

THE BALTIMORE SCHOOL OF URBAN ECOLOGY.

A PRIMER FOR DESIGN PROFESSIONALS

YALE HIXON CENTER FOR URBAN ECOLOGY

JEN SHIN

2018 HIXON STUDENT FELLOW YALE SCHOOL OF FORESTRY AND ENVIRONMENTAL STUDIES YALE SCHOOL OF ARCHITECTURE

ADVISING BY: MORGAN GROVE, PHD

YALE SCHOOL OF FORESTRY AND ENVIRONMENTAL STUDIES USDA FOREST SERVICE, LEAD RESEARCHER, NORTHERN FIELD STATION

KEY COLLABORATORS

Biohabitats, Inc. Chesapeake Bioregion Baltimore, MD

> Jennifer Dowdell, ASLA Jennifer Missett, PE Chris Streb, PE

USDA Forest Service Northern Research Station Baltimore, MD

Morgan Grove, PhD

Stillmeadow Evangelical Free Church

Pastor Michael Martin

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All photographs, diagrams, and drawings are the work of the author unless otherwise noted.

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This primer is a result of research, analysis, and design conducted in the summer of 2018. It synthesizes field observations, community meetings, and interviews into simplified processes and actions. It also documents the process of analysis and design thinking utilized in observing and understanding urban ecology and social ecology in Baltimore.

The primer is organized into four case studies. Taken together, these case studies illustrate how urban ecosystems encounter an array of challenges, anthropogenic stressors, and social complexity. Each case study is analyzed, documented, and framed as a design problem; descriptive spatial diagrams and drawings are the primary communication tool.

We hope that this primer can help to consolidate knowledge across ecology, engineering, community organizing, and design fields and serve as a learning resource that makes urban ecology accessible and meaningful to designers, ecologists, and educators alike.



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A tale of two streams: 1. Stony Run Stream channelized and restored

STONY RUN, BALTIMORE — Bisecting the City from the Wyndhurst neighorhood to Wyman Park, Stony Run is an ecologically and culturally important stream in Baltimore. Urban streams, like non-urban streams, serve important ecosystems functions. In addition to providing habitat for native flora and fauna, a healthy urban stream can help manage stormwater by facilitating groundwater recharge, slowing the flow of water downstream, reducing heat pollution, mitigating urban heat islalnd, and supporting healthy nutrient cycling^{1, 2, 3}.

Until recently, urban streams had been considered a nuisance health and hygiene liability. As a result, many urban streams are either buried or channelized⁴. Stony Run is no exception. Its channelization has led to the loss of many important stream functions. In unrestored sections, Stony Run is treated like a pipe to bring stormwater out to the Harbor, increasing stream flashiness and causing frequent flooding. This not only eliminates its ecological potential, but also separates Baltimoreans from this natural resource.

The restoration of sections of Stony Run through the stabilization of stream banks and restoration of riparian wetlands now alleviates this stormwater stress. And, with the establishment of riparian tree species like sycamores, lindens, and mulberries, wildlife, including foxes and rabbits, have also returned⁵.

The addition of a walking trail adjacent to the restored section of Stony Run has provided Baltimoreans access to this urban oasis, increasing social connectivity and reverence for this natural area.

SITE

Stony Run Channelized: West Northern Parkway to Wyndhurst Avenue Restored: Wyndhurst Avenue to West Cold Spring Lane

WATERSHED LOCATION MAP



BELOW An image of the channelized portion of the stream



DEFINITIONS

Riparian Zone Area directly adjacent to a stream. The riparian zone is important for soil conservation and habitat diversity.

Groundwater Recharge The process by which surface water moves downward to groundwater. This process helps move excess salts into deeper soil layers.

Heat Pollution

Occurance of elevated water temperatures from urban stormwater runoff from impervious surfaces. Heat pollution can put stream ecosystems at risk.

Nutrient Cycling

The movement and exchange of organic and inorganic matter into living matter.

Transpiration

Urban Heat Island (UHI) The phenomenon whereby urban areas experience higher heat than non-urban areas.

Stream Flashiness

Refers to how the rate at which stream flow increases and decreases during a storm. Flashy streams are common in urbanized areas because of increased stormwater runoff across impervious surfaces.

RIGHT

Schematic section illustrating the ecological and social functions performed by the restored section of Stony Run.

Slow infiltration of

stormwater into soil: Reduced heat pollution Groundwater recharge Reduced flashiness

Midland Zone

Trail

Riparian Zone

street runoff and



Residents can now enjoy the serenity of the stream and observe wildlife right in their backyard. The restored stream not only increases neighborhood connectivity but also reverence for urban ecological systems. The Stony Run trail, now maintained by residents of the adjacent Evergreen neighborhood, has become a source of community pride and stewardship.

ABOVE

Schematic section showing a channelized portion of Stony Run. Gabians and retaining walls divorce the stream from the riparian zone, cutting off community access to the stream and eliminating ecological function. The channelized portion of Stony Run is susceptible to flashiness.





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Building new relationships between people, church, and forest at Stillmeadow Peace Park

STILLMEADOW EVANGELICAL FREE CHURCH,

WESTGATE, BALTIMORE — Led by Pastor Michael Martin, Stillmeadow Evangelical Free Church, located near the western edge of Baltimore, is a beacon of hope, education, community support, and nature. Cited along a steeply sloping southern facing hill, the church, at first glance, seems to be a simple brick building adjacent to a huge asphalt parking lot. But what is not immediately clearly is that the property includes a ten-acre forest patch and stream. Though many members of the surrounding neighborhoods do not consider this forest patch as a community asset, Pastor Michael understands that this rare urban forest has the potential to become a social-ecological haven for his congregation and surrounding community.

Forest patches serve important ecological functions and also have have vast social potential. Because of plant respiration, forest patches can cool local air temperatures by ten degrees on hot summer days⁶, effectively serving as neighborhood air conditioners. Like streams forest patches can also help manage urban stormwater, absorbing and slowing the flow of stormwater into overburdened urban storm systems⁷. These benefits are important for the vulnerable areas surrounding Stillmeadow, which have experienced both an increase in cooling degree days and destructive floods⁸.

Urban forest patches also provide habitat for local flora and fauna as well as important social benefits. Youth nature education, community building through stewardship, and access to natural areas are just a few of the many opportunities forest patches can provide.

Pastor Michael has been actively conceptualizing his

SITE

Stillmeadow Peace Park 10-acre forest patch and stream

WATERSHED LOCATION MAP





ABOVE Stilmeadow has a large asphalt parking lot and is surrounded by a 10-acre forest patch. Image edited from Google Maps.

RIGHT

A series of meetings brought together city and non profit agencies with the church community. The goal was to host transdisciplinary conversation and develop new methods for transboundary work. This was an opportunity to learn from experts in various fields and experience and find creative outcomes to expressed desires. From these meetings we were able to develop a strategy of identifying trees to be removed and then leaving those logs to enrich soil or moving them to divert stormwater away from paths to prevent erosion. We also identified that starting invasives management in areas identified as meditation stations would allow for a phased management plan.

MIDDLE

A walking trail provides neighbors and congregation members with a place to enjoy nature.

BELOW

A summer camp group enjoys Stillmeadow Peace Park. Image from Stillmeadow Church.





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vision for what he has fondly named the Stillmeadow Peace Park. He imagines that the Peace Park can be a place for spiritual healing and fellowship through activities like bee keeping, gardening, hiking, meditation, and outdoor fellowship. He has also been thinking more broadly in terms of youth education and destigmatizing the forest to Baltimore youth as well as nature-based worship and healing within the forest.

The church has begun building and maintaining of a few paths within the forest patch. But Pastor Michael has realized that he needs additional capacity and expertise to avoid burnout and more effectively manage the Peace Park project. He's thus sought out partners to help him evolve this vision and explore implementation strategies.

This summer, we worked with Pastor Michael to simplify both the ecological and social concepts within the Peace Park idea and develop methods for networked, interdisciplinary collaboration. Together with community and professional experts, we mapped the physical and biological processes we knew would occur within the park and overlaid social processes that we wanted to include. The result was a series of socialecological feedback loops from which distilled the key relationships between **Church, Forest, People**.

This collaborative process is ongoing. We've learned that building relational capacity can give way to novel solutions, but require new methods for communicating across disciplinary silos. As complex social-ecological process require networked, interdisciplinary collaboration, we found that creating visual schematics were key for developing and strengthening broader conceptual frameworks.



ABOVE

Feedback sketches and site sketches helped to determine the final conceptual feedback of Church, Forest, and People.

DEFINITIONS

Urban Forest Patch An area of forest canopy set

within an urban area. Forest patches can vary in size and provide key ecological and social benefits.

Cooling Degree Days Number of days in which the average temperature is above 65F. This measurement is used to determine a city's energy demand for cooling buildings.

RIGHT

Schematic section illustrating the ecological and social functions achieved through the People, Church, Forest concept.

Riparian Zone

Stream



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1 BEFORE

Diagram of McKean Avenue with demolished buildings highlighted in blue.

2 AFTER

Diagram of McKean Avenue with new Easterwood/Sandtown Park & Playground.





UPPER RIGHT

Doc Cheatham is a key community steward of the McKean Miracle. Image taken by Dan Rodericks of the *Baltimore Sun*.

LOWER RIGHT

The McKean Mircale is a save haven for the Sandtown Community.



From vacant blocks to community plots - the making of the McKean Miracle

SANDTOWN, BALTIMORE — The Sandtown neighborhood in Baltimore City is often remembered as the neighborhood where, in 2015, a 25-year-old black man named Freddie Gray was arrested for alleged posession of an illegal knife, only to die a week later due to spinal cord injuries incurred while in police custody and at the hands of police offers. The hardships and poverty Sandtown has experienced track well before 2015, but the riots and grief that ensued after Freddie Gray's death have left a lasting pall over the community.

Considered Baltimore's Harlem, Sandtown was the setting of a vibrant arts scene midcentury. But more recently, the neighborhood has been afflicted by poverty, unemployment, violence, and back alley drug deals, exacerbated by the 2008 financial crisis and structural economic and racial inequalities that plague Baltimore. The community is 99% black.

In 2016, as part of Project CORE, a Baltimore program that demolishes vacant homes as part of revitalization of so-called "blighted" neighborhoods, an entire city block was demolished in the Sandtown neighborhood on McKean between Baker and Presstman.

The success of Project CORE is, at present, unclear. Though Baltimore has sunk millions into removing vacant buildings, it has only managed to demolish 300 of the over 16,000 vacant buildings in the past decade^x. Critics highlight that wiping out entire blocks for revitalization displaces the underserved communities it allegedly serves. In addition, the removal of entire city blocks of housing creates a discontinuous, fragmented urban fabric, eroding the sense of urban continuity Baltimore has historically enjoyed.

SITE

Easterwood/Sandtown Park & Playground, or, the McKean Miracle

WATERSHED LOCATION MAP



IMPLEMENTING PARTIES Project CORE Parks and People Doc Cheetham

DEFINITIONS

Uban Blight

A term – used traditionally to describe visible plant disease – adapted to characterize decay in urban neighborhoods due to ageing, neglect, and poverty. The term is entrenched in racial prejudice^{*}.



BRUCE STREET PARK

Spatial analysis (below and right) shows how **decreased** circulation and visibility throughout Bruce Street Park decreases safety.





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But in an extraordinary example of community resilience, the demolished block of the Sandchester neighborhood has become a vibrant community park, serving as a center of gravity for the neighborhood and safe space for community activism, environmental stewardship, and play. Dubbed the McKean Miracle, the park was completed in 2017 in partnership with Parks and People, a local nonprofit.

The success of the McKean Miracle is in large part due to local community heros like Marvin "Doc" Cheatham, who is a dedicated community servant and fiercly guards the park. While Sandtown is still extremely impoverished, the McKean Miracle serves as a beacon of hope and change thanks to local community stewards like Doc Cheatham.

Beyond community guadrians and nonprofit support, there are additional spatial mechanisms that have contributed to the success of the McKean Miracle. Just a few blocks south, there is a similar vacant houses-to-park site, the Bruce Street Park, which houses drug deals and violence instead of safe spaces for community cookouts and play. A spatial analysis of the parks reveals that indeed, a subtle difference between the two sites - their relationship to the street - results in drastically different outcomes. Whereas the McKean Avenue park is sited along a wide street that maintains visibility to adjacent streets, Bruce Street park is sited along a narrow alley. Visual connectivity to perpendicular streets and buildings is thus heightened in the McKean Park, while it is inhibited in the Bruce Street Park. Such subtle siting differences, combined with the social enhancement of safety by neighborhood stewards like Doc Cheatham, can largely determine the success - or failure - of Project CORE sites.

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The Baltimore Healthy4. Harbor 2.0 - visions for a watery future

BALTIMORE HARBOR — The Healthy Harbor 2.0 is a visioning project that builds off of the original Healthy Harbor Plan developed in 2011. The original plan focused on cleaning the harbor and water by addressing trash, sewage, and stormwater. This next plan seeks to advance those original goals and also emphasize the creation of meaningful connections between people and water as well as Baltimore City and the water by cultivating a rich urban life for both humans and nonhumans. It also seeks to prepare for and adapt to climate change and sea-level rise. Finally, the plan introduces diverse programs beyond tourism and recreation to help strengthen these social ecological and urban ecological processes.

Located on Algonquian and Susquehannock land, the Harbor has been the cultural and economic heart of Baltimore City since European contact in the early 17th century. With exciting trade, shipping, and industry occurring in the Harbor through the early 20th century, citizens had a haptic, visceral connection to the Harbor. The Harbor, a provisioning body for the citizens of Baltimore, was that which provided life.

In contrast, the public-facing areas of the Harbor today are focused on tourism, a direct result of the Urban Renewal efforst of the 1970s. Remaining industry and trade along the harbor is strategically sheltered from public view. Thus, our embodied connection to the harbor has been reduced if not lost.

The Healthy Harbor 2.0 seeks to recover this direct relationship with the harbor but also to reinvent contemporary and culturally appropriate ways to restore a reciprocal relationship with the harbor.

SITE Baltimore Harbor

COLLABORATORS Biohabitats, Inc.





ABOVE

Oyster shuckers sitting atop a pile of oyster shells, late 19th century. The direct, visceral relationship to the water how now been lost. Source: National Archives and Records Administration





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SITE 1: INNER HARBOR

The Inner Harbor is the most popular tourist destination in Baltimore. It has a hardened bulkhead, and impervious paving. Two pavilion buildings are slated for demolition (dotted line below) and have been omitted in this proposal.



RIGHT Site Plan

The proposal is to create a protected interior wetland that is sheltered by an elevated pedestrian promenade on the outer edge and a series of undulating berms on the inner edge. This new wetland park serves as not only a park for recreation and leisure but also as a site for youth education, faith based ecological stewardship, and community fellowship. Its unique corner location also allows this to become a gateway to the Harbor. Two new civic buildings are nestled into this corner to serve as a literal threshold to the water. Finally, this strategy addresses stormwater and resilience concerns as it creates both a buffer and retention area between the water and inland zones.







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ABOVE Perspective







SITE 2: JONES FALLS OUTFALL

Like the Inner Harbor, the Jones Falls Outfall has a hardened edge condition with opportunity for interior interventions. There is also a series of both pedestrian and automotive bridges. The Jones Falls is highly flashy, high water influx and flooding is common during and after storm events.



RIGHT Site Plan

The strategy here is to create a series of stepped pervious zones for cars, people, and bioswales, which empty into the Jones Falls. The water filters through an oyster cage, or biohut, which slows, filters, and reduces the flow of stormwater into the falls. It also slows or prevents damage to buildings from floodwater during large storm events.







RIGHT Perspective

Water flowing daily from the Jones falls passes through a series of biofilters hung from the various bridges. This filter uptakes excess nutrients and cleans the water before entering into the harbor. These filters also create habitat for fish and small mollusks.

Large rocks or additional fish huts can be installed along the canal bottom to create burrowing areas and habitat for the American eel, which journeys yearly from the Bahamas to the Chesapeake. American eels live most of their adult lives upstream in freshwater streams and reservoirs around the Chesapeake and need to be able to journey through such outfalls as the Jones Falls.





RIGHT

Perspective | 24" Flood Event

The tiered bioswales, pedestrian and bike paths, and impervious parking also act as a retention zone for excess stormwater. This image shows a 24" flood scenario.





RIGHT

Perspective | 42" Flood Event

The tiered bioswales, pedestrian and bike paths, and impervious parking also act as a retention zone for excess stormwater. This image shows a 42" flood scenario.







SITE 3: THE MARINA

When observing Baltimore Harbor from a boat, a large number of unused or unrented slip space throughout the marinas can be observed. For this case study marina alone, there are 185 empty slips – more than half – averaging over \$200k in yearly rental income loss and more in maintenance fees and property tax losses. By viewing each empty slip as a potential spatial variable, we can think strategically to optimize the marina not only financially but also ecologically and socially.







RIGHT

Diagrams illustrating the rearrangement of occupied boat slips.

By consolidating occupied boat slips, greater efficiency in creating a fleet of eco-boats is possible. HENDERSON'S WHARF MARINA 1001 FELL STREET

EXISTING CONDITION

OWNER: HENDERSON WHARF MARINA LLC CURRENT YEARLY TAXES: \$18,218 (2013) 126 SLIPS OCCUPIED 185 EMPTY SLIPS ~\$266,400+ IN LOST REVENUE ANNUALLY

HENDERSON'S WHARF MARINA 1001 FELL STREET

REARRANGED SLIPS

CURRENTS

~86,000 SF OF POTENTIAL ECO-BOAT OR GREEN INFRASTRUCTURE EQUIVALENT OF ~135 BOND STREET WETLANDS

• ... > MAIN ARTERY

VIEW

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CURRENTS



Diagrams illustrating the arrangement of infill of eco-boat slips.

If each empty slip is infilled with either an eco-boat, floating wetland, or turf scrubber, 86,000 SF of green infrastructure is gained.

The analysis of this marina as an urban condition reveals that the marina can be further optimized to increase social functioning. Marina urban zoning can consolidate various uses to create a functionally diverse urban form.



HENDERSON'S WHARF MARINA 1001 FELL STREET

REARRANGED SLIPS

~86,000 SF OF POTENTIAL ECO-BOAT OR GREEN INFRASTRUCTURE EQUIVALENT OF ~135 BOND STREET WETLANDS



OPPOSITE Rendered Plan

A little floating city of eco boats and wetlands can bring in various social partners to help create a rich marina urbanism.

These sites would be great opportunities for living classrooms, worship groups on the water, outdoor yoga, stewardship learning, and more, all while providing environmental harbor benefits.











SITE 4: THE GANTRY

Along the northern edge of Locust Point exist two abandoned gantries and their decaying infrastructure. These gantries were historically used to import and export loads to be exchanged between ships and freight trains. Though unused, they frame beautiful views across the harbor and act as a palimpsest of Baltimore's shipping history.



RIGHT Perspective

This strategy uses this decaying infrastructure to create both wetland habitat and social function. A riprap/wooden bulkhead wave break helps wetland to establish providing habitat for birds and fish, while stepped seating allows the gantry to frame views of the city across the harbor. This site can also be used for ecological stewardship, community groups, citizen science, and recreation alike.









SITE 5: THE DECAYING PIER/PIER PARK

Abandoned and decaying piers along the Baltimore Harbor waterfront are opportunities for Baltimoreans to connect back to the water through this historically industrial infrastructure. At Locust Point, piers have turned into urban ecosystems, with some becomming forested or providing habitat for fish.



LEFT AND OPPOSITE Concept Sketches

Piers are sistered with existing piles or replaced completely, creating a walkable piers that weave between newly installed floating wetlands. Underneath the decaying pier, a combination of coarse woody debris and biohuts create fish and mollusk habitat. Collected together, these piers that provide spaces for both humans and nonhumans.

RIGHT Rendered Plan

Locust Point Pier Park is a new plan to capture abandoned train tracks and piers back into the public realm as a usable waterfront area.

A pier that have become forest, is kept as a "nature pier" that connects as a part of a linear park along unused train tracks. Piers are connected together with a walking path that opens up to natural meadows on one end and the gantries on the other end.





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REFERENCES