist Brittany Piersma, were on that day driving around the island checking on owls and gopher tortoises (another resident species that burrows as well and can also be found on vacant lots). My phone conversation with Jean that day confirmed for me the tolerance and resilience of the owls. As we were talking, there were loud

sounds coming from an adjacent construction site that seem not to bother the burrowing owl that Jean is watching, but the noise is a reminder of the relentless development pressure that the owls and tortoises must contend with.

Volunteers like Jean make the program work on the ground. Each season some 50 or more residents, most retirees, train to become "owl monitors," agreeing to watch the active burrows at least once a week and to record important information along the way (such as the presence and age of chicks). Each pair of monitors is assigned to one of the island's 22 neighborhoods, with responsibility to monitor around 15 sites.



Serving as an owl monitor is so popular there has been a waiting list. I ask Jean what she thinks the volunteers get out of the experience. She says she is not sure but notes the high rate of return of volunteers each year and the considerable learning opportunities and stress-reducing benefits of looking for owl babies.

To encourage homeowners to make room for the owls a special financial incentive was created in 2020. Homeowners with active nesting burrows were entitled to receive \$250 each year as long as the burrow remained active. It is obviously not a lot of money, but as Cornell notes an important step nonetheless: “What it does I think is lend some official public community recognition of the value of having wildlife.” It’s a recognition, he says, that the owls are a community asset.

It is not a large commitment of public funds for the city, about \$5000 a year, but impressive still that the city council is willing to support the effort financially.

Is the subsidy a significant factor in encouraging homeowner participation? It is hard to say. “It’s not the money,” Hall tells me, noting that some homeowners have even returned the funds back to the city. It is something else that primarily motivates people, she thinks: a love of the owls. But the funds are a small yet important signal about the importance of the owls and official encouragement to reimagine what a front yard could be (i.e. a habitat/home for burrowing owls and tortoises).

It would be ideal if cities could shift the financial incentives in ways that nudge and educate. Already many cities in the US west have put in place some form of “cash for grass” rebate, providing subsidies for homeowners who replace water-thirsty lawns with native plants and xeriscaping. Why not go further still, building on the inspiration of Marco Island, and assess one’s local property tax bill with biodiversity and ecosystems services in mind: the more species finding homes there, the more trees and native plants, the greater the ecosystem benefits provided by one’s yard the lower the tax burden. In a way similar to the installation of solar panels on one’s roof, where the electrical meter spins backwards, perhaps in some cases a property owner would receive a check from the city rather than having to pay taxes.

Another important part of what makes this initiative work is the safe harbor agreement between the city, the Florida Fish and Wildlife Conservation Commission, and participating homeowners. Because the owls are on the state list of endangered species, the presence of an owl or an active burrow could prevent a homeowner or landowner from developing or using their land in a particular way. Modelled after a similar provision at the federal level, the agreement assures landowners that the presence of the owls will not prevent them from developing or using their property in the future. The agreement does stipulate certain obligations on

the part of landowners, including a requirement to maintain the height of vegetation close to the burrows, avoiding the use of pesticides, and keeping the entrance to starter burrows clear of debris.

Especially interesting are the stories of hope where schools have interacted with the owls. Cornell tells me about one case in nearby Naples where a pair of owls established a nest just below the goalposts of a middle school’s football field. The proposed solution was to set up four starter burrows in other nearby locations in an effort to persuade the owls to shift to a less disruptive site; the owls did indeed move the next week and ended up fledging 5 chicks. What a wonderful opportunity to engage the students at a relatively young age with birds and urban wildlife and to provide a tangible demonstration of what coexistence looks like.

As creative as the starter burrow program is, it is likely not enough to ensure the survival of the owls (or the tortoises). Some effort to protect and set aside potentially developable vacant lots has also got to be part of the answer. And there have already been efforts to secure parcels through Collier Conservation, a voluntary land acquisition program that dates to the early 2000’s and has led to the purchase and protection of some 4,300 acres of habitat in the county. In fall of 2020, voters resoundingly voted (77% in favor) to restart this initiative and impose again an addition of \$250,000 to property taxes for an additional ten years.

Individual homeowners are also jumping in to help. Brittany Piersma mentioned one landowner she encountered in the field who ended up so enthralled with tortoises that he purchased the empty adjacent lot to be set aside permanently as a conservation lot. A few days later, she reports being contacted by another nearby neighbor interested in hosting a starter burrow, suggesting the potential value of neighborhood-based forms of conservation. “No matter how small or large, every small effort can truly make a difference,” she writes in an essay in the Coastal Breeze News titled “The Hope We All Needed.”

Is it possible to love the owls to death? There is quite a lot of owl-connected tourism I am told. People come to Marco Island to see the owls and the sight of small buses stopping to watch them is now common. It is another argument for defending and making room for the owls, and as Hall notes, local businesses are thrilled to see the tourist interest. These economic arguments, while not primary, are nevertheless helpful. The larger City of Cape Coral, to the north, has even more burrowing owls within its borders than Marco and their owl-tourism is booming, punctuated each year with a popular Burrowing Owl Festival that features bus tours and extensive education about the owls, as well as raising considerable funds for habitat acquisition.

What the longer future holds for these charismatic owls is unclear, and whether it will be possible

to secure a permanent place in this growing coastal city. The way they are beloved by residents and visitors alike, and the extent of volunteer engagement, as well the creative tools and strategies employed, are cause for optimism.

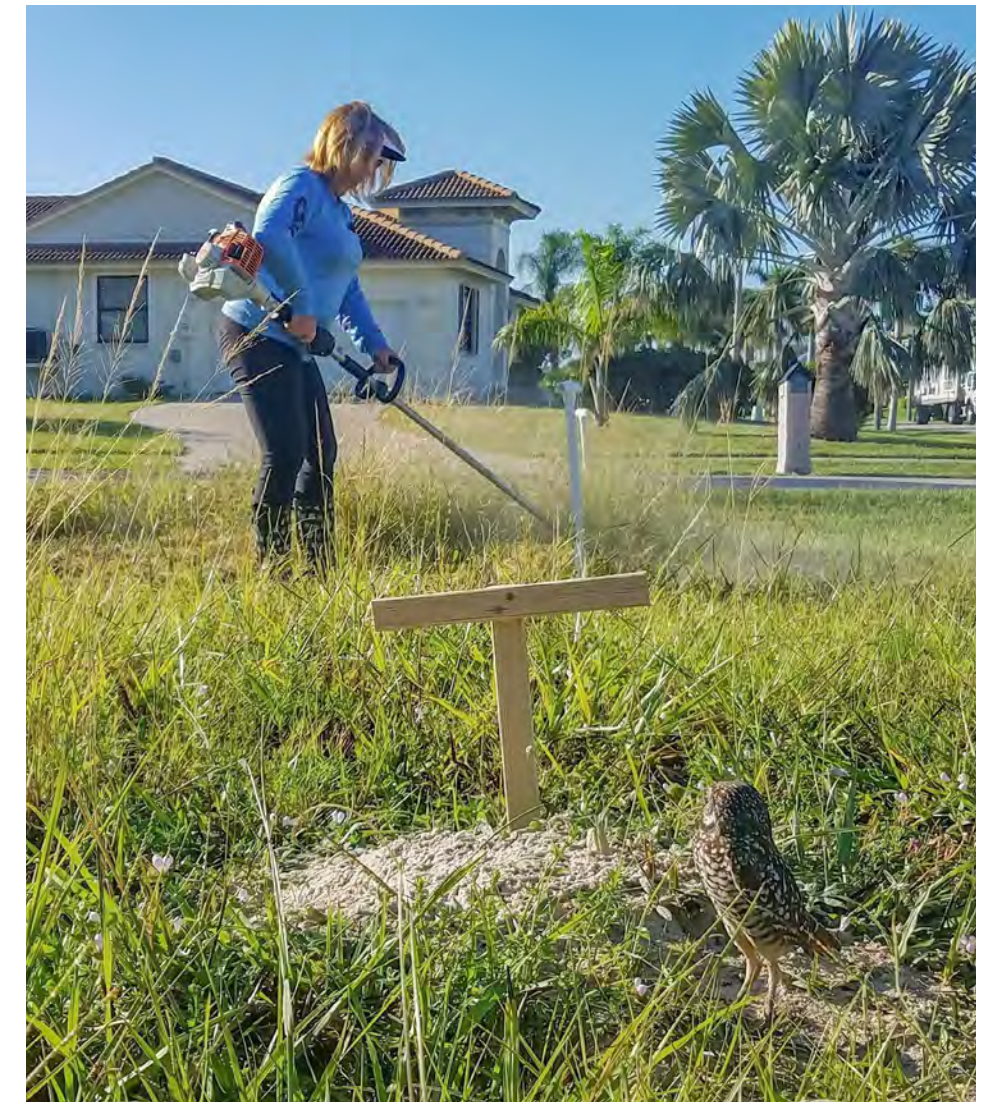
So far, the numbers of nesting owls is encouraging: the 2020 nesting season was quite successful, Brad Cornell tells me, with 255 nesting pairs on the island, producing 586 chicks fledged. Compared to the mid-1990’s this is a dramatic increase. The number of homeowners wanting starter burrows is another encouraging metric.

There is no doubt that Marco Island is a more interesting place because of the owls, as well as the tortoises and the other co-inhabitants of this barrier island, and the city a more caring and compassionate place for its efforts to make room for them.

Resources

Audubon of the Western Everglades (AWE). <https://audubonwe.org>.

Burrowing Owls: Building Habitat in Phoenix, Arizona [video]. <https://www.biophiliccities.org/burrowing-owls-film>.





Kindness Farm Boundary Wall
Image: VSPCA

VSPCA's Kindness Farm: A Food Smart Animal Sanctuary

By Priya Tallam and Pradeep Kumar Nath

The Visakha Society for the Protection and Care of Animals (VSPCA) proposes that food-smart animal sanctuaries are an excellent model for environmental and social justice, building in food security and climate resilience across rural communities in tropical India. The design, workflows and principles of such a preserve, would be important to city planning as well. This thoughtful plan demonstrates successful, nature-positive outcomes representing an imaginative linking between city and countryside via animals that are being forced out of human-dominated spaces and food systems. These living spaces are often simultaneously contemplated upon in terms of access to fresh food, management of rural migrants

and informal workers and more recently, biodiversity losses. Creating healthy, opportunistic living spaces in rural regions through innovative practices, which provide fulfilling occupations for village residents can reduce rural migration to cities. Animals, the important residents in these sanctuaries, are key to influencing universal human values and instilling the value of the region's biodiversity.

Background: The World to India to Visakhapatnam

A report from [The Task Force on Nature-related Financial Disclosures \(TNFD\)](#) found that more than half of the world's economic output is dependent on mother nature. This implies that life on Earth is sustained through nature's biodiversity. TNFD

reports that humanity has wiped out 83% of all wild mammals and half of the world's plants. This has brought the living world to the brink of the climate crisis and inflicts food insecurity on more than a billion people.

Farmers in India are increasingly desperate. Deep cracks in food security coupled with disruptions in the supply chains of the agricultural sector have disproportionately affected rural communities and large numbers of informal sector workers. [For India's 303 million informal sector workers the consequences of food insecurity are dire.](#) The continuing waves of Covid-19 in India can push rural communities into transient poverty with a potential impact of plunging upwards of 4 million informal sector workers into poverty.

The same article breaks numbers down to the Visakhapatnam district: like the state of Andhra Pradesh, it is primarily an agrarian economy engaging a majority of its citizens in agriculture and allied industries. In Andhra Pradesh alone, around 100,000 Micro, Small and Medium Enterprises (MSME) provide employment to more than 1,000,000 people, while the state employs around 800,000 people in its management. The state, which was resplendent with good water reserves, now faces issues of severe water stress and exploitation as identified by the Jal shakti Abhiyan. There are nine districts of Andhra Pradesh, facing severe water stress, one of which is Visakhapatnam. Along with this challenge, is the double burden of being flood prone during the monsoons. This makes the region vulnerable to climate changes and monsoonal variability.

The Kindness Trust

In this situation of great loss (of the world's biodiversity and nature) there is genuine opportunity to resurrect nature-positive outcomes by pursuing sustainable ecosystems, which involve local people and rescued animals while ensuring biodiversity retention. In the heart of rural Visakhapatnam, a food-smart animal haven is expanding possibilities for health and well-being of all. This is VSPCA's Kindness Farm.

In 2012, VSPCA procured land deemed "useless" in the Kuruvada region meant to house rescued animals from the city and countryside. Late actress Ms. Olive Walker, world-renowned animal activist, Mr. Philip Wollen of [The Kindness Trust](#), Mrs. Esther Geisser of NetAP and Mrs. Shobha Narayanan helped realize this project with VSPCA's Founder, Mr. Pradeep Kumar Nath. Calling it the "Kindness Farm," Pradeep

began his first task: carting truck-loads of water to wet the land and dig wells –planting many thousands of native fruit and shade saplings for animals, beginning the processes of soil regeneration. The aim: invite pollinators and the region's biodiversity to return to this region. VSPCA does not believe that any piece of land is useless or barren. Animals, birds, insects, reptiles, and microorganisms live everywhere – from deserts to ice-lands to deep down in the ocean where life is not expected to survive!

In 2019, VSPCA obtained a similar property in "Narsipatnam" that is being re-modelled after The Farm. Narsipatnam covers about 14 villages. The ultimate aim of these efforts by VSPCA is to influence a region of about 97 villages stretching from "Anakapalle" through "Nathavaram" by creating sanctuaries that provide both biodiversity sustenance and



Sridevi Goat Field Supervisor
Image: VSPCA



self-reliance, offering livelihood to villagers in this region and influencing their compassion for rescued animals – so that every citizen internalizes the value of all the precious biodiversity that abounds this region.

Several dozen locals have joined hands in working with VSPCA, recognizing that an oasis was forming in their dry region. Today, VSPCA employs about 50 Kuruvadan residents to manage the Farm and renewable energy production, handle animals, and ensure the availability of year-round water while maintaining the regional watersheds. With their help, the Farm has evolved the best sustainable practices and living habits. Throughout this region, there now is heightened awareness of the incredible value of the biodiversity that exists here.

Why is this Project necessary?

Food insecurity, climate change and urban sprawl threaten rural ecosystems with fragile economies and keystone species. Conventionally, such challenges are addressed via costly state/international interventions and aid, often with scientific complexities, at the expense of local participation and trust.

VSPCA has been evolving self-sustainable, ecosystem service-based, long-term, adaptive, replicable infrastructures. In all landscapes, whether coastline, city, or countryside, these include local and animal cultural ecologies, agency, and participation.

As VSPCA worked through its [sea turtle conservation program](#), the founder and staff learned of the true impacts of empowering ground-up conservation. In rural

Andhra Pradesh, through the Kindness Farm initiative, they continue to explore opportunities to expand their food-smart, food-shed, while continuing to work closely with all animals. Working with the Smart City Mission in the City of Visakhapatnam – the realization dawned that the countryside has great resources to be just as “smart” as any Smart City – because the rural countryside is in greater proximity to nature! And, what can be smarter than nature herself?

It’s seen that the Farm suffers drought and flooding in mirroring the story of Noah’s Ark. As soon as plants and animals began thriving in the Farm’s environment, the next steps were to build for climate resiliency and adaptive capacity in rural Andhra Pradesh. So, VSPCA began the construction of its Rain Water Harvesting Project. This best

management practice is training rural residents in the process of rain water harvesting. Certain farmers like Mr. Satyanarayana are observing this process keenly to bring such a system to their own farms and animal cooperatives in the region. Rains mean life in this region. Rain water harvesting addresses both drought and flooding. It channels the heavy coastal storm waters into rain water pits and wells, and the bio-gas-based energy pumps the water into overhead tanks – for year-round water availability. Precious rain water isn’t wasted and different crops can be rotated year-round. The animals and residents are guaranteed water in difficult times because of the storage capacity of the system. Animal dung keeps the soil healthy, which retains more moisture along with the nitrogen-fixing microorganisms for plant health, and prevents soil erosion.

Water attracts more biodiversity. Animal species are flocking to the Farm. A leopard, a mongoose and varieties of snakes are now seen at the Farm. There is overall prosperity with rain water harvesting.

VSPCA, an animal-protection organization, has ways to deter species who may attack the Farm’s animals, without employing lethal means, while attracting pollinators and birds to propagate the native trees throughout the region.

Important design elements in the Farm include a delightful “Community-Dog Park” and Cat House as model spaces for rescued dogs and cats. As VSPCA runs a shelter in the City of Visakhapatnam, they have the knowledge to build and train the locals on construction and management of an aviary, apiary, and a primate sanctuary

here. Several “Cattle-Shalas” exist inside the Farm. There is room to bring in liminal, stray, wild, and migratory animals – promoting compassion for all the biodiversity that saunters in, thereby fortifying long-term, the ecosystem services we receive from them.

The Scope of Kindness Farm

When replicated across rural communities, the Farm has tremendous scope. It is a demonstrably self-reliant model – a much needed means of innovation and livelihood! People are able to learn to grow their own food by innovative means with the backing of evolving best practices. The soil is regenerated and well-fixed because there are a variety of animals who produce the best fresh fertilizer and support the vermicomposting needed. The Farm produces its own biogas

Food-Smart, Food-Shed

The Kindness Farm is a model “food-smart food-shed,” demonstrating the following strategies:

- **Natural and Organic Farming combined with Agroforestry** regenerating soil health with native plants and trees, utilizing rescued-animal waste efficiently, and building self-sustaining practices throughout this region.
- **Rain Water Harvesting and Watershed Management** ensuring water availability year-round, in this drought-prone region, which receives limited yearly rainfall.
- **Interspecies Co-existence** is about inviting the region’s biodiversity back – to revitalize natural ecosystem services provided freely by Mother Nature. Animal sanctuary-management activities are key in this proposed food-smart, food-shed.
- **Awareness and Education Campaigns in Adjacent and Neighboring Villages and Townships** is the tactic for system multiplication and/or scaling up; and
- **Establishing the Relevant Concerned Network** of village panchayats, region’s farmers, market channels, relevant NGOs for scientific knowledge around seed and crop, animal rescue co-ops and universities - all, for the purposes of socio-economic growth of the selected regions, continued scientific needs/research, strategic & tactical planning, and change management.

for its energy needs such as pumping water, preparing food and medicine, surgical needs, etc. Here too, animal waste is effectively utilized. Beyond this, animal waste, such as cow urine, allows for the production of tons of ground cleaner. There is a high demand across cities in India for cow-based ground cleaners. Cow dung cakes and incense sticks are other hand-made products that the villages can sell in the markets, and which have export value due to the resurgence of the demand for natural products.

Applying rescued-animal waste in cultivation and energy management speaks to greater efficiencies and efficacious use of resources, especially in economically hard-hit regions. Importantly, it manifests compassion for the animal world. Apart from fruit and wood trees, people can plant crops and work towards the growing need for localized food – as through Farmers’ Markets. When replicated across many thousands of villages, such food-smart, animal sanctuary-based food-sheds, promote healthy living.



Food transported over tens of thousands of miles using incredible transportation and energy resources, is one of the causes of food insecurity. Large amounts of money are redirected to bringing food to the masses, grown, packed and processed across oceans, which can actually be grown locally and freshly. The Farm seeks to demonstrate local food production and consumption.

Innovations in farming and the high demand for organic products across the world, provide opportunities for fulfilled employment of village youth, men and women at their very locations. As the Kindness Farm has proven, it can gainfully employ the village youth, men and women. This has prospects for reducing mass migrations from villages to cities. Most cities in India are struggling to provide healthy living for people migrating in large numbers, who often end up in slums and shanties.

Conclusion

Native people are accountable to their land. The indigenous

are accountable to the lands and waters, which are their means to survival. They work closely with Mother Nature. Being close to nature, is being close to their survival. Nature and survival are often demanding and cruel. Animals and the native peoples know and live this.

When we work with animals and make their existence a part of ours, we begin to unravel the language of how to manage the land and waters for the betterment of the whole ecosystem.

In cities, as we tend to destroy natural lands or eliminate animals from urban spaces, we lose the special language that can only be learnt by observing biodiversity. Animal stories are always woven into the land and only become revealed when humans make efforts to retain all the biodiversity around them.

The Kindness Farm is such an experiment that perseveres in demonstrating how humans can make homes for various species and live effectively with nature. The Farm illustrates frameworks needed for healthy living, species-by-species.

Taking the example of the Dog Park: here might be the framework pathway: (1) ensure ample water for living; (2) make homes for dogs, as everyone needs a home on this planet to call their own {therefore, you will see references to “dog bungalows” in pictures/articles of Kindness Farm}; (3) plant trees sustaining the larger ecosystem; and (4) provide domesticated



Learning how cattle can be effective partners in farming!
Image: VSPCA

urban dogs in such facilities, similar essentials and amenities needed by anyone for survival – e.g. food, water, vaccinations, health care, recreation, etc.

In conclusion, modern scientists work through established scientific methods that demand evidence. Therefore, indigenous sciences and animal cultures are considered “primitive,” unable to adhere to the modern scientific method. However, the scope of modern scientific method can often be puny in space, time and spirit. How do we emulate an entire ecosystem in the lab? Or, from a petri-dish? How can we traverse centuries in our experiment? Ecosystems have evolved over millennia to provide the ecosystem services needed for the survival of species. VSPCA in its work, recognizes indigenous methods of knowing, transmitted over centuries, and applies this to augment the

modern scientific methods.

It is also important to internalize that modern science is sanctioned through settler colonial power structures whose authority does not authentically tolerate questions because the evidence has been supplied. Basically, science tends to be authoritative, but hasn’t evolved the scientific method to be questioned against the bigger scheme of things over centuries and across the cosmos. Modern science therefore, can go wrong – as compared with centuries of indigenous wisdom obtained directly from nature. We must think: – through all our technological advancements, is global warming a true sign of progress for all of humanity?

We must develop a deeper compassion for all animals. VSPCA’s Kindness Farm brings animal and human cultures

together in a way that empowers both humans and nonhumans to live peaceful lives, while sustaining larger ecosystems with greater biodiversity.

Resources:

VSPCA. <https://vspca.org>.

Kisslay Anand & Roshni Sekhar. 2020. “Food Security and PDS in Andhra Pradesh”. Available at <http://www.swaniti.com/wp-content/uploads/2020/06/Food-Security-and-PDS-Final.pdf>.

VSPCA Sea Turtle Conservation Program. 2021. Biophilic Cities Journal Vol. 4, No. 1. <https://www.biophiliccities.org/bcj-vol-4-no-1>.

Winsome Constance Kindness Medal. <https://www.kindnesstrust.com/kindness-gold-medal>.



Domestic fowl housed near waterways create risk for transmitting zoonotic pathogens (Bogor, Indonesia) Photo by Jamie K. Reaser

Land Use-Induced Spillover: Considerations for Urban Mitigation Planning

By Jamie K. Reaser and Gary Tabor

The advent of COVID-19 (SARS-CoV-2 virus) is a call for greater attention to the human activities that drive pandemics. An understanding of causes facilitates the envisioning of solutions. Here we provide a brief overview of the ecological conditions and processes that facilitate pandemics, as well as pose questions for urban planners to take into consideration for achieving pandemic risk reduction.

Along with other colleagues, we recently proposed dominos as a way of imagining the chain of events that ultimately result in pandemics: something triggers the first domino to fall and the rest then fall in sequence, until all of the dominos have been

knocked over. The trigger, we believe, is land use change—human activities that destroy or degrade natural systems. We refer to the process as land use-induced spillover (Plowright et al. 2021, Reaser et al. 2021a, 2021b). Ecological countermeasures are targeted landscape-scale interventions that can be employed to reduce pandemic risks in human-modified ecosystems (Reaser et al. 2021c)

The metaphoric dominos fall as land use change creates environmental conditions that stress wildlife. The theory, which is backed by an increasing amount of scientific research, is that when wildlife become stressed, their immune systems become impaired making them

highly susceptible to infection by pathogens, disease-causing microbes. These animals thus become hosts, larger organisms that pathogens thrive on or within. Ongoing or additional stresses cause wildlife hosts to shed (release) pathogens in the environment, usually through urine, feces, or saliva. When humans come into contact with these pathogens, directly or indirectly, they too become pathogen-infected—they contract diseases. The transmission of a pathogen from animals to humans is known as zoonotic spillover. Sometimes the pathogens are transmitted from wildlife to people, and sometimes from wildlife to domestic animals to people. Some pathogens rely on vectors,

such as mosquitos or ticks, to accomplish transmission. Once a pathogen enters the human population, it spreads from person to person. The term epidemic means that a disease is prevalent throughout a community. The term pandemic means that a disease has reached global scale.

What role do urban environments play in triggering land use-induced spillover?

How can urban planning mitigate zoonotic disease risks?

Urban environments are constantly interacting with the landscapes in which they are embedded; the collective expression of human activities reaches near and far. While an urban “footprint” may be discrete, a city’s “metabolism” is hyper-connected to other cities and landscapes at a global scale. Urban living can facilitate large-scale zoonotic disease outbreaks—through the transmission opportunity associated with high density living, as well as the geographical extent of urban lifestyles. This poses challenges for urban planners in considering zoonotic disease risk mitigation (Ahmed et al. 2019).

We breakdown the mechanistic process of land use-induced spillover through the infect-shed-spill-spread cascade as it relates to cities, with the aim of highlighting points of strategic epidemic intervention for forward-looking urban designers. Although tropical and subtropical environments are

most commonly associated with zoonotic pathogen emergence (origin), once a pathogen spreads into a widely-distributed host, such as a house mouse or a human, the world may become borderless to disease. This is particularly worrisome given the increase in inter-urban networks. As COVID-19 has aptly demonstrated, the consequences for communities that have not wisely-invested in disease prevention and mitigation strategies will be measured in lives and livelihoods lost.

Infection & Shedding: Urban Stressors

Risks: Urban areas are developed and provisioned through various land use processes that impact terrestrial, freshwater, and marine ecosystems. Environmental impacts may occur within a city’s vicinity as habitats are destroyed and degraded for construction purposes, or in relatively remote wildlands on the other side of the world where minerals are

mined, timber is felled, wildlife is extracted, or food is grown for export to urban centers. These impacts may be localized and acute, or intensive and pervasive, as well as dynamic across space and time.

Of course, cityscapes are not just characterized by what they take up and take in; urban areas also have a wide-range of outputs, among them pesticides, pharmaceuticals, garbage, and excrement. Noise, dust and light pollution are often overlooked as disturbances, but the scale of these nuisances are becoming vast as cities grow together creating mega-cities. Many of these pollutants can directly stress wildlife. Others may increase the prevalence and distribution of pathogens in the environment, sometimes in unexpected ways. For example, plastic products (including microplastics) can serve as colonizing substrates for various pathogens.



Fruit stand with unwashed produce could be contaminated with zoonotic pathogens. Sanitation stations could reduce risk (Rome, Italy). Photo by Jamie K. Reaser

Considerations:

What can be done to educate urban developers about the risks their projects pose to human health so these risks can be mitigated? How can the development process be biophilic?

How can regulatory measures be more effectively employed to prevent land use-induced environmental stresses on wildlife species that are known zoonotic pathogen hosts?

How can urban environments be designed so that the majority of resources are provisioned locally?

Spillover: Wildlife-Human Proximity

Risks: The risk of zoonotic pathogen spillover (transmission) between wildlife and people is largely a matter of proximity. In urban environments people may intentionally and unintentionally come into contact with numerous types of wildlife that have the potential to carry and transmit zoonotic diseases. Some of these diseases, such as rabies, are not readily spread from person to person. However, disease such as plague, cholera, and monkeypox have strong pandemic potential. Invasive vertebrates should be of particular concern in city environs because many zoonotic pathogens are associated with wide-spread invasive species (often considered “pests”) and ports of entry make urban areas especially vulnerable to biological invasion.

Common ways in which people intentionally come into direct contact with wildlife in urban areas include keeping wildlife (non-domesticated species) as pets (this includes animals purchased in pet stores), feeding wildlife, handling injured or orphaned wildlife, and consuming wildlife for food, medicine, or display purposes (e.g., trophies or art). Common ways in which people unintentionally come into direct or indirect contact (e.g., excrement) with wildlife in urban areas include via the infestation of invasive rodents and birds in dwellings, handling of containers used to feed wildlife, touching unsanitary surfaces in outdoor areas (e.g., picnic tables), and interacting with domestic animals that have been exposed to wildlife in urban yards, parks, farms, and zoos.

Considerations:

What can be done to educate city dwellers and tourists about the risks that contact with wildlife poses to human health while also promoting wildlife appreciation—fostering biophilia?

How can regulatory measures be more effectively employed to minimize human contact with wildlife in urban environments by, for example, establishing stringent measures to eradicate and control invasive species, effectively manage waste and sanitation, and prohibit wildlife feeding?

How can urban environments be better designed to prevent

contact between high-risk wildlife (species known to carry zoonotic diseases) and people in ways that are not only humane to wildlife but foster wildlife populations in low-risk contexts? This could involve, for example, refraining from landscaping with fruiting plants that attract and concentrate high-risk wildlife near dwellings and recreation areas.

Spread: Human Relations

Risks: Urban environments are characterized by large numbers of people living and working in close proximity. Human to human contact is high, whether direct or indirect, intentional or unintentional. For this reason, cities can serve as pandemic epicenters—hubs for the spread of zoonotic diseases.

Considerations:

What can be done to better educate city dwellers and tourists about the importance of and options for reducing disease transmission risk? This might include, for example, city-specific social marketing campaigns that promote adoption of risk mitigation behaviors.

How can regulatory measures be more effectively employed to minimize human to human contact in urban environments as a pre-emptive strategy rather than just a response measure after a zoonotic outbreak has been reported? For example, could regulations be more effective at managing food and water supplies, ventilation systems, and waste streams?

How can public transportation and structures in urban environments be designed to reduce person to person contact risks?

Human health is determined by environmental health. The more we can do to support large, intact, well-connected natural landscapes, the healthier—and much happier—we’ll be as people (Patz et al. 2004). When the “natureful city” paradigm extends the full length of the urban footprint, urban living can help reduce the risk of land use-induced spillover through public education, regulatory measures, and design innovation. Urban living is being redefined to reduce stress and promote the equitable well-being of city inhabitants. This goal should also encompass protecting the quality of life for all species, far and wide, impacted by urban structure and function. Reducing the risk of zoonotic disease outbreaks is consistent with celebrating and conserving nature, with regular immersion in nature and appreciation of native plants and animals as an aspect of urban thriving, and with expressing the ethical responsibility that cities have to conserve nature to the benefit of all life on Earth from local to global scales.

References and Further Reading

Ahmed, S., Dávila, J.D., Allen, A., et al. (2019). Does urbanization make emergence of zoonosis more likely? Evidence, myths and gaps. *Environment and Urbanization* 31: 443-460. doi: [10.1177/0956247819866124](https://doi.org/10.1177/0956247819866124).

Patz, J.A., Daszak, P., Tabor, G.M., et al. (2004). Unhealthy landscapes: policy recommendations on land use change and infectious disease emergence. *Environmental Health Perspectives* 112: 1092-1098. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1247383>.

Plowright, R.K., Reaser, J.K., Locke, H., et al. (2021). Land use-induced spillover: a call to action to safeguard environmental, animal, and human health. *The Lancet Planetary Health* 5. doi: [10.1016/S2542-5196\(21\)00031-0](https://doi.org/10.1016/S2542-5196(21)00031-0).

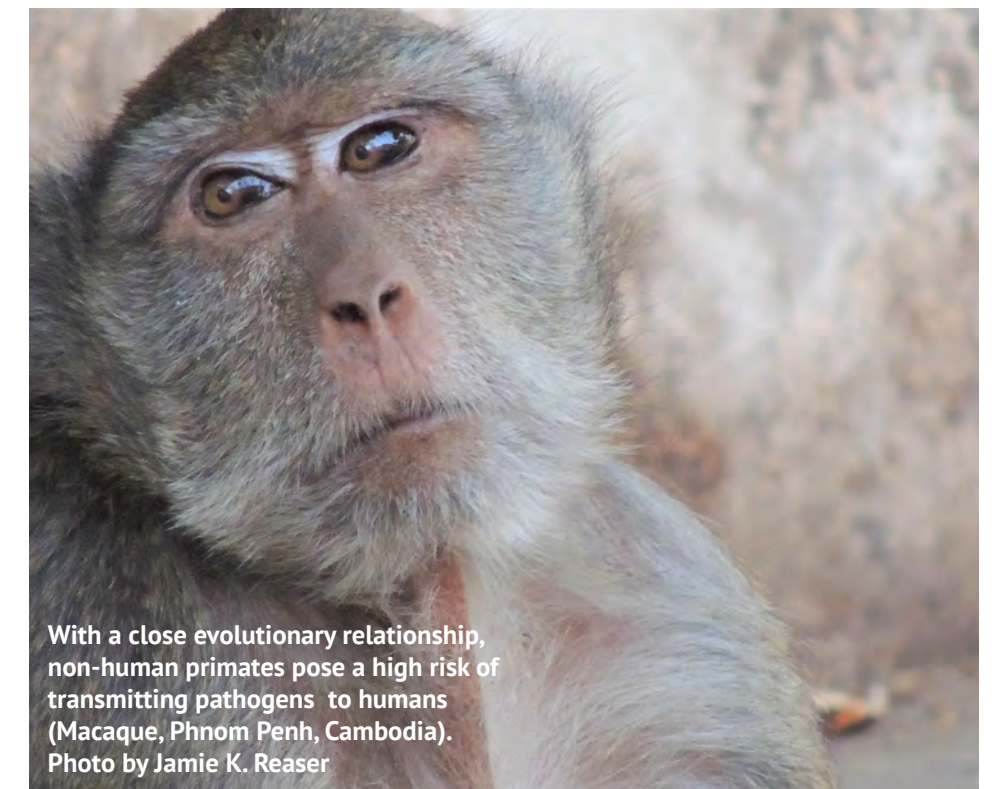
Reaser, J.K., Hunt, B.E., Ruiz-Aravena, M., et al. (2021a). Reducing land use-induced spillover risk by fostering landscape immunity: policy priorities for conservation practitioners. Preprint: <https://ecoevorxiv.org/7gd6a>.

Reaser, J.K., Tabor, G.M., Becker, D.J., et al. (2021b). Land use-induced spillover: priority actions for protected and conserved area managers. *PARKS* 27 (Special Issue): 161-178. doi: [10.2305/IUCN.CH.2021.PARKS-27-SIJKR.en](https://doi.org/10.2305/IUCN.CH.2021.PARKS-27-SIJKR.en).

Reaser, J.K., Witt, A., Tabor, G.M., et al. (2021c). Ecological countermeasures for preventing zoonotic disease outbreaks: when ecological restoration is a human health imperative. *Restoration Ecology*. doi: [10.1111/rec.13357](https://doi.org/10.1111/rec.13357).

Jamie K. Reaser, Giving Voice to Resilience, Stanardsville, Virginia, USA.

Gary Tabor, Center for Large Landscape Conservation, Bozeman, MT, USA.



With a close evolutionary relationship, non-human primates pose a high risk of transmitting pathogens to humans (Macaque, Phnom Penh, Cambodia). Photo by Jamie K. Reaser



Figure 1: Vitoria-Gasteiz Tramway
Image Credit: wikimedia/Basotxerri (CC BY-SA 4.0)

Green Tracking of Light Rail: Creating Future-Focused Biophilic Transport Infrastructure

By Ed Clayton

Background

Tāmaki Makaurau Auckland is the largest city in Aotearoa New Zealand. Home to around 1.5 million people, it has been experiencing rapid growth and now houses around 30% of the national population. Congestion is a hot topic in the media with estimates that it [costs the city up to \\$1.3 billion \(NZD\) annually, or around 1.4% of the GDP](#). While undoubtedly this congestion is due to growth, it has roots in several historic decisions made in the 20th century. In the 1950's and 1960's,

Tāmaki Makaurau Auckland's once extensive tramways were removed and replaced with trolley buses. At the same time, a decision was made to focus on building a motorway network at the expense of extending the commuter rail system. Now, a light rail network has been proposed to alleviate congestion and help enhance community connection for several different routes (ironically, down some of the very same tram routes removed 70 years ago). The first of these is the [connection between the city center and the international](#)

[airport](#), an approximately 20km line that will access areas expected to host around 17% of the population growth and 33% of the job growth occurring in the next 30 years² (Figure 2).

Essential Freshwater Reforms

Recently, new national water management legislation has provided a driver to turn this light rail route into a biophilic transport asset that can provide not just improved access, but a myriad of other benefits as well. The new national direction governing water management

for Aotearoa New Zealand are the [Essential Freshwater reforms](#). They demand immediate improvement to our freshwater systems and the need to bring waterways to a healthy state within a generation. Te Mana o te Wai (roughly translated: the power/authority of the water) is the central concept and sets out the directions local body authorities (city, district and regional councils in Aotearoa New Zealand) need to take to improve waterways. Key to this are the principles of governance and stewardship, where those with authority must prioritize (improving and enhancing where required) the health of waterways now and into the future to ensure the needs of future generations are sustained.

To give effect to Te Mana o te Wai, councils must apply the following hierarchies of obligation: 1) the health and

well-being of water; 2) the health needs of people; and 3) the social, economic and cultural well-being of people and communities. Following such directions, it can be reasonably interpreted that councils should take steps to ensure that infrastructure supports Te Mana o te Wai. For transport, this means building infrastructure that firstly has low pollutant generation and secondly can actively treat pollutant loads by sequestering contaminants within its structure, ensuring any discharged water is filtered and cleaned before entering the receiving environment.

But, our current transport paradigm remains inherently polluting. Centering cars and private vehicles in our urban spaces creates swathes of impervious surfaces. This results in “[Urban Stream Syndrome](#)”, where paved areas create faster

runoff, leading to streams that have higher flood peaks and more erosive power, transport more pollutants and sediment, and have fewer species and less complex ecosystems. Compounding this is the fact that the more we drive, not only do we require more impervious surfaces to drive on, we also increase the number of [tyres, which are major sources of heavy metals and microplastics](#), released to the environment as they wear. Tyres are 1-2% zinc oxide by weight, added during vulcanization to make tyres harder wearing and longer lasting. [In Tāmaki Makaurau Auckland, zinc is a major contaminant in our marine receiving environments](#), where too much zinc creates toxic conditions for macroinvertebrates and small benthic organisms that are integral parts of the food web. [Wear and tear on road surfaces from tyres](#) is estimated to directly contribute 10% of all microplastics in the world's oceans.

None of the above is new. Auckland Council recognizes that [roads carrying more than 10,000 vehicles per day are high contaminant generating activities](#). To mitigate this, such roads should have treatment devices within the corridor that can do a mix of reducing pollution and runoff. Yet retrofitting existing roads is challenging because these treatment devices generally take up more room than is available without a drastic reshaping of the corridor. Changing our vehicle powertrains from

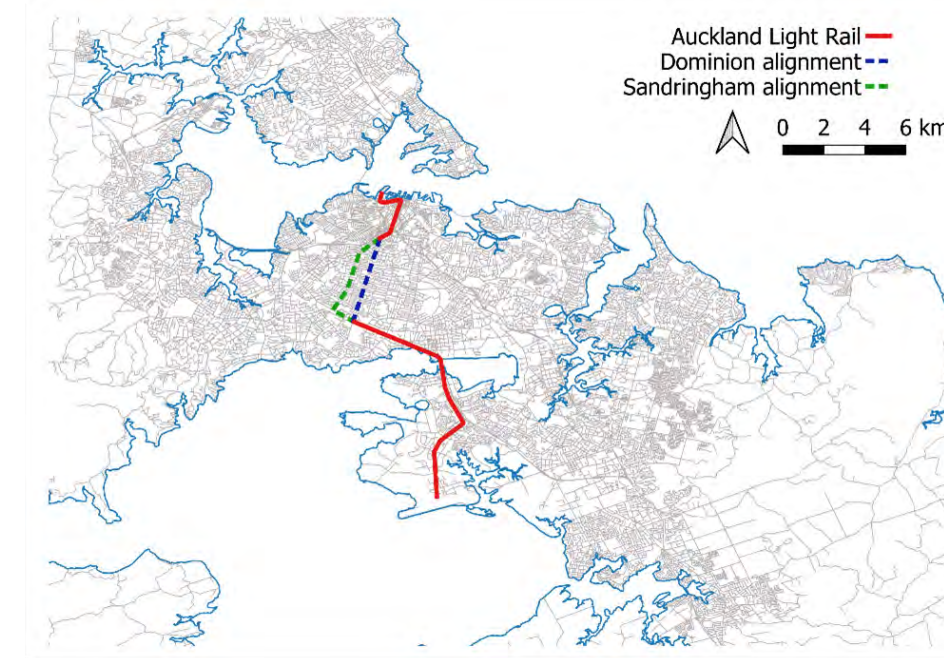


Figure 2: Potential Auckland Light Rail route showing two different central alignments, to be decided. City centre is at the north end of the route, airport is at the south end. Contains data sourced from the LINZ Data Service licensed for reuse under CC BY 4.0

internal combustion to electric or hydrogen will not address tyre wear, or reduce impervious surfaces either.

Knowing that we need to improve our waterways but continuing to design systems for cars that create toxic freshwater environments leads to incompatible outcomes. The requirements of Te Mana o te Wai legislation will place responsibilities on local government that creates conflict with building roads as normal. Application of biodiversity net-gain concepts can help explore the choices we face (Knight-Lenihan 2019). We need to ask the question “What would urban transport look like if the fundamental requirement was a net-gain in water quality?”

Green Light Rail

We may have an answer if we can build a light rail network that is integrated with engineered swales and biofiltration devices. The use of “lawn” or “grass” tracking in light rails is extensive in Europe and implemented in a range of other countries including China, the U.S., Australia and Spain (Figures 1 and 3). These tracks incorporate grasses and groundcover plants over infilled soil. Often, the only visible parts of the light rail network will be the rails themselves and the overhead wires. [Such designs have important benefits](#). Compared to a standard concrete light rail surface, they improve air quality by helping filter airborne contaminants and improve community wellbeing through

increased visual green space. They reduce the noise associated with light rail vehicle movement, lower urban heat island effects, and have lower embedded emissions as there is less concrete used in construction. The Parramatta Light Rail line, currently under construction in Western Sydney, Australia, has 10% of its length as grass track. Where used, this has reduced the required concrete by 81% compared to standard construction and [overall the project reduced carbon emissions by 36%](#) due to material reuse and recycling.

Most importantly for this discussion, grass tracks allow surface water to soak in, thereby removing contaminants and slowing stormwater runoff with studies showing [up to 90% of rain falling within the rail corridor soaking in and being used by the plants](#). Yet, these tracks are not designed with water quality outcomes as a priority. Usually, these tracks are built to delineate the light rail lines, stop cars from using them, and provide aesthetic quality to local areas.

The proposed idea of “green” tracking takes these ideas one step further and prioritises the water quality outcomes as a fundamental design requirement. How this might look is similar to the photos of European examples but with specific engineered soils designed to infiltrate and treat contaminants. Cross sections would be altered to drain water from road surfaces to a center running light rail line. Effective treatment trains would consist

of vegetated swales for pre-treatment before discharge to raingardens, removing sediment in swales and ensuring efficient infiltration in the raingardens. Native groundcover plants could be used to provide a rough surface texture that slows water movement, keeping water visible at the surface when it rains and providing food for bees and pollinators when dry. In areas where road stormwater discharges to streams and marine areas, we could remove contaminants generated from tyres. Where possible, clean water would soak to the aquifers below in much the same way as it does now, but at slower and more manageable rates. In places where the corridor has a wide margin, trees could be planted to create a linear forest (Figure 3). We know that climate change is likely to deliver more extreme heat events that impact on rail systems, trees can create a more consistent microclimate that shade and protect the infrastructure.

While the final alignment of Auckland light rail is yet to be decided, the alignment will likely be adjacent to roads carrying between 15,000 and 25,000 vpd, all classified as high contaminant generating activities. Some of this overlies fractured basalt zones where stormwater is directed to soakage (and then to aquifers) or combined stormwater/sewer networks. The aquifers feed urban catchments that in turn discharge to coastal areas under permanent swimming bans. Other areas have more standard stormwater systems that discharge directly



Figure 3: Grass tracks, Barcelona
Image Credit: wikimedia/addshore (CC BY-SA 3.0)

to urban streams. Treatment for these roads is sporadic at best with gross pollutant traps only at a select few locations (usually not good enough to filter out microplastics and particulate bound contaminants such as zinc). Making a conscious decision to put water quality outcomes first means that we could build light rail with swales and raingardens that can treat all of the runoff from adjacent road surfaces (see Figures 4 and 5 for example designs).

As an example, to treat the 4.9 km stretch of Dominion Road between the two proposed stations at Mt. Roskill Junction and Dominion Road Junction (see the proposed 2016 Dominion Road route map, Figure 6), only 1500 m of swales and 150 m of raingardens would be needed (assuming treatment efficiencies as described in Auckland Council's GD01 document). These would not be needed in a continuous stretch, rather short sections of treatment could be targeted at suitable areas with

enough hard space in between for stations, vehicle crossings and intersections.

Continuing this design along the proposed light rail line, we could build such a system to tie into the central city where plans are afoot for a revitalized Queen Street in the central city. Much discussion has been had around daylighting the stream buried during the colonial settlement (Waihorotiu). Together with the green light rail it would make a green and blue space that could create a stunning biophilic linear transport network from the city center to Māngere (Figure 7).

Next Steps

As this article is written, it is unknown if the planned light rail for Tāmaki Makaurau Auckland will have green tracks. Likely a detailed design with route selection and station location will be released soon. From consultation documents it is clear that the central government has charged the

Auckland Light Rail team with considering environmental and climate outcomes while making these decisions. This could be the example we need to take a systems approach to transport infrastructure and put our freshwater systems first when we plan infrastructure, together with an urban design process that addresses not just the light rail line but the adjacent land use too.

Ed Clayton is a freshwater scientist and a committee member of the non-profit Sustainability Society, a technical interest group of Engineering New Zealand. He lives in Tāmaki Makaurau (Auckland).

Resources:

Auckland Council. 2013. "Auckland Unitary Plan stormwater management provisions: Technical basis of contaminant and volume management requirements." Auckland Council Technical Report TR2013/035. Available at <https://knowledgeauckland.org.nz/media/1651/tr2013-035-auckland-unitary-plan-stormwater-management-provisions-no-appendices.pdf>.

Auckland Light Rail. <https://www.lightrail.co.nz>.

Cheng, Hefa, and Martin Reinhard. 2010. "Field, Pilot, and Laboratory Studies for the Assessment of Water Quality Impacts of Artificial Turf." Prepared by the Department of Civil and Environmental Engineering, Stanford University for the Santa Clara Valley Water District. Available at <https://www.valleywater.org/sites/default/files/Water%20Use%20Impacts%20of%20Artificial%20Turf.pdf>.

Kelly, S. 2010. "Effects of stormwater on aquatic ecology in the Auckland region." Prepared by Coast and Catchment for Auckland Regional Council. Auckland Regional Council Document Type 2010/021. Available at <https://knowledgeauckland.org.nz/media/1769/tr2010-021-ecological-impacts-from-stormwater-in-the-auckland-region-a-literature-review.pdf>.

Knight-Lenihan, Stephen. 2019. "Biodiversity net-gain in New Zealand: Adding biodiversity values." New Zealand Planning Institute Planning Quarterly 214:13-17.

Kole, Pieter Jan, Ansje Löhr, Frank Van Belleghem, and Ad M.J. Ragas. 2017. "Wear and Tear of Tyres: A Stealthy Source of Microplastics in the Environment." International journal of environmental research and public health. 14(10):1265. <https://doi.org/10.3390/ijerph14101265>.

Ministry for the Environment and Ministry for Primary Industries. 2020. "Essential Freshwater: Te Mana o te Wai factsheet." Publication number: INFO

968. Available at <https://environment.govt.nz/publications/essential-freshwater-te-mana-o-te-wai-factsheet>.

New Zealand Institute of Economic Research. 2017. "Benefits from Auckland road decongestion." Report to the Employers and Manufacturers Association, Infrastructure New Zealand, Auckland International Airport Ltd, Ports of Auckland Ltd, National Road Carriers Association. Available at <https://infrastructure.org.nz/wp-content/uploads/2021/08/Benefits-Auckland-Roads-Decongestion-Report.pdf>.

Novales, Margarita, and Emilio Conles. 2012. "Turf track for light rail systems." Transportation Research Record. 2275(1):1-11. <https://doi.org/10.3141/2275-01>.

Parramatta Light Rail. 2021. "Parramatta Light Rail achieves 'leading' ISCA Design rating." <https://www.parramattalightrail.nsw.gov.au/isca-design-rating>.

Pfautsch, Sebastian, and Vanessa Howe. 2018. "Green Track for Parramatta Light Rail: A Review." Western Sydney University. <https://doi.org/10.26183/5c05fc021efb3>.

Walsh, C.J., Roy, A.H., Feminella, J.W., Cottingham, P.D., Groffman, P.M. & Morgan, R.P. 2005. "The urban stream syndrome: current knowledge and the search for a cure." Journal of the North American Benthological Society. 24(3):706-723. <https://doi.org/10.1899/04-028.1>.



Figure 6: Proposed Dominion Road route map



Figure 4: Raingarden design, Jellicoe St. Auckland



Figure 5: Vegetated swale, Seattle



Figure 7



Biophilic Building for Human Resilience: The Spine Liverpool, the Royal College of Physicians New HQ

By Rob Hopkins and Steve Edge

All Images by Dan Hopkinson / AHR

Following a Royal College of Physicians (RCP) led competition, [AHR Architects](#) were commissioned to design the new northern home for the RCP, The Spine in The Knowledge Quarter, Liverpool UK. Designed by architect Rob Hopkins, Regional Director at AHR. The Spine is set to become one of the healthiest buildings in the World.

The philosophy behind the design of The Spine draws on

the narrative of the human body and its abstract representation through architecture, biophilia and salutogenics. With the College as the anchor tenant in The Spine, the development has enabled the Knowledge Quarter in Liverpool to attract further leaders in science, health, technology, culture and education. This has already been manifested in the recent opening of a Pandemic Institute in The Spine and over the next decade

it will continue to establish Liverpool as one of the world's leading healthcare innovation districts.

“The UK’s Royal College of Physicians was established by King Henry VIII in 1518 as the first recognized body in Great Britain to regulate medical practice. The College for many years was considered as an elite institution with only up to 8 people each year invited to take

the examination and potentially become a member. This ritual involved scrutiny by the RCP committee in the Sensors Room, a space that has followed RCP to each of its homes.” (Moore 2014).

The RCP are now pioneers in all areas of medicine, authoring numerous evidence-based papers and reports. However, based in London since 1964, the organisation was starting to have a “London-centric” reputation and needed to significantly expand its facilities in order to reflect its standing in the world of medicine. The London base for the RCP was designed in 1964 by Sir Denys Lasdun and was highly influential for Hopkins when creating his design narrative for The Spine, as Lasdun placed a similar importance on the use of natural light and themes relating to the human body in his design.

The WELL Building Standard, created by Delos Living LLC, is a performance-based system

for certifying and monitoring the built environment and its connection to user health and wellbeing. When compiling the WELL Building Standard, Delos unsurprisingly referred to much of the RCP’s research. So, together with the client’s brief for the occupants, “to be healthier when they walk out of the building than when they walk in”, WELL was a natural starting point for Hopkins to work from when designing The Spine. Hopkins later commissioned [Salvedge Sustainable Design Ltd](#) to work with his design team, in providing biophilic and salutogenic design strategies, to help them attain the highest standards possible in WELL and BREEAM sustainability certification. To date, The Spine is the first building in the world to be awarded a WELL Platinum for the construction and fit-out and a BREEAM Outstanding for the structure. Furthermore, it has attained 109 out of a possible 110 WELL Version 2 Credits,

the highest of any other WELL building in the World.

The Spine takes its name from its striking geometric staircase, inspired by the human vertebrae, located at the rear on the North Side of the building. Occupants are encouraged to use the staircase rather than the elevators, as it offers panoramic views across Liverpool, as far as the mountains of Snowdonia in Wales to the south and those of the Pennines in Yorkshire to the north. “Movement” is one of the WELL Standards Concepts, and providing a “Visual Connection with Nature” is the first of [Terrapin Bright Green’s 14 Patterns of Biophilic Design](#).

Terrapin Bright Green is an environmental consulting company which has conducted extensive interdisciplinary research and used empirical evidence to create the “14 Biophilic Patterns”, which are invaluable to designers. Both AHR and Salvedge used a key selection of these patterns to help them focus their strategies. Their use of biophilic patterns was combined with data gathered from a RCP staff questionnaire regarding innovative work activities, physical features, service features etc, to help ensure that the resulting impact the design would have on employees’ productivity, health, wellbeing, pride and sense of community, was evidence based.

The design narrative of the human body is most evident in the distinctive façade pattern of the building, which takes



its influence from the human skin and has been created by using a mathematical Voronoi pattern, resulting in 23 million unique polygons etched into the glazing of the curtain walling system. This not only helps control solar gain but also simultaneously creates a form of a “forest canopy” of internal shading, reminiscent of the Japanese health practice Shinrin Yoku, (Forest Bathing) and simultaneously complying with the 8th Biophilic Pattern, “Biomorphic Forms and Patterns”. Additional “body” concept features are the buildings’ exposed internal concrete supporting columns that have been cast and moulded to represent a trabecular pattern, the strongest part of a human bone for reflecting mechanical stress.

Further biophilic interventions are The Spine’s series of double-height sky gardens acting as “vertical villages” to represent the “lungs” of the building. These

contain a rich mix of plants and trees that help increase oxygen levels, whilst also promoting the building’s biophilic and salutogenic properties. The helical stairs also provide a visual and physical connectivity to the planting between floors.

Biophilic buildings aim to bring you in tune with your surroundings. Accomplishing this requires all aspects of the building; lighting, air, water, and the space itself, to evoke the natural environment. This means that, where possible, they should all have a biological reference. Consequently, sensor-based monitors are used extensively to control such features. The glazed curtain wall system also uses timber on the interior face of the structural framework to ensure that there is always a visual and tactile connection to nature, which follows the design teams’ philosophy for materials and finishes that “if you can touch it, it’s real.”

Every individual computer has access to a dashboard with real-time environmental data relevant to the building and their own workspace. Sensors fitted into light fittings detect how spaces are used, how often and by how many. The human body doesn’t appreciate uniform temperatures, so workspaces have been designed instead to allow the optimum three-degree variance across the floor, delivering pockets of warm and cool air. So, individuals can move to areas they feel most comfortable with and psychologically, they will hopefully feel that their personal needs are being catered for. When applied in a workplace setting, each of these can have a significant and measurable impact on human response mechanisms, reducing stress and improving overall resilience to long indoor working hours.

There is extensive evidence that demonstrates that by introducing biophilic strategies into the built environment, cognitive performances are improved, stress recovery is enhanced and physiological responses such as heart rate and blood pressure are reduced as well. The economics of biophilia are therefore plain to see, so what might initially be a small percentage increase in design and construction costs, and in some cases no extra cost at all, if implemented correctly and thoroughly by professionals, can provide an excellent return on investment, saving money in the long term for all concerned.

Having spent time with the RCP in London, Hopkins came to understand its staff’s working

practices and what was needed for RCP’s new northern home, whilst still preserving Lasduns’ legacy. This is a new chapter for the RCP as the anchor tenant of The Spine, placing it in the heart of a world-class community of innovators and fortifying their reputation as principals in their field.

Resources:

AHR. <https://www.ahr.co.uk>.

Moore, Rowan. 2014. Anatomy of a Building. Little Brown Book Group.

Salvedge Sustainable Design Ltd. <https://www.salvedge.co.uk>.

Terrapin Bright Green. 14 Patterns of Biophilic Design. <https://www.terrapinbrightgreen.com/reports/14-patterns>.

The Spine. <https://www.salvedge.co.uk/single-project>.

Rob Hopkins, Architect and Interior Designer for The Spine, Director and Head of Sustainability at AHR Architectural and Building Consultancy Practice

Steve Edge, Biophilic Design Consultant, Salvedge Sustainable Design Ltd.



The Majesty of Trees

A review of a trio of books by Tim Beatley

At a time when much of the world's forests are under direct attack -- we see Sequoia's burning in California, record high rates of deforestation in Amazonia, and trees sacrificed to build or expand roads in Indian cities -- a suite of books that celebrate the wonder and majesty of trees is welcome indeed. While not explicitly aimed at urban trees, there are abundant lessons and remarkably fresh eyes through which to see and understand our forest brothers and sisters.

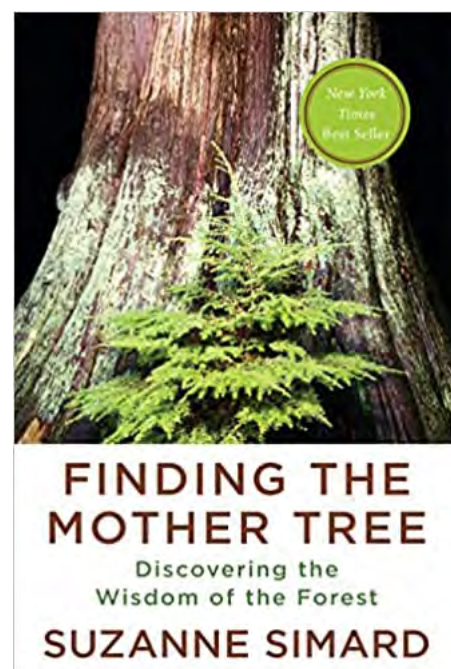
Finding the Mother Tree: Discovering the Wisdom of the Forest, By Suzanne Simard (Knopf, 2021)

Few forest ecologists have made greater contributions to our understanding of trees than the work of University of British Columbia professor Suzanne Simard. She is renowned for discovering and rigorously demonstrating through her research and field work that trees are not solitary or singular organisms but members of complex communities of life. They are connected together by a dense network of mycorrhizal fungi, a "wood-wide web" she calls it. Trees share resources, communicate with each other, help their offspring and other trees to survive, even signaling to other trees when there are threats. At the heart of this network, which she likens to the neural network of the human brain, are the larger older trees, the mother trees.

This new way of thinking about trees is nothing short of revolutionary and will forever change the understanding of forests and hopefully how we protect and manage them in the future. To some readers,

there will be too much anthropomorphizing: attributing intelligence, agency, and sentience to trees will be a step too far. But the case she makes is a strong one; noting at one point how trees meet the Latin definition of intelligence ("to comprehend or perceive"). I love the logical admonition at the end of the book that we begin to see trees as people. This is certainly how I have felt about particular trees in my own life!

The book is also a memoir and life story. She begins with the story of growing up in the northwest of Canada in a family with a long heritage of timber harvesting. She takes us through her early days navigating the (still) conservative culture of timber and wood products industry, and their palpable resistance and skepticism about her ideas. Even the scientific community clings to orthodoxy, believing strongly in an overly narrow view of plant and forest ecology as a world of competition rather than, as she finds, one cooperation and



mutualism. There are difficult personal challenges along the way as well: she loses a brother to a bizarre accident; she raises children and struggles in a marriage that ends in divorce; and she grapples with cancer, all while moving her pioneering ideas and research forward. In many ways, the personal stories seem to closely parallel the science, as her own network of friends and family sustain her in difficult times. "We were there for one another when it counted,"

she reflects about her family (p.296), and there is little doubt about her own importance as a mother and cornerstone in her family.

It is a compelling and interesting personal story of growth, discovery and perseverance, and it is an immensely engaging read. There are few references to the implications of her work and ideas for cities and urban forests, something a green urbanist can't help but keep top of mind while reading this book.

The Nature of Oaks: The Rich Ecology of Our Most Essential Native Trees By Douglas Tallamy (Timber Press, 2021)

Some of these new ecological understandings of trees and approaches to tree-planting, which are contained in Simard's book, are also clearly evident in Douglas Tallamy's new book. As a lifelong lover of oaks, Tallamy's *The Nature of Oaks* was a delight to read. I learned many things I did not know about oaks and especially the sense of an oak tree as an immense ecosystem supporting and interacting with a complex biodiversity changing over the course of a year. Indeed, the book's narrative follows oaks through a year's cycle, beginning with October and ending in September; each chapter a single month's focus on the biological goings-on of oak trees.

A deeper dive into the complex mutualism and ecological

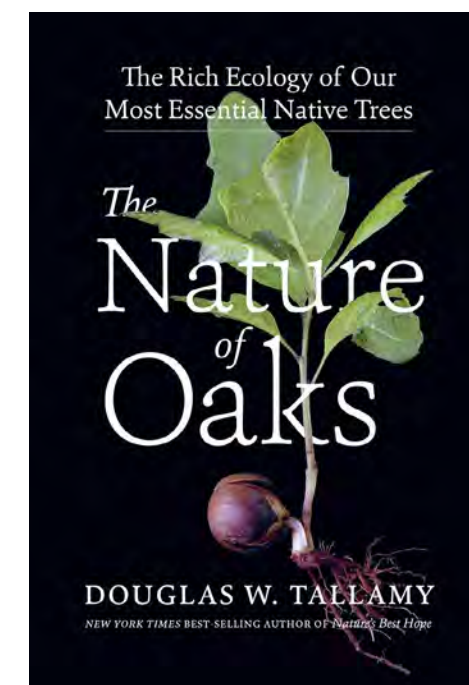
Recently, on the other side of Canada, the City of Toronto has chosen to preserve a 250-year old northern red oak, located on a suburban house lot. It is thought to be the oldest tree in the city, an urban mother tree certainly, but with less ability to provide the nurturing and community-strengthening functions that might be possible in less-urban, less-fragmented landscapes. But might these revelations lead to new opportunities to envision cities and suburbs where older mother trees are left in place,

synergies with many other lifeforms makes their importance that much clearer. As a lover of birds, oaks play a special role that in some ways I did not understand before. Tallamy makes a strong case in earlier work (especially in his 2020 book *Nature's Best Hope*) of the outsized ecological role oaks play, specially white oaks, in providing for insects and caterpillars; the essential food sources needed to raise young birds. Oaks are in a league of their own; what Tallamy calls "keystone species".

Tallamy tells a story, that I have never heard, about the special connection between Blue Jays and oak trees. I grew up loving Blue Jays, brash and loud and colorful. They fill

where corridors and ecological connections of various kinds and sizes are secured and set aside and where the mycorrhizal fungal grid could be allowed to work its magic? Simard's critique of planting trees in straight rows could apply as well to cities, challenging us to find creative ways to plant groupings of trees, even when they extend beyond the neat confines of linear streets and sidewalks.

much of my outdoor childhood memories. Little did I know how important oaks are to the survival of these birds, and vice versa how essential Blue Jays are to the dispersal of acorns and



the propagation of oaks. Tallamy pulls together some remarkable stats: Each Blue Jay collects and buries some 4,500 acorns every season. The majority of these are never retrieved and eaten and so become planted seeds. Blue Jays, Tallamy says, are the “ultimate dispersers,” something he discovered himself as he tried to figure out how new oak seedlings had emerged on his own newly-acquired land when the nearest oak tree was more than a mile away. Even the physiology of Blue Jays has evolved in response to their dependence on acorns: a small curve in their beak for puncturing an acorn’s outer layer and an enlarged esophagus permitting the birds to carry as many as five acorns at once during flight.

There are many other aspects and examples of ecological interdependence, and the book describes them all with enjoyment and wonder. We learn about: acorn masting (when oaks produce an unusually large crop of acorns) and the benefits it might confer; leaf marcescence (why oaks hold onto their dead leaves longer than other trees); how oaks provide food for songbirds even in the dead of winter; how oak leaf litter may help control invasive plants; and why leaves at the bottom of an oak tree are larger than those of the top. These are just a few of my favorite insights gleaned from this book!

There is also considerable practical advice for readers.

The need to plant oaks is a key message, but Tallamy cautions against planting anything other than acorns (seedlings and young oak grown in pots will develop tangled and limited root systems that will impede healthy growth). And, again reflecting the new reality of tree biology gleaned from Suzanne Simard’s research, suggests planting oaks in groups, eschewing the idea of a singular specimen tree in one’s yard. I have already taken Tallamy’s advice about the acorns, collecting several in hopes of helping to disperse (in loving collaboration with my friends the Blue Jays) these wonderful trees.

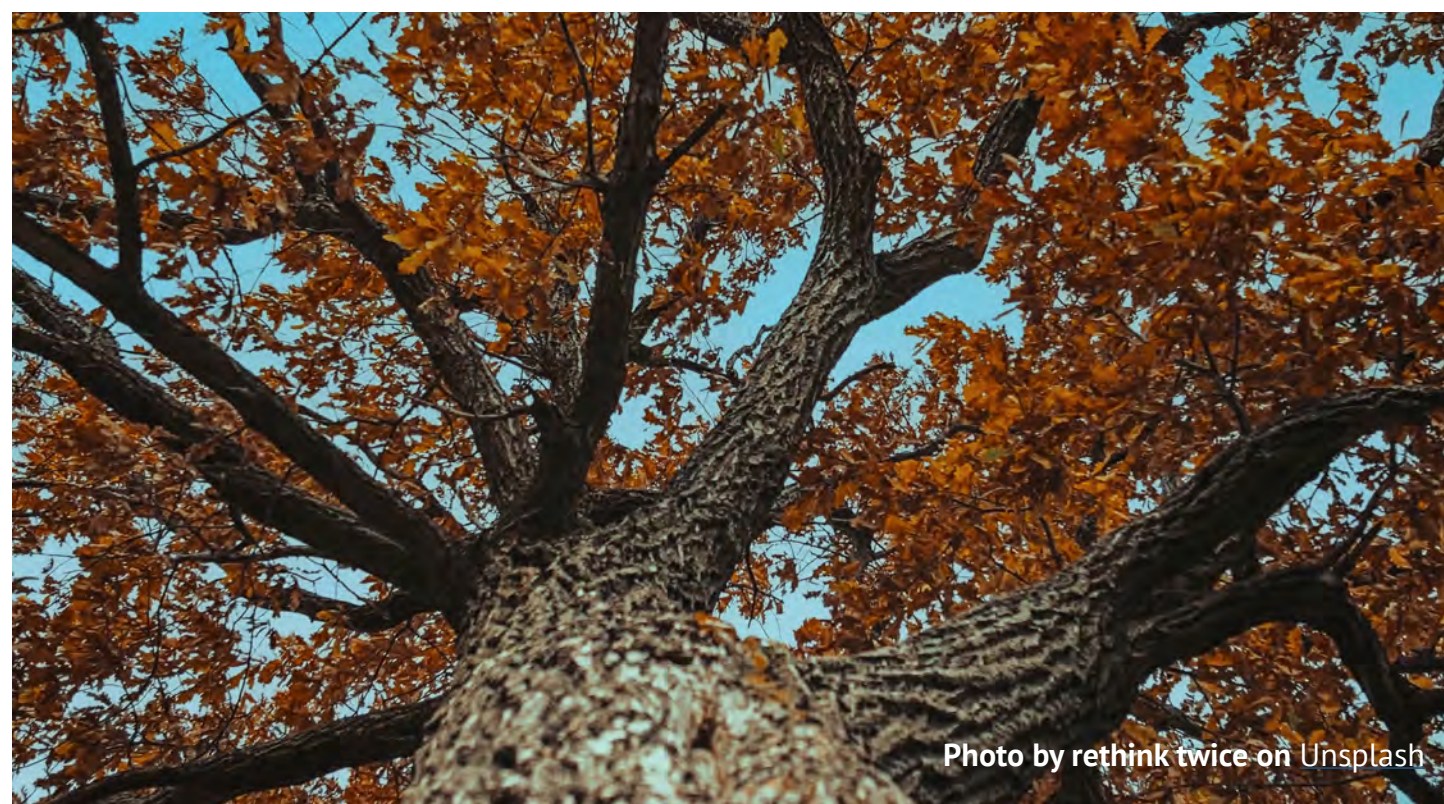
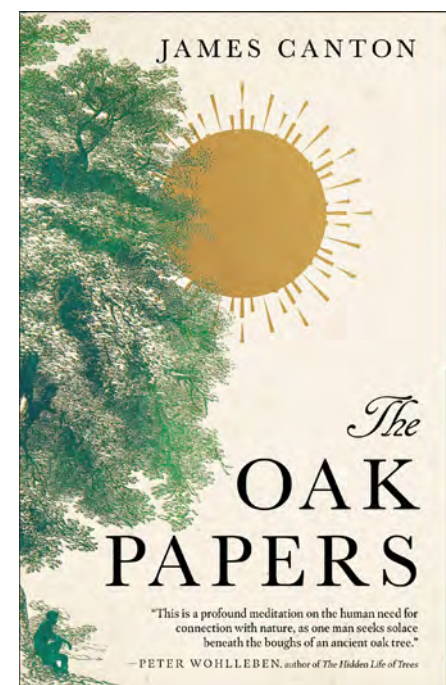


Photo by rethink twice on Unsplash

The Oak Papers, by James Canton (Black Inc, 2020)



Finally, James Canton’s book *The Oak Papers* is an equally pleasurable read and perhaps the most wide-ranging in terms of coverage. Canton explores the many different dimensions and connections we have to ancient oaks -- historical, cultural, and literary, among others.

The approach may also be the most personal in the way Canton connects with one specific tree -- the ancient Honeywood Oak, on the Marks Hall Estate in the UK. He decides to visit this tree daily and does so for some two years. His visits are up close and personal, and lead to some personal revelations. He records his experiences and observations diary-style (which essentially is the format of the book), and the many entries are informative and eloquent, ranging from

explorations of Buddhist thought and British naval history to the poetry of Keats. He also records in his entries the remarkable degree of biological bounty both visiting and living on or within the tree; from midges and bees, to squirrels, kestrels and many other species of birds.

One aspect of the power of an ancient oak being is to induce a feeling of humility. “We are as bees or birds, that come and go across the years and pause a second here beside the boughs before we wander on. This great oak has existed across the time that some thirty generations of human beings like me have been born and lived their lives and died back into the soil. And still the oak lives on.” (p.106). It is reassuring that there are ancient life forms that will be here when we arrive and will continue beyond our lives.

“You can stand beneath a grand oak and know that your more distant ancestors did so too. Oaks hold onto the memories of earlier generations. By touching the skin of the oak it is possible to feel some tentative trace of those that have gone before” (p.5). Canton finds himself at several points vividly remembering his father. Oaks in their role of timekeepers seem to encourage thinking about the past and are helpful in facilitating a sense of deeper

time. After all, Canton reminds us at one point, the Honeywood Oak was “a mere sapling when the Magna Carta was signed” (p.9).

Canton’s book is a convincing first-person account of the power of simply hanging out in the presence of such antiquity, majesty and beauty. Just being around such trees, inhaling their smells, watching the many other lives that flutter and inhabit these spaces, and touching the bark, all contribute to a sense of solace and calmness. “Something happens,” Canton writes, “My heart slows A calm creeps over me as though a blanket has been wrapped around my shoulders” (pp.16-17).

Together, these books are a compelling trifecta for trees: two from the sciences and one from the perspective of the humanities. All three authors are in agreement about their deep love of trees.

The Owls of Arlington

By David Howell, author and photographer

Regardless of whether it is true that owls are as wise as folklore suggests, their presence in urban areas enhances the biophilic experience for people who share their space.

Most owls are nocturnal hunters, filling the nighttime with and their calls. By day they are largely concealed, which makes it difficult for many residents to see them or even be aware they exist. Although, residents can be alerted to their presence by the daytime chatter from birds such as crows and jays when they discover an owl in their territory.

A healthy natural habitat is important to support resident owls in any city. Sustaining owls with suitable living spaces can involve conservation, restoration

and even extension of biodiverse places into the built environment. Parks and natural spaces in Arlington, Virginia represent less than five percent of the county's total area of 26 square miles, but these spaces contain a mixed forest ecology supported by good stewardship that extends into some residential areas.

Arlington provides viable habitat for three species of resident owls, including nesting habitat: the Great-horned; the Eastern screech; and the most commonly seen Barred. The Barred owl can be seen and heard in many parks and wooded neighborhoods throughout the year. Great-horned and Barred owls are found more broadly than the tiny Eastern Screech owl, which shuns competition and favors smaller

spaces. These images show both adults of each species and unfledged owlets, months away from supporting themselves.

Images

Lower left: Eastern Screech with owlets

Lower right: napping Barred

Opp. top left: Eastern Screech

Opp. top right: Great Horned Owl

Opp. lower left: Great Horned owlets waiting for lunch

Opp. lower right: Barred with owlet in nest






Biophilic Cities