Improving Human Health and Well-Being through Sustainable Coastal Restoration and Community Advocacy

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A growing body of research measures how short-term activity in parks and green urban environments positively affect human health and well-being, yet few coastal restoration projects directly consider these connections. This case study examines a design research project that sought to raise public awareness of the links between environmental design and human health, while fostering a commitment to sustainable coastal restoration and stewardship. Designing urban public landscapes that integrate resilient coastal strategies and public health policies is crucial as sea levels rise.

Located amidst contaminated industrial sites and a racially diverse and economically disadvantaged urban neighborhood, the Paradise Creek Nature Park is a forty-acre, coastal restoration project in Portsmouth, Virginia. Environmental, economic, and social stresses contribute to ecological degradation, gang violence, and public health risks in the area. In addition to these challenges, sea levels in southeast Virginia are rising faster than anywhere else on the East Coast of the United States. Land subsidence in the region exacerbates this threat and persistent flooding is already problematic. Students and faculty from the University of Virginia's *Global Sustainability Initiative* worked with community partners to create designs for the Park and its' sustainable and interactive Wetland Learning Lab and Rainwater Filtration Pavilion. We collaborated with the Elizabeth River Project, Portsmouth Public Schools, the City of Portsmouth Department of Parks and Recreation, and Crisman+Petrus Architects in this effort. Connecting academic learning with student desire to make a positive difference in the world forged a commitment to both environmental ethics and sustainable practices. The design research investigation sought to create a coastal restoration park and green pavilions that increase human health and well-being for all ages, while educating visitors about community resilience and sustainable urban transformations. Ultimately, this paper argues for the value of designing resilient coastal landscapes that integrate public health strategies in cities threatened by climate change and sea level rise.

Figure 1: Paradise Creek Nature Park Plan: UVA Crisman Studio (Beth Kahley)

RESEARCH GOALS

This civically engaged design project empowered the community and influenced public policy while investigating several research questions. Can experiencing an urban coastal restoration park within a working industrial landscape improve the visitor's well-being and resilience? How can a particular landscape and architectural design encourage individual and community reflection, environmental stewardship, and sustainable practices? The first research goal sought to create a public place that increases the sense of well-being, economic vitality, and opportunity for outdoor exploration for all ages. There were several objectives: complete a literature review of environmental and evolutionary psychology research that studies the measurable impacts of nature and urban public parks on visitor health and well-being; create a design research process to maximize the potential for the Park to increase human health and well-being; design green pavilions that educate park visitors about sustainability by revealing the relationship between natural and

Figure 2: View to Wetland Learning Lab across 11-acre restored wetland

built systems; and develop strategies for industry and the natural ecosystem to co-exist in harmony. Construction of the Wetland Learning Lab was completed in 2016 and the public park is open. Current research focuses on a second goal of understanding how urban coastal restoration parks can contribute to improved human health and well-being. Park visitor surveys, interviews, and an ongoing post-occupancy evaluation are informing evidence-based best practices for the design of coastal restoration parks in industrialized urban settings.

URBAN PARKS AND PUBLIC HEALTH

Current public health research examines how both natural and synthetic environments affect human health and well-being. Many studies seek to measure and compare the benefits of short-term human activity in these two types of environments.[1] Use of the term 'natural' in these studies is confusing, however, since this implies that a park is not the result of human design. It is crucial to study the full range of designed outdoor spaces and how they range in character from manicured monocultures to restored wetlands and urban wilds. Putting aside these concerns, this quantitative public health research can support the claim that the built environment does far more than meet functional demands and create experiential delight. This evidence-based research can directly support an argument for green versus (or in addition to) gray coastal resilience strategies by satisfying the quantitative bias of many policy-makers, clients, and communities. A recent paper, entitled "A Systematic Review of Evidence for the Added Benefits to Health of Exposure to Natural Environments,"analyzed twenty-five such studies and concluded that "natural environments may have direct and positive impacts on well-being."[2] While this is a powerful statement, the authors qualified their findings as quoted below.

"Cross-sectional studies have suggested positive relationships between green space and health; however, identifying the causal pathway can be complex. In order to objectively assess whether or not there is an 'added benefit' from green space, research studies need to investigate if there is a difference in the health benefits of an activity in a natural environment (e.g. a park) compared with the same activity in a more synthetic environment (e.g. a gym). If it is found that the natural environment does bring added benefits to health and well-being over and above those arising from the activity being undertaken, it is important to understand what benefits are realised, by whom, and in which environments."[3]

In their 1989 book, *The Experience of Nature: A Psychological Perspective,* environmental psychologists Stephen Kaplan and Rachel Kaplan developed the "Attention Restoration Theory" that humans concentrate more effectively after spending time in nature.[4] Their later paper, "The Restorative Benefits of Nature: Toward an Integrative Framework," goes further to state: "Natural environments turn out to be particularly rich in the characteristics necessary for restorative experiences."[5]

A growing body of research examines the effects of natural spaces within cities on human health and well-being.[6] For instance, "Green Space, Urbanity, and Health: How Strong is the Relation?" studies how the health of different socioeconomic groups is affected by parks and other green spaces within urban areas. Their findings show that "The percentage of green space inside a one kilometre and a three kilometre radius had a significant relation to perceived general health. The relation was generally present at all degrees of urbanity. The overall relation is somewhat stronger for lower socioeconomic groups. Elderly, youth, and secondary educated people in large cities seem to benefit more from presence of green areas in their living environment than other groups in large cities. This research shows that the percentage of green space in people's living environment has a positive association with the perceived general health of residents. Green space seems to be more than just a luxury and consequently the development of green space should be allocated a more central position in spatial planning policy."[7]

Based on these findings, one could expect that the local population served by the Paradise Creek Nature Park may experience greater benefits. Also important to acknowledge is E.O. Wilson's *Biophilia Hypothesis* that an instinctive or evolutionary biological bond exists between humans and other living things. Wilson defined biophilia as "the urge to affiliate with other forms of life."[8] Related theories of evolutionary psychology and biophilic design support the human need and often preference for trees, animals, and natural settings.

While accepting the value of evolutionary and environmental psychology studies linking human well-being to spending time in natural environments, this research does not quantitatively measure such outcomes at the Paradise Creek Nature Park. Just as important as these scientific and social science studies is the scholarly research that investigates the relationship between ethics and aesthetics in place design. For instance, several essays in *The Hand and the Soul: Essays on Aesthetics and Ethics in Architecture and Art* connect issues of beauty, form, and sensory pleasure with ethical obligations to the human community and the natural world.[9] It is critical to acknowledge qualitative aspects, which are undervalued in psychological or medical research that rely on the scientific method. This omission must be remedied in order to achieve a holistic understanding of these relationships.

DESIGN RESEARCH

This study utilizes a design research paradigm that builds on several theoretical frameworks, including the 'reflective practitioner' as articulated by Donald Schön, Nigel Cross' designerly way of knowing, Brad Haseman's performative research paradigm, and Alain Findeli's project-grounded research.[10] In "Exploring the Swampy Ground: An Inquiry into the Logic of Design Research," Wolfgang Jonas argues for the validity of design research using theories from the 1960s to present.[11] "Working on the Elizabeth River," my essay published in the *Journal of Architectural Education's* issue, Architectural Design as Research, Scholarship, and Inquiry, advanced the design research method that is utilized in the Paradise Creek Nature Park study.[12] Architectural knowledge is generated directly through the design process, physical realization, critical reflection, and dissemination.

THE INDUSTRIAL LANDSCAPE

The Paradise Creek Nature Park is located along a tributary of the Elizabeth River in southeast Virginia. A tidal estuary and one of the most polluted and industrialized tributaries of the Chesapeake Bay, the Elizabeth River is Norfolk's harbor and supports the world's largest naval base. There is limited public waterfront access and residents are largely disconnected from the river both physically and psychologically. The site offered challenging constraints and rich opportunities. A mature forest coexisted with dredge spoils, invasive plant species, toxic industrial sites, and an economically challenged urban neighborhood. In this area of exquisite beauty and horrific environmental degradation, citizen-led efforts are creating wildlife meadows and rain gardens, storm water improvements, back yard habitats, and a constructed oyster reef. The US Navy has converted seventy acres of waste landfill into wildlife habitat across the creek. Today the Paradise Creek Nature Park is a primary component of these coastal restoration efforts that engage residents and visitors in a deeper relationship with their community and River.

WORKING WITH THE COMMUNITY

Community engagement has been crucial to the research throughout the programming, design, and implementation process. The Paradise Creek Nature Park project began as part of a larger initiative led by the Elizabeth River Project (ERP)[13] to restore the Paradise Creek watershed through more than twenty small-scale restoration projects. A community stakeholder committee identified the need for public park access to inspire long-term river stewardship. ERP purchased a forty-acre site and met over a two-year period with nearly fifty diverse stakeholders to develop consensus on park goals. University of Virginia (UVA) research involvement began at that point in 2006. The UVA research team collaborated with multiple external partners, including the Portsmouth Parks and Recreation department, Portsmouth Public Schools and their Starbase Victory

Figure 3: Wetland Learning Lab overlooking the industrial landscape beyond UVA Crisman Studio and Crisman+Petrus Architects

STEM teachers, Cradock Neighborhood Association members, the US Environmental Protection Agency, and other government agencies. Together we worked to restore living resources, plan for sea level rise, conserve land, increase public access, and expand citizen stewardship of the Park and the Chesapeake Bay. Several outreach methods engaged with key stakeholders to build public support. For instance, twenty at-risk youth became Park Ambassadors. They removed invasive species, grew native plants, educated the community, and provided input on the park design. Funding challenges lengthened the process and in 2012 a University of Virginia architecture studio led by Professor Phoebe Crisman completed the schematic design of several educational structures and landscape elements that engage urban kids in hands-on learning. The Wetland Learning Lab was built in 2016 and more construction is ongoing.

IN THE STUDIO

The studio pedagogy was informed by scholarship on community engagement[14] and theories of agency by Anthony Giddens, Bruno Latour, Tatjana Schneider and Jeremy Till.[15] Architecture students created case studies of innovative nature parks and outdoor classrooms, studied environmental education programs, and researched the water, wetland and wildlife ecosystems and human culture and settlement history of the site. After completing detailed site analysis, they designed iterations for a Phase II Park plan; pavilions for educational activities, social gatherings, and individual relaxation and reflection; and play areas to promote physical activity. Throughout the process UVA students worked closely with the Elizabeth River Project staff and teachers from Portsmouth Public Schools and Starbase Victory—a hands-on science enrichment program focused on science, technology, engineering, and math skills for middle-school students. The pedagogy was structured to teach architecture students how to create designs that enrich both the mental and physical wellbeing of individuals and the larger community. Sustainable strategies based on *SITES Guidelines and Performance Benchmarks,* such as orientation, accessibility, safety, and signs of human care were employed to create places for mental restoration, social interaction, and physical activity.[16] Educational and interactive elements, including paths, portals and pavilions, were designed to welcome people into the park and teach them about its history and culture. The park was designed to heighten environmental awareness by creating restorative natural views of the river using visual and sound screening to focus visitors.[17] The restored and healthy ecosystem of Paradise Creek Nature Park is the source of many real and measurable benefits that humans derive from a relationship with nature.

RESEARCH OUTCOMES

Today the Paradise Creek Nature Park meets the needs of diverse visitors in one of the most populated regions of Virginia. The Park is the first public landscape in the Hampton Roads metropolitan area with the primary purpose of engaging over 20,000 citizens a year in environmental stewardship of the Chesapeake Bay through public river access and conservation education. Park visitors include inner-city students and families lacking access to meaningful outdoor experiences and missing out on the well-being that comes with green space. The park connects residents with their home river at the physical and psychological levels. Reconnection to the Elizabeth as a living river is essential to sustain public support for ongoing

coastal restoration efforts. Surrounded on three sides by heavy industry, the Park is a place of reconciliation between industry and environment. Neighboring industries have been crucial partners in pollution reduction and habitat restoration projects. The Park has increased green space in the distressed city of Portsmouth, which as the poorest of four cities in the watershed, has only one third of the park space recommended for its size.

Several research outcomes contribute to the goal of increasing a sense of well-being and health for Park visitors and nearby residents. The Elizabeth River Project offers environmental education workshops and guided tours throughout the year. Buildings and exhibits were designed to be visitor-centered, inquiry-based, and interactive. The Wetland Learning Lab, built of recycled materials, collects and filters rainwater in a native plant rain garden. Using the elements of portal, path, destination, and sense of surround, the designs educate visitors about the value of coastal restoration, green infrastructure, tidal wetlands, riparian buffer conservation, native plants, and the role of the citizen steward. A handicapped-accessible boat launch and clear-bottom kayaks provide access and wetlands exploration to all ages and abilities. Public engagement is evaluated based on the number of park visitors. Green infrastructure performance is monitored and measured green by calculating nutrient reductions using the Virginia Stormwater Management Nutrient Design System. As the research is disseminated through publications and exhibitions, the project is becoming a national model for how a public park may promote health and well-being in the midst of industrial uses and a stressed urban community. The research includes pedagogical outcomes as well. Working with diverse community partners and real world constraints, the project empowered University students to enrich and focus their research, design and communication skills, while learning about intertwined issues of human health and sustainable design, environmental education, and community engagement. The students connected sustainability education with their lives as citizens making a positive difference in the world. Their work has contributed to the city of Portsmouth and the entire Hampton Roads region by establishing a translatable model for sustainable coastal restoration and public recreation that physically and spiritually engages this urban community.

Figure 4: Restored wetland and Elizabeth River industries beyond

Figure 5: Neighborhood kids enjoying the Park and planting native wetland grasses through the Wetlands in the Classroom program

Figure 6: Local student experiencing the restored wetland

ENDNOTES

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