

DEEP DIVE

THRIVING NATURAL WORLD

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CONTRIBUTION 1 OF 2

THRIVING NATURAL ENVIRONMENT

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CONTRIBUTION 2 OF 2

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THRIVING NATURAL ENVIRONMENT

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The Children & Nature Network (C&NN) believes that everyone deserves a meaningful connection with a healthy natural world. We have a responsibility to ensure that all people—especially those with the greatest barriers—have access to the many benefits of spending regular time in nature.

Our vision is a world in which everyone has access to the many benefits of a meaningful connection with a healthy natural world everywhere they live, learn and play. Our mission is to increase equitable access to nature so that children, communities and the natural world can thrive.

We drive equitable access to nature through three core strategies:

- Foster the belief that a connection to nature is critical for healthy physical and cognitive development and well-being.
- Drive systems change efforts to increase equitable access to nature.
- Grow and support the movement to connect all children, families and communities to the many benefits of time in nature.

C&NN is able to achieve this big vision through strategic partnerships and by influencing the big systems that affect children's daily connection to nature—including youth development, municipal and state government, education, early childhood, parent education, public health and others—that allow us to make an outsized impact for our size.

The most significant accomplishments of the past five years include growing a grassroots movement. In 2019 alone, we saw more than 435,000 unique sessions on our website, where practitioners, educators, and parents can access tools, research and practical information on how to increase equitable access to nature. More than 257,000 fans follow us on our social media platforms and more than 900 people participated in our monthly webinars. In 2019, more than 600 individuals and organizations from around the world joined or renewed their C&NN memberships. The support of these leaders builds the constituency for children and nature and helps make possible the work we do to curate research and develop

tools, resources and training for the field.

More than 800 leaders from 15 nations joined us in Oakland, California in May 2019 for our biennial Increasing Impact of Inside-Out International Conference. Through inspiring speakers and hands-on workshops, participants learned about best practices for increasing equitable access to nature and networked with peers from around the world. The conference wrapped up our two-year residency in Oakland. Mayor Libby Schaaf helped kick off the event by announcing *Oakland Goes Outdoors*, a school district partnership that will provide every Oakland middle school student with regular, outdoor learning experiences. We are now actively working on our [two-year residency in Atlanta](#).

C&NN's online [Research Library](#) now has more than 1,000 curated studies about the benefits of nature for people's health and well-being, with about 20 studies being added each month. C&NN has been building this collection since 2005, when there were approximately 60 studies available on this topic. Given the centrality of human and nature connection, it remains a surprisingly underdeveloped area of scientific exploration, however, the increase over the past 15 years in both the quantity and quality of research is notable. An accomplishment in itself, this milestone also represents the growth and momentum of the children and nature movement.

When we launched the Cities Connecting Children to Nature program six years ago with the National League of Cities, nature connection wasn't even on the radar for most municipal leaders. Today, a growing number of mayors and policymakers recognize that increasing nature access can support a city's top priorities, from reducing academic opportunity gaps and health disparities, to improving climate resilience. School districts, from Oakland, California, to Grand Rapids, Michigan, to Providence, Rhode Island, launched efforts to provide students with regular outdoor experiences and to create nature-filled schoolyards for learning and play. This [short video](#) provides a good overview of accomplishments to date.

C&NN joined with other national organizations to launch the [Youth Outdoor Engagement Policy Playbook](#)

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to provide education and information on how states are ensuring equitable access to nature. C&NN has a diverse network of stakeholders made up of the following worldwide audience:

- Outdoor education, recreation and nature-based program service providers
- Health care and public health professionals
- Educators
- Conservation professionals
- Federal, state and local government officials
- Environmental justice and Indigenous-led organizations
- Landscape architects and urban planners
- Journalists and thought leaders
- Policymakers and funders
- Grassroots activists, parents, youth and children

THE STATE OF THE CHILDREN & NATURE MOVEMENT PRIOR TO COVID-19

The children and nature movement was growing and thriving pre-COVID-19. That said, most people not already part of the movement—and likely some inside the movement—tended to think about nature connection as a “nice to have” but not an essential part of what is needed to support healthy thriving communities and reduce health disparities. While there were significant efforts underway to address the lack of diversity across the field, leading organizations and government agencies were predominately white—staff and especially executive positions and boards of directors.

There is a considerable and growing body of scientific evidence that shows a direct link between positive outcomes for youth and regular connection to a healthy natural world. While there is a growing understanding that this is true, the systems and structures we have in place in most communities don’t support regular connection to nature, especially in communities that could benefit most.

The environmental movement has a long and complicated history in the United States. While there have always been Black, Indigenous, Latinx and other People of Color who have advocated for environmental protection, the

vast majority of widely recognized organizations and thinkers in the environmental movement have been white, affluent, and until recent decades, primarily men.

The operative framework saw nature as something pristine, needing protection from human encroachment, and certainly didn’t recognize people as part of nature. This framework led to organizations and strategies that focused on ecosystem protection, without consideration for the human-nature connection. As a result, many of these organizations were considered elitist and not relevant to communities dealing with issues of safety, access to food, education, jobs, etc.

In 2006, the founder of the C&NN, Richard Louv, published his groundbreaking book, *Last Child in the Woods: Saving our Children from Nature Deficit Disorder*. Louv documented the world-wide disconnect from nature that has transpired in just the past 30 years. There are many reasons for this, but the impacts on both people and the planet raised dire concerns. Louv called for a New Nature Movement, one that recognizes the interconnection of all life on earth including plants, humans, and other animals. There is a growing international movement supported, in part, by C&NN. There are some systemic changes being made in communities across the country—this [short video](#) provides some examples—but much more needs to be done to ensure equitable access to the benefits of nature in every community.

EQUITY & ACCESS TO GREEN SPACE DURING COVID-19

Over the past few months, we have seen people around the world turn to nature for reprieve and respite from the stress and uncertainty caused by the COVID-19 pandemic. A [new report](#) from Google that analyzes cell phone location data to see how people’s activities are changing during COVID-19 shows a marked rise in park usage. While some states are showing decline in park usage—New York is down 47 percent, Texas 27 percent, and Nevada 38 percent—others show a rise in park usage: North Dakota park activity was up 73 percent, Utah saw a rise of 26 percent, and park activity in South Dakota and Ohio more than doubled, increasing by 126 percent and 117 percent, respectively.

With each passing day of the crisis, however, it is becoming clear that too many children and families lack equitable access to the benefits of nature at a time when

they need it most. Just as systemic racism impacted the design and distribution of parks and greenspaces, Black, Indigenous, and Latinx people in the United States are disproportionately dying from COVID-19 in yet another tangible reflection of the true cost of inequitable systems.

Mounting research suggests that improving equity in access to greenspace may help combat health inequities. Access to safe, nearby nature must be prioritized as critical public health infrastructure and not just an amenity for a few.

As we think about how to help communities emerge from this crisis, will we repeat the mistakes of the past, or will we think holistically about what truly supports health and well-being? Let's not make false binary choices between things like food, shelter, and transportation or access to education, jobs, health care, and nearby nature. People need all of these things to thrive. While somewhat beyond the scope of these recommendations, it bears mentioning that the loss of ecosystems and habitat, climate change, and other factors are part of the reason for this and future pandemics (Rich, F, 2020). Biodiversity in and outside of cities can create buffers to zoonotic-disease and therefore pandemics.

The C&NN's [Research Library](#) has more than a 1,000 peer-reviewed articles that help us understand how, why and under what circumstances connection to nature supports health and well-being

PIVOTAL MOVES FOR NEAR-TERM ACTION TO IMPROVE EQUITY IN ACCESS TO NATURE

GREEN SCHOOLYARDS

The recent closing of school buildings and the move to online learning has been a tremendously difficult challenge for many families to navigate. While there are many benefits to online learning, especially for older students, teaching and learning happen best in relationship with others and the rest of the natural world. How can we leverage the momentum of this time of massive disruption to shift to a more mindful, sustainable, and equitable model of public education that addresses new and deeply embedded threats and injustice?

COVID-19 has taught us we are capable of rapid change. It is time to turn education inside-out. Green schoolyards, forest preschools, and outdoor early childhood programs

have been around for decades, but now their practices seem prescient: they call for ample outside time, natural play, and exploration, all of which support the physical distancing measures that will be needed moving forward. These programs also employ enthusiastic educators who enjoy helping children learn in and from nature, a critical skill as we become more keenly aware of our interconnectedness with nature and the need for thinking ecologically—to understand how nature supports our health, and how we can support the health of the natural world.

Early studies are showing that COVID-19 is much more likely to spread indoors, where it can stick to surfaces and live for days. Outdoors, there's a dilution factor that reduces exposure. A recent article in the New York Times, [What We Know About The Chances of Catching the Virus Outdoors](#), reported that there is "growing consensus among experts that, if Americans are going to leave their homes, it's safer to be outside than in the office or the mall. With fresh air and more space between people, the risk goes down." Setting up outdoor classrooms allows students to spread out, with the recommended six feet or more of distance.

We have the land we need. Public schools are one of the top three land holders in most communities, as stated in [Green Schoolyards America, 2015](#). This points to a great and often underutilized resource that can be reimagined to support student achievement and community well-being, and to mitigate the effects of climate change. School grounds and the natural infrastructure that exists in every community can be activated for effective learning, dovetailing with professional development for teachers and school staff on how to move learning effectively and safely outside.

Now is the time to call on school districts and community leaders to invest in green schoolyards and other nature-based learning environments as we continue to adjust to the presence of COVID-19 in our lives. Let's create a new normal of equity, peace and health. We need schoolyards packed with trees, native plants and grasses, and gardens where children can explore and learn in spaces that encourage creativity and solution-oriented thinking. Imagine how a foundation like that can shape the life-long learning of engaged citizens working to make the world we live in the best it can be.

What would green schoolyards achieve?

Green schoolyards foster resiliency and equity which translate to better test scores

Studies show that exploring, playing and learning in nature improve academic achievement more than indoor classroom instruction. An integrative review of the research (Kuo, Barnes, and Jordan, 2019) found positive shifts in perseverance, problem-solving, critical thinking, leadership, teamwork and resilience—skills that are essential in overcoming the unprecedented challenges we face today.

Researchers have also found that outdoor learning can improve standardized test scores and graduation rates. Current longitudinal studies offer encouraging data. A six-year study of 905 public elementary schools in Massachusetts found that third-graders who attended schools that were closer to natural areas got higher scores on standardized testing in English and math (Leung, et al., 2014). Likewise, preliminary findings of a 10-year University of Illinois study of more than 500 Chicago schools, comparing green schools with more typical schools, indicate similar results, especially for the most challenged learners (Kuo, et al., 2018). While all students benefit from outdoor learning, the outcomes are relatively greater for those who are negatively impacted by economic disadvantage, systemic racism, trauma and other challenges, suggesting that green schoolyards are a smart strategy for addressing education gaps (Kuo, et al., 2019).

Outdoor learning also supports the health and well-being of educators. One study (Paddle and Gilliland, 2016) suggests that educators who have the opportunity to take students outdoors to learn are less likely to burn out. Improving teacher retention and the quality of educators attracted to the profession can have profound effects on the success of students. One of the best choices we can make as we prepare to go back to school is to equip a new generation of teachers with the knowledge and confidence to take students outdoors to learn.

Green schoolyards reduce stress and support well-being

The stress and the social isolation resulting from the COVID-19 pandemic is taking a toll on our collective mental health. Teachers are going to need strategies to

support themselves and their students once school is back in session.

When children, or adults for that matter, are overloaded with stress hormones, their stress response systems kick into high gear. Cortisol is dumped into the bloodstream, negatively impacting sleep, metabolism, and other physical systems. This dramatically impacts a child's ability to learn and develop healthy, trusting relationships with adults and peers (Felitti, et al., 1998).

We know that outdoor learning helps reduce stress. In an experimental study, views of green landscapes from classroom windows helped high school students recover more quickly from stressful events (Li and Sullivan, 2016). In another study, 11-year old students in Germany were either taught indoors or spent a day a week over the course of a year learning outside in forest school programs. The forest school students showed a normal, healthy decline of cortisol levels over the course of the morning. This decline in cortisol was not found in the indoor control group, suggesting a more chronic level of stress in students taught indoors (Dettweiler, et al., 2017). A 2020 report of peer-reviewed studies found that as little as 10–20 minutes in nature daily may serve as a preventative measure for stress and mental health strain for people between the ages of 18–22 (Meredith, et al., 2020).

Physiological health markers of stress associated with time in nature included decreased heart rate and blood pressure (Twohig-Bennett and Jones 2018). Psychological indicators of reduced stress associated with time in nature included less depression, anxiety and fatigue and increased vigor, positive affect and feelings of calm (Meredith, et al., 2020). The natural world is abundant in healing qualities that we can make more accessible to teachers and students by implementing green schoolyards and outdoor education programs.

Green schoolyards promote environmental stewardship and climate action

The typical public schoolyard includes turf grass, impervious surfaces, and aging playground equipment and athletic facilities, which provide little to no benefit to the natural environment. Current schoolyard conditions unintentionally contribute to flooding, loss of pollinator habitat, and heat island impacts. A lack of nearby natural amenities limits the ability of schools to: better

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integrate environmental education; use the outdoors as a classroom; and foster next generation environmental stewards.

Green schoolyards are a solution to this problem. By reimagining how we use public land around schools in every community, we can reduce the risk of flooding, keep communities cooler, and create places where birds and pollinators find refuge. With outdoor classrooms, students can learn about the natural world all year long, which encourages pro-conservation behaviors (Hughes, Richardson, and Lumber, 2018).

There are numerous examples from across the country of successful implementation of district-wide green schoolyards. This [short video](#) provides an overview.

Green schoolyards offer access to nature for students and communities out-of-school time

Green schoolyards are an exceptional use of public space, creating equitable access to green space, providing places to play and learn during school time, and offering community access out-of-school time. Given the inequities in access to parks and green space, partners in numerous sectors—from education, to health care, to landscape design—are advocating for using that public land to support community health and well-being by opening school grounds for the public when not used by the school. With play structures being closed due to COVID-19, the public access of green schoolyard features has become even more critical. Formal community schoolyard access is imperative to ensure that schoolyards—whether school is in session or not—are able to provide public access benefits to ensure that all communities have safe, quality green space within a 10-minute walk of their homes.

C&NN worked with dozens of national partners to develop an [action agenda](#) for ensuring that every public school ground in the U.S. has a green schoolyard by 2050. This [action agenda](#) outlines the conditions that would allow for this vision to become a reality. Specific actions that federal partners can take include:

- Include green schoolyards in the next federal assessment of school facilities.
- Add green schoolyards to the Collaborative for High Performing Schools, U.S. Department of Education Green Ribbon Schools, U.S. Green

Building Council Green Schools, and LEED for Schools criteria.

- Create a menu of green schoolyard elements that can aid municipalities in meeting Clean Water Act permitting requirements for stormwater and combined sewer systems run by the states and U.S. Environmental Protection Agency.
- Expand use of Community Development Block Grant funds to include green schoolyards for green space development.
- Include quality and quantity of green schoolyards in the Office of Civil Rights (Department of Education) school report card in order to collect accurate data on inequities in green schoolyard distribution.
- Align green schoolyards with Centers for Disease Control and Prevention (CDC) and Association for Supervision and Curriculum Development (ASDC) “Whole School, Whole Community, Whole Child” model.
- Broaden definition at Internal Revenue Service of “community benefit” for addressing Community Health Needs Assessments to include green schoolyards.
- Pilot a Health Impact Project where green schoolyards have been identified as an intervention and included in a Health Impact Assessment.
- Advocate for new language for technical specifications that address ADA compliance in outdoor learning and play environments on school grounds.

ELEVATE THE OUTDOORS AS A PLATFORM FOR YOUTH LEADERSHIP AND EMPLOYMENT

As we rebuild communities after COVID-19, we recommend a national program to employ young people to help bring more parks and greenspaces into communities where they don't exist, support the creation of green schoolyards, plant community gardens, native healing gardens and trees to help with urban heat island effects, and provide outdoor programming, at a safe distance.

Our country's demographics are rapidly evolving. According to a 2015 Pew Research Center report, Millennials are the most racially diverse generation in

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American history, a trend driven by the large wave of Hispanic and Asian immigrants who immigrated to the United States over the past half century, and whose US-born children are now aging into adulthood. The US Census Bureau projects that Latinix, African Americans, American Indians, Asian American/Pacific Islanders are the emerging majority in the United States and will comprise more than half of the American population sometime around 2040. Additionally, 29 percent of the emerging majority are Millennials between the ages of 18-29 and a staggering 59 percent of all Millennial-age citizens identify as non-white.

There is a growing gap between people and nature, particularly among youth living in urban communities (Louv 2005). Kids spend less time engaged in meaningful outdoor activities, opting instead for video games, television and other indoor activities. And now that, according to the US Census Bureau, 80 percent of Americans live in cities, whole communities lack critical access to natural areas, and fewer people understand how their own well-being is inextricably linked to the health of our natural world.

When kids spend more time outside, everyone benefits. Some of the outcomes associated with engaging youth in regular outdoor activities outdoors include:

- **Public Health and Wellness**—When kids and their families spend more time outdoors, using the natural infrastructure that exists in every community, communities see meaningful, documented improvements to health and well-being.
- **Education and Workforce Development**—Integrating outdoor education and environmental literacy into education and workforce development training creates new job opportunities and improves education and learning outcomes.
- **Youth Development**—High quality nature-based programs support positive youth development and social-emotional outcomes.
- **Economic Development and Conservation**—Outdoor recreation and conservation provide direct economic benefits to local communities, as outlined in the Outdoor Industry [Report on the Outdoor Recreation Economy](#), and also in more intangible benefits such a violence reduction (Kuo and Sullivan, 2001).

Young People of Color are, therefore, at the epicenter of our planet's future and their access to nature and participation in nature-based experiences is disproportionately low. In its 2014 report, the Outdoor Industry Foundation found that Caucasians have the highest outdoor participation rate at 70 percent, while the emerging majority accounts for less than 25 percent, with African Americans representing the lowest participation. Today also marks a pivotal moment in conservation, outdoor recreation and public lands policy in the United States. The outdoor industry has grown dramatically over the past decade and currently represents 6.1 million American jobs, \$646 billion in outdoor recreation spending each year, and \$39.9 billion in federal tax revenue (Outdoor Industry [Report on the Outdoor Recreation Economy](#)). Engaging the emerging majority in the outdoors has never been more critica—but there is much work to be done.

All of us who care about the future of conservation have a role and a stake in engaging the next generation of diverse leaders in the movement to connect children and families to nature and taking action to protect our shared natural heritage. We must also elevate the existing nature connections and competencies that exist within every culture and collaborative efforts to engage the emerging majority in critical conversations and decisions concerning our shared natural resources, in order to welcome a new era in America's conservation legacy.

Engaging youth in outdoor and nature-based infrastructure development would achieve several things:

- It would provide needed jobs and skills training for young people during an economic downturn.
- It would provide needed natural infrastructure to support the health and well-being of communities that have been underinvested in.
- It would provide ample opportunities for young people to spend time outdoors and be part of the recovery effort.

The infrastructure for this kind of effort exists (e.g. national and local organizations, park districts, etc.), but they need funding to ramp up these efforts. Also, there would need to be guidelines in place to ensure that investments are made equitably, focusing first on those communities with the greatest needs and largest health disparities. Federal partners could help with funding, through leveraging job training and employment dollars.

Park-library partnerships

Communities need new and innovative approaches to reduce growing health and academic disparities. Current solutions are often sporadic, singularly focused and “provided for” communities. There are many programs designed to engage kids and families in nature, creating meaningful experiences and important social connections. But low-income communities have been historically underserved and not involved in planning and leading such programs. There is also a limit to the impact these programs can have on their own. Systemic change needs to come from within underrepresented communities.

To address nature access disparities, collaborative, community-driven “Nature-Smart Libraries,” are a feasible and replicable model. The primary goal of Nature-Smart Libraries is to use the trusted, but underutilized, platform of public libraries that exist in every community to develop informed and knowledgeable school-aged children and their parents who can identify local needs and engage in healthy nature-based activities. The effort would focus on building the capacity of libraries to integrate Nature-Smart strategies into their city’s library departments and regular operations.

Initial need for Nature-Smart Libraries was identified through a 2017 survey conducted by the Minnesota Library Association of 75 of its member libraries across Minnesota. 82 percent of libraries indicated that it is a priority to develop nature-based programming based on community interest. Additionally, the City of St. Paul, Minnesota has identified park-library partnerships as a priority, building on a successful model piloted at one of their sites, the Sun Ray Library. While libraries are beginning to recognize their potential for engaging families in hands-on, nature-based activities, they report they are not currently equipped to provide these programs. Eighty percent identified lack of know-how, capacity, and funding as primary barriers for implementing nature-based programs.

We recommend that a national effort be piloted in 10 to 20 cities across the country to equip libraries with training and tools to engage parents and school-aged children in hands-on, nature-based learning and conservation activities, with an emphasis on libraries that serve low-income families and neighborhoods where access to safe green space is sparse. Because we are building the capacity of libraries to integrate Nature-Smart

strategies into their city’s library departments and regular operations, this effort could have lasting impact.

Evaluation of the pilot could provide critical data to help inform if and how library services might help address disparities and leverage opportunities. It would explore how new ways of engaging families in nature-based programming might enhance the health and well-being of families and communities. Using libraries as key community conveners, the process should place the voice of children, youth, and parents at the center of needs-identification, planning, and decision-making and use regular community checkpoints to refine and redirect project activities.

Major outcomes of the Nature-Smart Libraries pilot could include:

- The design, development and implementation of a new, replicable model for equipping libraries to deliver “nature-smart” programming, and position libraries as a significant community resource for equitable access to nature.
- Creation of Nature Action Backpacks that include hands-on lesson plans and resources, activity cards and community-based stewardship planning tools.
- Training, support and engagement of youth in nature-facing internships and job training.
- An online suite of Nature-Smart Library resources and tools that librarians can access for replicating Nature-Smart Libraries at their library.

The infrastructure for Nature-Smart Libraries already exists. Federal funding through the Institute of Museum and Library Services could support a pilot that could be scaled over time.

POLICY FRAMEWORK FOR LONG-TERM TRANSFORMATION TO ENSURE EQUITABLE ACCESS TO NATURE

The three ideas presented above present opportunities for both immediate action and long-term transformation.

We also recommend the adoption of a [policy framework](#) developed by a national coalition of organizations that supports youth outdoor engagement. The policy framework is informed by key principles that define and inform our approach to policy focused on youth outdoor engagement. High-quality policy should adhere to the

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following principles:

- Child-centered and focused on the whole child
- Family focused and multigenerational
- Equitable access for all
- Leverage multiple approaches
- Locally supported
- Culturally relevant
- Research based
- Systemic

What this looks like in action is linking municipal, state, and national decision makers with community-led grassroots groups to design and implement local solutions that respond to community needs.

There are many national partners that are critical to these efforts. For green schoolyards, there are 100+ organizations that have signed onto the Green Schoolyards Action Agenda. There is a national cohort of organizations working to increase green schoolyards including, Trust for Public Land, The Nature Conservancy, National Recreation and Park Association, City Parks Alliance, National League of Cities, Children & Nature Network and others. There is already good momentum moving on these efforts, so with minimal effort, there could be some significant movement towards implementing a green schoolyard agenda.

There are also many partners at the national and local level working on engaging youth in the outdoors to improve health and well-being outcomes. The Aspen Institute Forum for Community Solutions, Native Americans in Philanthropy, Casey Family Programs, the National League of Cities and the Children & Nature Network are working to advance integration of nature-based interventions into youth development efforts.

Likewise for Nature-Smart Libraries, the Urban Library Council as well as a growing network of libraries around the country are starting to think about how to use libraries as a jumping off point for nature connection.

Each of the actions taken should be prioritized through an equity lens and informed by understanding of who does and doesn't have access to safe outdoor spaces. Everyone—especially those with the greatest barriers—deserves access to the many benefits of a meaningful

connection with a healthy natural world.

We will know if these interventions made a difference by understanding and evaluating:

- What explicit structural change is happening across communities to increase equitable access to nature: Policies, Practices, Resource Flows.
- What semi-explicit structural change: Relationships & Connections, Power Dynamics.
- What transformative change has impacted mental models constraining ways of thinking that hold inequities in access to nature in place.

The National League of Cities, in partnership with many other national organizations including the Children & Nature Network, has developed a set of metrics that could be employed to track impact.

SOURCES AND DOCUMENTS

Multimedia Sources

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Twohig-Bennett, C. and Jones, A. (2018). The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and healthy outcomes. *Environmental Research*, 166, 628-637. doi: [10.1016/j.envres.2018.06.030](https://doi.org/10.1016/j.envres.2018.06.030)

REFERENCES FROM KEY SCIENTIFIC LITERATURE ON THE HEALTH AND WELL-BEING BENEFITS OF NATURE

The Children & Nature Network has collected more than 1,000 peer reviewed articles that speak to the health and well-being benefits of spending regular time in the outdoors and nature-filled areas. While it is difficult to point to one “definitive” article, the sheer volume of research that point to similar outcomes in physical and mental health outcomes and pro-social behaviors add up to a compelling case for including access to nature in youth development, community development and planning, public health planning, school policy and infrastructure investment. Below is a summary of the key data culled from the research.

Physical health benefits

Youth in nature tend to be more active.

- Time in nature promotes physical activity—[Kondo, et al. 2018](#) (review)
- Daily physical activity improves brain function in children—[Hillman, et al. 2014](#)
- Play in natural environments promotes locomotor skills—[Lim, et al. 2017](#)

Greener neighborhoods boost immune functioning.

- While there are many physical and psychological benefits of spending time in nature, a central pathway for these impacts has emerged from the literature: enhanced immune functioning – [Kuo, 2010](#)

Time outdoors protects eyesight.

- Time outdoors in bright sunlight reduces risk of

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myopia – [French, et al. 2013](#) (review); [He, et al. 2015](#) (experimental study involving over 1800 children)

Newborns tend to be healthier if mothers live in greener neighborhoods.

- Residential greenness may benefit maternal health and fetal growth – [Fong, et al. 2018](#)
- Increased exposure to green space may be a positive influence on gestational age of newborns for women with a low level of education – [Nichani, et al. 2017](#)
- Surrounding greenness is associated with increased birth weight and head circumference – [Dadvand, et al. 2012](#)

Nature can serve as a protective factor and reduce violence.

- [Branas, et al. 2018](#) – found that urban green space exposure is linked to improved human health and decreased community violence
- [Shepley, et al. 2019](#) – Based on the 45 quantitative and qualitative papers summarized as part of this review, researchers felt there was ample evidence to support the idea that the presence of parks and other green space reduces urban crime
- [Younan, et al. 2016](#) - Overall the results of this study indicate a consistent pattern of decreased aggression associated with increasing residential greenspace

Mental health and well-being benefits

People of all ages living in greener environments tend to have more positive moods, higher self-esteem and greater resiliency.

- [Kondo, et al. 2018](#) found a positive association between time in nature and more positive moods, suggesting that adding greenspace to a neighborhood can improve mental health of residents (review, primarily experimental studies; excluded were qualitative studies and case studies)
- [Farmer, et al. 2017](#) found that adding more natural elements to the school playground and encouraging more risky play through engagement with nature led to more reports of “being happy” at school and of playing with more children)

- [Tillman, et al. 2018](#) found that time in nature was associated with resilience in children (systematic review of quantitative studies)
- [McCormick 2017](#) found access to green space was positively associated with different aspects of well-being (systematic review)
- [Bang, et al. 2018](#) found significant improvement in self-esteem and significant decrease in depressive symptoms after participation in a forest therapy program
- [Twohig-Bennett and Jones \(2018\)](#) - Meta-analysis of the data showed that greenspace exposure was linked to statistically significant reductions in diastolic blood pressure, salivary cortisol (a physiological marker of stress), heart rate, and incidence of diabetes. Findings also indicated that exposure to greenspace reduces the risk of preterm birth, premature death, and high blood pressure. Kids who spend time in nature on a daily basis tend to be happier.
- Engagement with nature is associated with more positive moods – [Kondo, et al. 2018](#) (review)
- Forest Therapy show significant decreases in depression – [Bang, et al. 2018](#)
- Engagement with nature led to more reports of “being happy” at school and of playing with more children – [Farmer, et al. 2017](#)
- Daily exposure to nature can have a positive impact on adolescents’ mood – [Li, et al, 2016](#)

Time in nature promotes self-esteem and reduces risk for mental illness.

- Time in nature reduces children’s risk factors for mental illness – [Bratman, et al. 2015](#)
- Interactions with nature may positively influence the mental health of children and teenagers and Time in nature can promote resilience – [Tillman, et al. 2018](#)

Time in nature reduces stress and anxiety.

- Nature can reduce stress levels – [Lee, et al. 2018](#), [Dettweiler, et al. 2017](#), [Wells and Evans 2003](#)
- Nearby nature helps children cope with adversity – [Corraliza, et al 2012](#)

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- Nature can promote resilience – Tillman, et al. 2018, Holland, et al. 2018, [Chawla, et al 2014](#)
- Nearby nature is associated with decreased depressive symptoms – [Bezold, et al. 2018](#) (correlational study involving 11,000 children)
- Engagement with nature can decrease anxiety – [Tillman, et al. 2018](#)

Nearby nature can help children cope with adversity

- [Corraliza, et al 2012](#) correlational study involving 172 children from 4 schools; data based on multiple assessment measures showed that nearby nature was linked to improved children's ability to cope with adversity.
- Youth who spend time in nature demonstrate more positive and fewer negative social behaviors.
- Time in nature promotes enhanced social skills and pro-social behaviors – [Müller, et al. 2017](#)
- Time in nature promotes empathy – [Holland, et al. 2018](#) (review)
- Children demonstrate fewer behavior problems in natural settings – [Tracey, et al. 2018](#), [Holland, et al. 2018](#) (review)
- Less bullying occurs in natural vs. built environments – Farmer, et al. 2017
- Natural playscapes foster more sustained, constructive, and cooperative play – [Kuh, et al. 2013](#)
- Decreased risky behaviors, such as substance abuse, etc. – [Tesler, et al. 2018](#)

Educational achievement benefits

- Kids with nearby nature at school do better academically
- School garden activities increased students' knowledge of nutrition and science [Wells, et al. 2015](#)
- Green schoolyards were associated with attention restoration – [Li and Sullivan 2016](#)
- Student engagement with nature may be especially helpful for children from disadvantaged backgrounds and may help close the achievement gap – [Jagannathan, et al. 2018](#), [Ray et al. 2016](#)

- Garden and green space improve educational outcomes – [Williams and Dixon 2013](#)
- Green space learning experiences promote self-regulated learning – [Dettweiler, et al. 2017](#)
- Green space learning promotes engagement with learning – [Ohly, et al. 2016](#)
- Increased greenness around schools was associated with decreased absenteeism – [MacNaughton, et al, 2017](#)
- Connecting children with nature can promote brain functioning
- Exposure to greenspace early in life results in beneficial structural changes in the brain – [Dadvand, et al. 2018](#)
- Children living in greener urban neighborhoods have better spatial working memory [Flouri, et al. 2018](#)
- Long-term exposure to green space is positively associated with cognitive functioning – [de Keijzer, et al. 2016](#) (review)
- Engagement with nature is associated with improved executive function – [Carr, et al. 2017](#), [Torquati, et al. 2017](#)
- Nature-based risky play promotes problem-solving, socialization, creativity, focus, and self-regulation and reductions in stress, boredom, and injury. – [Brussoni, et al. 2017](#)
- Children with ADHD who regularly play in green settings have milder symptoms than those who play in built outdoor and indoor settings, Faber Taylor and Kuo, 2011

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INTRODUCTION

Natural Resources Defense Council (NRDC) combines the power of more than three million members and online activists with the expertise of some 700 scientists, lawyers, and policy advocates across the globe to ensure the rights of all people to the air, the water, and the wild.

Our purpose is to solve humanity's most pressing environmental challenges. NRDC advocacy is firmly grounded in meticulous research and sound scientific principles. Our experts, drawing on their knowledge and experience in disciplines ranging from molecular biology to nuclear physics, examine critical environmental challenges and identify the most effective solutions. NRDC helped pass our nation's bedrock environmental laws, and our seasoned attorneys have argued all the way to the Supreme Court to ensure those laws are enforced and polluters are held accountable. We take on the world's most powerful corporations and win, delivering justice and standing with those who fight for their right to clean air, clean water, and healthy communities.

Creating Springboards for lasting environmental change isn't enough. We have to persuade decision makers to adopt those innovative solutions, so NRDC's advocates work at every level, from mayors' offices to the halls of Congress to international negotiating tables. Our successful track record means those decision makers listen to our advice, and when they need an extra push, we mobilize strategic coalitions and the grassroots power of millions of citizen activists to urge elected officials to put the public interest ahead of polluting industries. We also have some of the smartest minds in the business world put their economic expertise to work on ways to spur global prosperity while improving our environment and communities. We pioneer strategies to make buildings more efficient, improve green infrastructure, and encourage manufacturers to clean up the fashion industry.

No organization, no matter how motivated, can change the world alone. To help shield communities from

pollution and build political strength, NRDC joins forces with a diverse network of allies: leaders of low-income communities and Communities of Color concerned about [air pollution](#), mayors seeking to institute innovative policies to address climate, religious groups calling for climate action, ranchers committed to living peacefully with wolves and grizzlies, and brewers whose success depends on clean water, and many more.

Our work is intended to benefit all demographic groups across the country. NRDC believes community sustainability is best achieved when all races, income levels, ages, and abilities are beneficiaries of each initiative. We have a particular interest in strategies that bring equity to People of Color and low-income families. Our work spans different scales from international to the community level.

THE ENVIRONMENT PRIOR TO COVID-19

Across the country, low income communities and Communities of Color have experienced disproportionate burdens from environmental hazards, unhealthy land uses, historical traumas, and other sociodemographic stressors. The [wealth of evidence](#) shows that Communities of Color are already highly vulnerable to and disproportionately live near sources of [toxic air and water pollution](#), exposing them to a higher risk of [serious health problems](#). That some of these very health conditions—asthma and cardiovascular disease, for example—have now been [linked to worse COVID-19 outcomes](#) underscores the [cumulative nature of vulnerability](#) that is experienced daily by low-income communities and Communities of Color.

Private industry has a legacy of locating facilities and exploiting business for profit at the expense of low-income and Communities of Color. The current Administration is dismantling the safeguards to protect the most vulnerable communities. When it comes to protecting the victims of environmental injustice, the U.S. Environmental Protection Agency has been close

to worthless. Flint, Michigan has the unfortunate role of being a poster child from the problem. Environmental justice, in practice, has brought little in the way of environmental benefits or legal justice to communities that continue to suffer from the toxic and other health impacts of deliberate policies that have created a swath of destruction through poor and minority populations.

THE IMPACT OF COVID-19 ON THE ENVIRONMENT

As the global COVID-19 pandemic rages, the spread of the virus is exposing deep and persistent fault lines of vulnerability along race and economic status, and a stark absence of social safety nets in this country. Historically, the environmental movement has largely failed to prioritize in its work the creation of strong social safety nets. Now, more than ever, we must assume this responsibility if we hope to build a just, equitable and livable future for all.

Our most vulnerable communities face multiple and compounding threats in a crisis like this one. As the virus itself ravages Black, Indigenous, and Latinx communities, many of these people [lack the luxury](#) of working from home and have to continue placing themselves in harm's way carrying out low-wage, consumer-facing service jobs. Previously seen as unskilled and replaceable, service industry workers are now essential to maintaining the basic functioning of our society.

The multiple catastrophic disasters of recent years and the predicted increases in disaster damages due to [climate change](#)—as well as the sudden rise of COVID-19 itself—highlight the shortcomings of our current approaches. Clearly, we could be planning and preparing better, but existing gaps in hazard mitigation will be further strained by COVID-19 and vice versa, as responding to the health crisis necessarily diverts resources from other work.

Even absent a global health crisis, disasters [exacerbate existing inequities in our society](#). Without urgent action, the dual threat of COVID-19 and climate-driven disasters will only [further burden](#) Communities of Color, low-income communities, and other marginalized and at-risk populations.

Safe [running water for household cleaning and personal hygiene](#) is a paramount necessity, especially during this public health crisis. Energy is needed to heat and cool

homes, prepare meals and keep food and medicine secure. Yet, [one in three households](#) in the US face extreme hardships in paying energy bills and rural, low-income and Communities of Color, especially [Indigenous communities](#), have the least access to clean water in the United States, [exacerbating risks](#) to COVID-19.

Clean water should be a right of all people, at all times. Congress should institute a national moratorium on shutoffs of water, electricity and gas for occupied residential buildings; require and provide resources for utilities to safely reconnect water and electricity; and increase funding to support affordable water and energy programs for low-income families. The legislation should ensure that families get plenty of time after the crisis to use long-term repayment plans, and utilities that receive federal grants or loan forgiveness should forgive their residential customers past arrangements.

AN ACTION AGENDA TO RECOVER FROM COVID-19

A just response and recovery to COVID-19 means understanding the interconnectedness of this global pandemic with issues of income inequality, access to health care, environmental degradation, and racism. It means supporting those who have historically been made socially and economically vulnerable, as well as rethinking the way we provide care and create opportunity in our society. And it means standing with and supporting communities and advocates who are demanding a response to this crisis that ensures social justice and centers on equity.

PROVIDE TOOLS AND RESOURCES THAT COMMUNITIES CAN USE TO DEVELOP THEIR OWN RESPONSE

These tools should support communities and local stakeholders to analyze climate and future catastrophic events to support an equitable and just path to build resiliency.

Rapid Climate Vulnerability Assessment (RCVA)

The RCVA is a 3-step process that brings community members together around local goals and priorities. This can be for the update of a local planning effort, or responding to future natural disasters or events, or even projects such as developing a new grocery store or soccer field. Using readily available climate data and local knowledge, RCVA participants consider how those decisions might be affected by future climate change

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projections such as rising heat or sea level.

The assessment prompts them to consider both existing stresses relating to health, equity, or any other community priorities, and the effects of climate change. They can see where these variables intersect—an exercise that helps them see the ways people connect to nature and the environment, understanding that climate change directly affects their lives in ways both small and large. Once those initial links are made, community leaders can engage in a strategic session to address vulnerabilities and solve for what the community cares about. That leads to decisions about investment and revitalization that means the community can better withstand the effects of climate change.

Illustration: Elevated Chicago

An RCVA workshop in Chicago led by Elevated Chicago focused on promoting racial equity, prosperity, and resilience in Chicago communities by using equitable transit-oriented development as the catalyst for change. One focus of its work is centered on displacement, and it's RCVA prioritized ways to “ensure residents can remain and want to remain in their communities.” The workshop focused on climate change interactions with health and community equity, which was defined as the sharing of community assets and other development resources and investment in neighborhoods in a fair and equitable way. The RCVA explored connections including, for example:

- **Health:** The Chicago region will face [annual temperatures 5-9° F higher](#) by the end of the 21st century and changing precipitation patterns resulting in both higher risks of flash floods and extended dry periods. These changes would be expected to increase heat-related illnesses and deaths, worsen air quality and aggravate respiratory illness and asthma, exacerbate crime, cause the release of contaminants from soils, and disrupt the food supply chain.
- **Equity:** Concentrated flood damage from heavy rainfall would hit low-income families especially hard. The Center for Neighborhood Technology's urban flood risk data show the lowest income ZIP codes are disproportionately impacted by urban flooding. In areas of Chicago, such as those near the California Pink Line, residents have the highest percentage of impervious surface area, leading to greater flood risk and air quality concerns.

- **Climate:** The impacts of ground-level ozone and other air pollutants, for example, are exacerbated by high temperatures, which increases the frequency of red-air days (restricting the use of outdoor space, and limiting outdoor activity), damages trees and vegetation, threatens crops, and keeps tourists away, affecting jobs and businesses.

The RCVA in Chicago revealed the need to explore potential air quality hotspots, including generating improved and more localized data, especially those related to poor air quality in residential neighborhoods with already significant rates for asthma, especially childhood asthma. When you add the simultaneous challenge of heat vulnerability from climate change, this makes for an even bigger health concern. Proposed solutions included advocating for requiring clean freight transportation best practices, planting hedges around perimeters of new developments to improve air quality, requiring clean air stipulations for new developments, advocating for community benefits, and encouraging people to check the air quality before going outside for extended periods of time.

Environmental Justice and Cumulative Impact Tools

Provide mapping tools such as [EJSCREEN](#) and the [Environmental Justice Screening Method](#) to analyze the high cumulative vulnerabilities to environmental pollution borne by environmental justice communities. Utilize data and methodologies in partnership with community groups and state agencies to map industrial corridors, polluting hot spots, and other sources of contaminations that harm already vulnerable communities. Communities can use the analysis to advocate for land use and public health reforms to address these zones filled with diesel trucks, dusty materials, noxious odors, and other environmental hazards located immediately adjacent to parks and dense residential neighborhoods.

Cumulative impacts analysis seeks to look at both environmental and sociodemographic factors because research has shown that the same environmental exposure is more likely to harm health or result in greater harm when it occurs in populations with certain sociodemographic indicators of vulnerability. For instance, young children experience greater personal exposure than adults despite the same level of ambient pollution, as they take in more air relative to their body volume. Seniors are more likely to have pre-existing heart, lung, and other

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health conditions, making their systems particularly vulnerable to pollution. Low-income communities and Communities of Color also may be more likely to have been burdened by other environmental exposures in the past and to experience higher rates of psychosocial stress than other communities. [Looking at environmental and socio-demographic factors together](#) provides a more complete picture than assessing environmental information alone.

Illustration: Chicago mapping analysis

A [mapping analysis with Chicago community organizations](#) reinforced what advocates and residents have been calling out for years: the high cumulative vulnerabilities to environmental pollution borne by environmental justice communities in Chicago. The analysis mapped against Chicago's industrial corridors, calling attention to the cumulative vulnerabilities in Little Village, Pilsen, McKinley/Brighton Park and other nearby Southwest Chicago communities, as well as on the Southeast Side near the Calumet River and Lake Calumet. Communities adjacent to rail yards also show up as highly vulnerable. Unsurprisingly, these communities are largely low-income and Communities of Color, which research shows compounds their vulnerability to environmental threats.

The cumulative impacts map of Chicago took a combined look at environmental conditions along with sociodemographic characteristics that are associated with increased vulnerability to such environmental pollution, comparing the resulting cumulative burden across census block groups. It is a screening tool that brings out disparities and highlights areas in the City that should be targeted for increased environmental monitoring, enhanced enforcement, and land use and public health reform.

Ensure Equitable Access to Parks and Open Space

Through COVID-19, we've seen the need for access to adequate public and open space that allows for people to access fresh air, sunlight, and exercise while maintaining proper distancing. Lower-income and Communities of Color are least likely to have access to park and open space areas. A focus on [equitable development of parks and urban open spaces](#) is a focus on people's right to live in and have access to safer and less polluted environments, ensure that environmental projects provide the intended benefits for Communities of Color, and help provide natural and safe respites for families and cultural

activities. Such an approach takes into account the daily struggles of low-income and People of Color, some of whom experience open space not as a freeing and restorative experience, but as potentially threatening and unsafe. The positive aspects of parks and open space can only be created if their development is just, equitable, and inclusive in both process and outcome—so that people can stay in place if they so choose. Use the [Principles of Park Equity](#) when planning for new space and addressing deficits in existing parks and open spaces, particularly in low-income and Communities of Color.

Illustration: The 11th Street Bridge Park

The [11th Street Bridge Park](#) in Washington, D.C. took an approach to focus work on workforce development, housing, small business and wealth building, and social equity while planning for future park space. Since the vision began, 71 full time jobs have been created in historically lower income Wards 7 and 8, more than 2,500 residents have become engaged in tenants' rights initiatives, cultural works such as the Black Love Experience featuring music and art have been supported, and more than 7,500 pounds of fresh produce have been harvested through community-driven strategies. One lesson that the 11th Street Bridge Park has for others is to [start the work of equitable development early](#), countering the practice to build the infrastructure and then deal with the consequences.

This model illustrates that green spaces can be a positive anchor for community and equitable community development, while ensuring that their wide range of social, economic, environmental, health, and cultural benefits can be captured by all members of a community. Benefits that range from free spaces for arts, to healthier air, and to [improved psychological well-being](#). By centering green space development on racial equity and spatial justice, it also ensures that these spaces don't drive up the cost of living so much that residents are displaced from their homes and unable to benefit from the improvements.

Ensure universal access to clean water and energy throughout the crisis and beyond.

Institute a national moratorium on shutoffs of water, electricity, and gas for residential buildings and provide \$100 million to water utilities to compensate for reconnecting all residential water services nationwide.

Extend the moratorium on shutoffs to at least 120 days

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after the crisis to enable people to regain financial footing and prohibit draconian collection practices such as liens. Require lenient payback periods. Such provisions were included in section 103 of the [House COVID-19 legislation](#).

Require safe reconnections for water and provision of safe municipal watering stations where immediate safe reconnection is not possible. Safe reconnections are critical because water that has remained stagnant after a shutoff loses chlorine disinfectant and can allow high levels of bacteria and pathogens to grow in pipes and can also have a buildup of lead and structural problems may occur due to corrosion. Crews and plumbers may not be immediately available so mobile safe municipal water stations, such as water buffalos, should be temporarily installed.

TRANSFORMING COMMUNITIES

Invest in equitable community infrastructure so that we can rebuild stronger than before the crisis

Lawmakers must look towards reinforcing the long-term strength of communities. At a minimum, significantly more federal resources are needed to ensure all communities have access to basic infrastructure that is safe, climate-ready and healthy. Basic infrastructure includes [healthy housing](#), [water](#), [food](#), energy, [mobility](#), transit, parks, health care, [hazard mitigation](#), quality child care, and more. Frontline infrastructure such as [community health centers](#) are especially in need of support during this time. It is imperative to require an inclusive recovery implementation process that engages residents and nonprofits from vulnerable communities in the design, construction, operations, and maintenance of these infrastructure systems.

Increase funding for the Drinking Water State Revolving Fund (DWSRF) by at least \$10 billion a year and the Clean Water State Revolving Fund (CWSRF) by at least \$10 billion a year for at least the next five years and permanently extend Buy America provisions for both programs. As part of this legislation:

Establish a federal interagency partnership between key departments and agencies

Focus on partnerships between the EPA, DOE, HUD, DOI, DHS, DOT, SBA, etc. with the goal of ensuring that the agencies' policies, programs, and funding consider and support the interconnectedness of climate, health, and equity.

Modeled after the Partnership for Sustainable communities, a new administration should establish cross-agencies programs, funding, and policies that support healthy and affordable housing, equitable transportation, green buildings, clean energy, safe and affordable drinking water, access to open space and environmental protection, all together. Founded on the idea that how and where we invest in our communities affects our economy, our environment, and our everyday lives, this new cross-programmatic partnership would align investments and policies to support communities that want to give Americans more housing choices, make transportation systems more efficient and reliable, and support vibrant neighborhoods that attract businesses, run with clean energy, and have healthy, green infrastructure. Coordinating federal investments in infrastructure, facilities, and services meets multiple economic, environmental, and community objectives with each dollar spent.

SOURCES AND DOCUMENTS

- [Rapid Climate Vulnerability Assessment](#)
- [EPA EJ Screen](#)
- [Environmental Justice Screening Method](#)
- [Principles of Park Equity](#)
- [Partnership for Sustainable Communities](#)