[UN] NATURAL

A Discussion of Nature and Cities and Nature in Cities

SUMMER INTERNSHIP 2012
BERGER PARTNERSHIP

Jasmeen Bains, Intern
with Brad McGuirt and Guy Michaelsen

PARTNERSHIP berger

Cover Photograph: Doug Scott
Following Images: Guy Michaelsen (L), Scott McCraken (R)

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[UN]


NATURAL

INTRODUCTION

We love nature! On that much we can overwhelmingly agree. In our love of nature, we advocate for it; we seek to protect it, preserve it and enhance it, even as we live in a world of continued urban growth and development. We are increasingly aware of the negative impacts we have on our environment, both those in the past and those of our actions and decisions made today. We seek to mitigate those impacts by altering our habits and making sacrifices as individuals and as a community.

Yet in spite of our awareness and actions, nature is losing. This is, in part, a direct result of how we errantly perceive and define nature, in particular, urban nature. These misperceptions are rooted in a misunderstanding of the appearance, functionality, and geographic "limits" of nature.

To many, nature is a romanticized ideal: a pristine spring or an isolated forest. Tied to this perception is a specific look or character, often universally applied across differing ecotypes, where the landscape is wholly free of human presence and intervention. In this errant view, nature becomes idealized imagery, isolated from and potentially even contrary to the realities of its critical ecological functions. Such perceptions can falsely and unnecessarily detach nature from our everyday urban lives.

Yet the reality is "Nature pervades the city."[1] Nature, as manifested in myriad natural processes, is an active agent in the formation and performance of cities. It directs where and how we build, alters the flow of goods, and can often be a disruptive force in the life of a city. Cities undoubtedly affect nature. They change hydrology and wind patterns, modify the surrounding temperature, and affect biodiversity.

Our misperception of nature is problematic. It is incongruent with the reality of our built environment and greatly limits the opportunities to embrace and enhance natural function in unnatural places.

What if we were to acknowledge and celebrate the unnatural nature in our cities? We could manage landscapes and cityscapes as a living ecological system, one in which humankind is an integral part. What models are there for inspiration, what might new urban ecologies look like, and which strategies could be pulled and broadly applied to urban environments in our region and beyond?

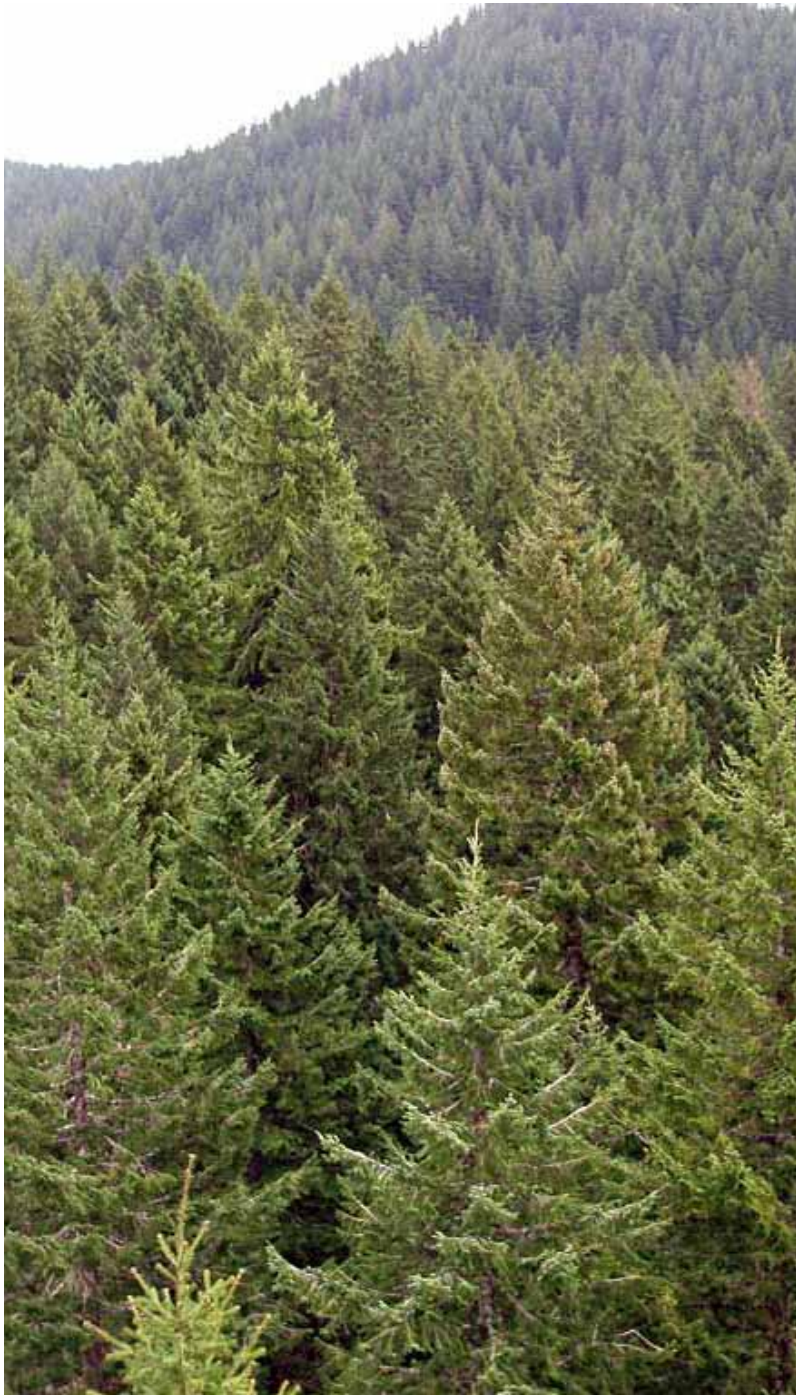
Therein lies the catalyst for this effort.

Our exploration of unnatural landscapes via our 2012 internship program is born of both passion and frustration. As designers of landscapes that support increasingly dense and rich urban environs, be it spaces in the heart of our cities, or the parks and natural areas that offer escape and revitalization, we seek to maximize ecological function, even as we enhance the human experience. Yet often, in spite of having the design and ecological resources to do so, our efforts are limited or complicated by misperceptions of nature and ecological function, often by those advocating on nature's behalf.

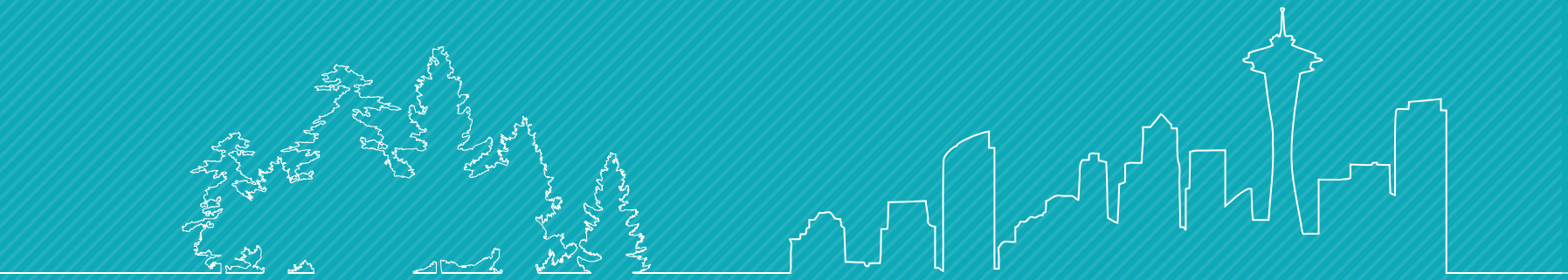
[UN]Natural presents a discussion of Nature and Cities and Nature in Cities. It challenges the perception of what is natural. It acknowledges the degree to which humans intervene in both cities and nature. And it seeks to establish a deeper understanding of the relationship between cities and nature, one that can guide future interventions toward the mutual health and prosperity of both humans and nature.

Images: Institute for Redwood Ecology (L), Mark Meland & PeopleCore (R)

1 Spirn, Anne Whiston. The Granite Garden: Urban Nature and Human Design. New York: Basic Books, Inc, 1984.



01 THE DISCUSSION



The concept of city has separated human processes from natural processes

We consider nature outside of the urban realm

This disconnect denies a more integrated relationship between cities and natural systems

The disconnect is between

NATURE & CITY
NATURAL & CONSTRUCTED

denying a relationship between

CULTURAL PROCESSES &
NATURAL PROCESSES

The historic perception of the city is largely defined by that which it is not: nature. The city exists as a manufactured cultural product—a product that stands in opposition to the nature that lies outside its border.

Conversely, nature is perceived as that which is not the city. It exists, presumably as it always has, “out there” beyond the daily lives of urbanites.

In spite of humankind’s far reaching impacts on our landscape, we instinctively assume and accept that land which is not actively managed is natural and that which is created or managed is inherently unnatural and incapable of becoming natural.

Such a diametrical opposition, or rather the perception thereof, fails to acknowledge the complex and active relationship between the city and nature. Ultimately, this limited view undermines the wealth of possibilities for the vision and health of built environments.

MAGNUSON PARK

A former Naval airfield, designed, constructed, and managed with inputs that would otherwise not occur.

[UN]

CITY OF SEATTLE

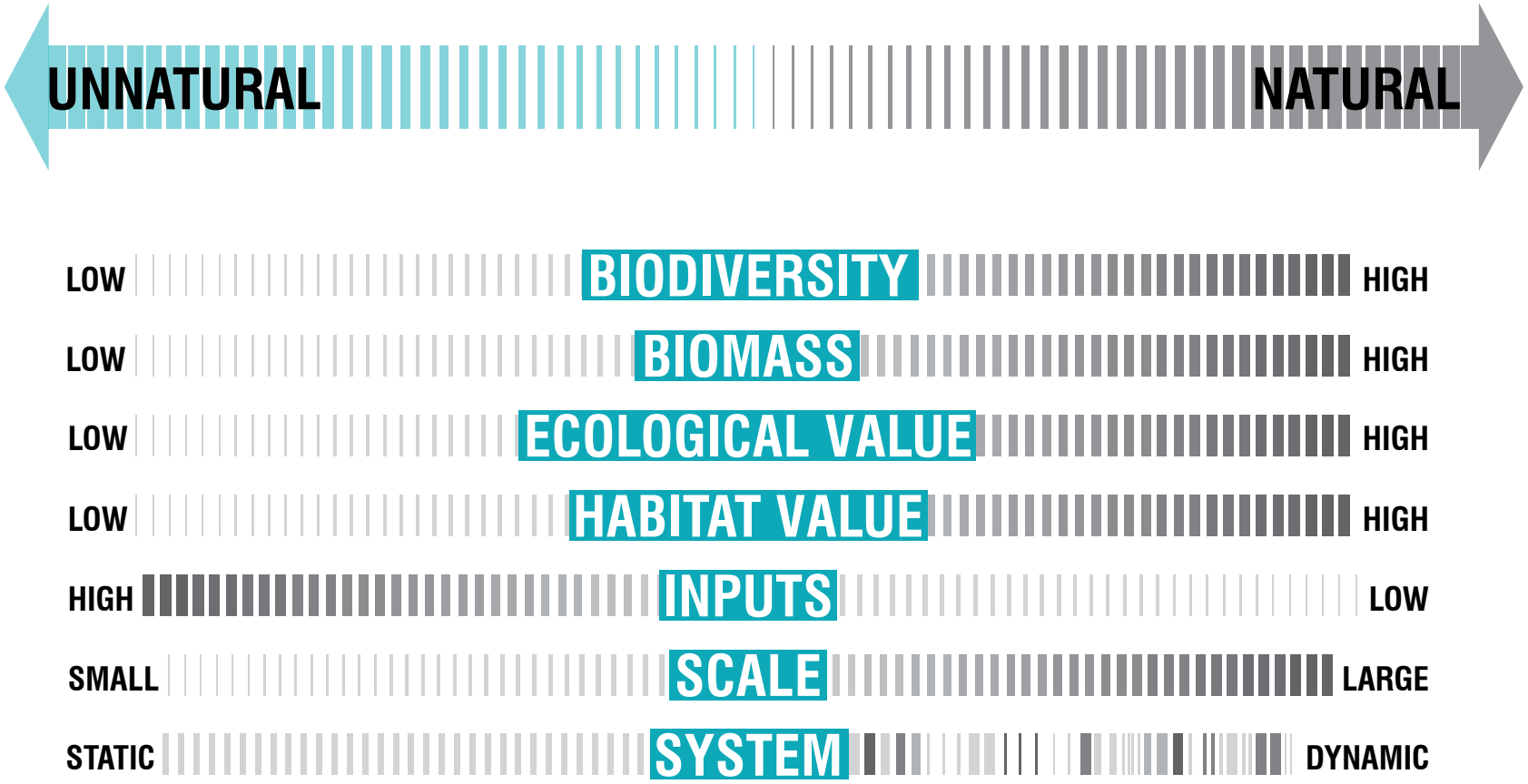
Processes of the human habitat - cultural, social, and infrastructural - combined with a complex urban ecology.

NATURAL

OUR PERCEPTION OF NATURAL IS NOT CONGRUENT WITH THE REALITY OF ECOLOGICAL FUNCTION.

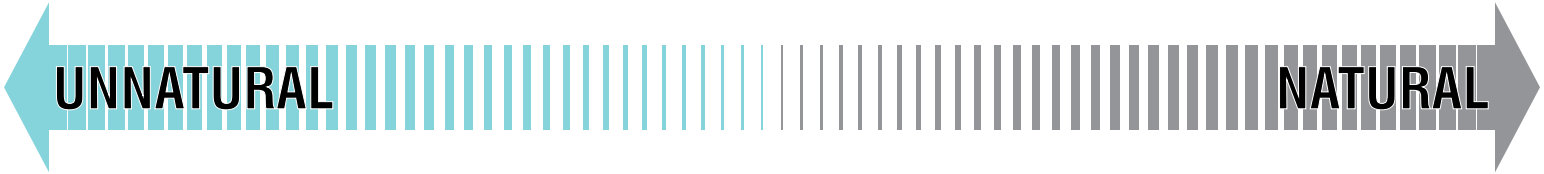
WHAT ARE THE PERCEIVED VALUES OF NATURAL?

What functions and qualities are typically associated with “natural” landscapes? What is the natural stereotype?


UNNATURAL
NATURAL
LOW
BIODIVERSITY
HIGH
LOW
BIOMASS
HIGH
LOW
ECOLOGICAL VALUE
HIGH
LOW
HABITAT VALUE
HIGH
HIGH
INPUTS
LOW
SMALL
SCALE
LARGE
STATIC
SYSTEM
DYNAMIC

WHAT ARE THE REALITIES OF ECOLOGICAL FUNCTION?

Contrary to common perception, there is a range of ecological function in both natural and unnatural landscapes. Created landscapes can be shaped and managed to provide ecological function that exceeds a landscape found in nature.



Unnatural constructed wetland
Shanghai Houtan Park, Shanghai
200 plant species

Unnatural constructed reserve
Bloedel Reserve, Seattle
wide range of plant species

Natural succeeded monoculture
Queen Anne Ravine, Seattle
5 main plant species

LOW **BIOMASS** HIGH

Unnatural constructed wetland
Magnuson Park, Seattle
High biomass

Natural prairie
Mima prairie, Washington
Medium biomass

Natural tundra
Mount Rainier, Washington
Very low biomass

UNNATURAL ⟷ **NATURAL**

LOW **ECOLOGICAL VALUE** HIGH

Unnatural constructed water treatment
Wadi Hanifa wetlands, Saudi Arabia
Cleanses water, creates habitat and vegetation

Unnatural constructed water treatment
Portland Green Streets, Portland
Cleanses street runoff, reduces runoff volume

Natural geyser landscape
Geyser Basin, Yellowstone National Park
Limited ecological function

LOW — HABITAT VALUE — HIGH

Unnatural constructed park
Central Park, New York City
High habitat value

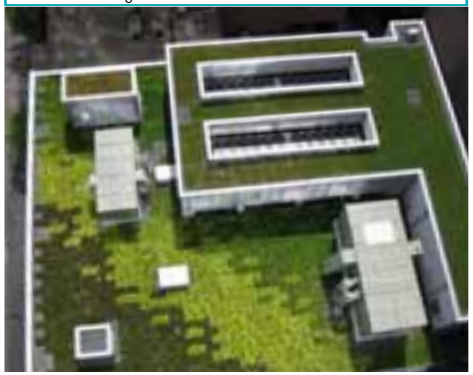
Unnatural farming/palouse landscape
Eastern Washington
Medium habitat value

Natural salt flats
Bonneville Salt Flats, Utah
Low habitat value

UNNATURAL ⟷ NATURAL

HIGH — INPUTS — LOW

Unnatural constructed green roof
Olive 8 Building, Seattle
Minimal irrigation and maintenance



Unnatural constructed park
Toronto, ON
Planting, irrigation, invasives removal

Natural Forest
Mt. Baker National Forest, Western Washington
Timber management, invasives removal, recreation

SMALL — SCALE — LARGE

Unnatural constructed greenway
Seattle, WA
1 mile long

Unnatural constructed landfill park
New York, NY
2,200 acres

Wilderness
Black Rock Desert, Nevada
314,835 acres

UNNATURAL ⟷ NATURAL

STATIC — SYSTEM — DYNAMIC

Unnatural constructed wetland
Tianjin, China
Adaptable system

Unnatural constructed park
Toronto, ON
Input managed ecologies

Natural desert
Sonoran Desert, Arizona
Xeric plant species

02 CASE STUDY

CASE STUDY EVALUATION

Reorienting visual bias

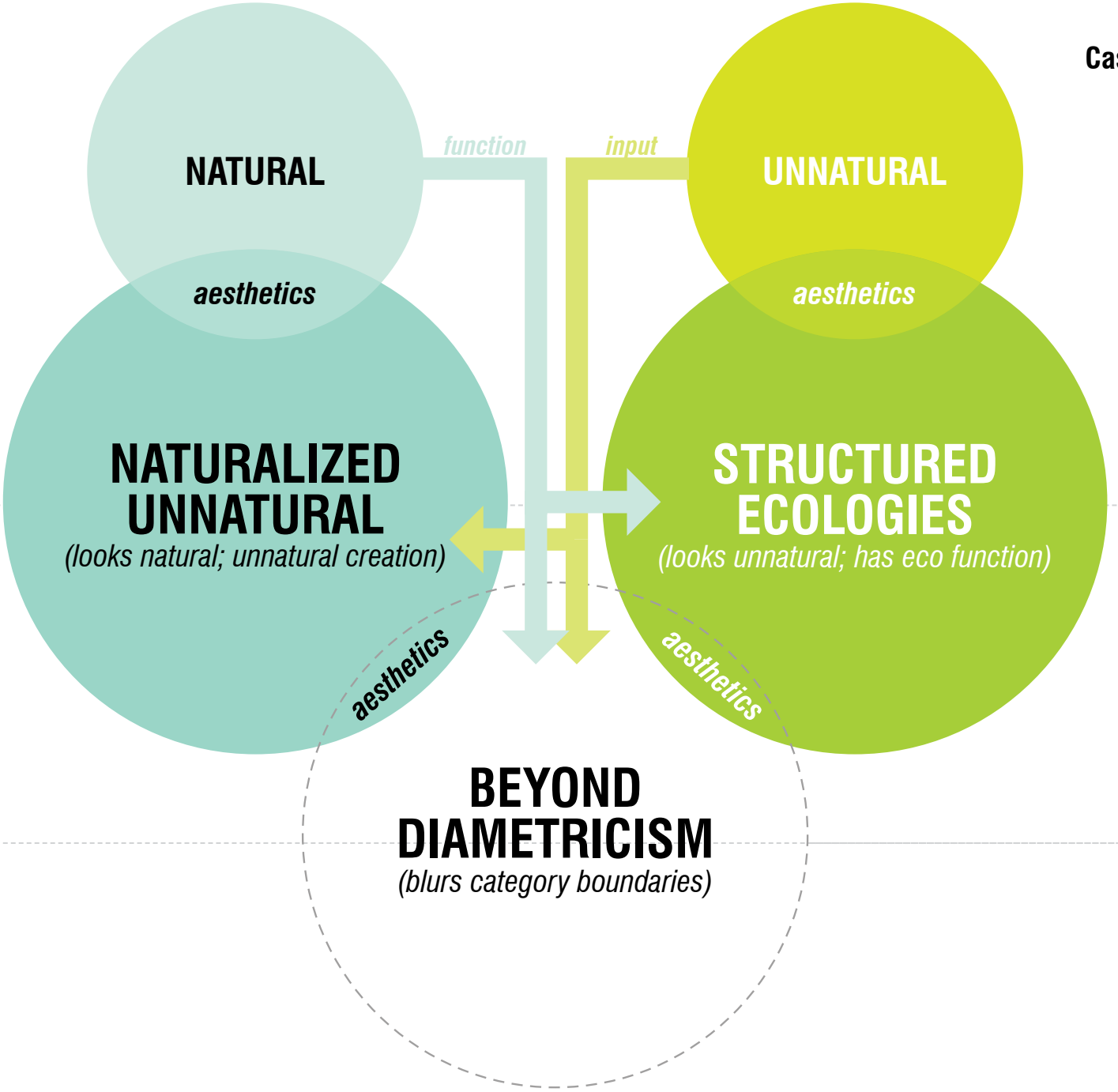
Places that look natural are often attributed with a high degree of ecological function, while those that look unnatural are not. This visual bias is understandable; a site's look, its raw visual data, is often the first and primary source of interaction between humans and their environment. However, the value associated with aesthetically natural areas does not necessarily relate to its ecological function.

Via case studies, the following section pushes beyond this visual bias to examine alternative methods for how value can be assessed. The case studies are divided into three categories. Appearance or "look" is used as a point of relation while unnatural inputs and ecological function are employed as points of comparison.

THE NATURALIZED UNNATURAL: Sites that look natural but have unnatural, constructed inputs in their creation and/or maintenance.

STRUCTURED ECOLOGIES: Sites that look unnatural but have high ecological function and value.

BEYOND DIAMETRICISM: Sites that encompass both the above categories: they look unnatural and constructed, but their ecological value is also visually evident.


NATURAL
UNNATURAL
function
input
aesthetics
aesthetics
NATURALIZED UNNATURAL
(looks natural; unnatural creation)
STRUCTURED ECOLOGIES
(looks unnatural; has eco function)
aesthetics
aesthetics
BEYOND DIAMETRICISM
(blurs category boundaries)

CASE STUDY EVALUATION

Reorienting visual bias

The case studies were evaluated along a timeline (before human impact, during peak urbanization, and the current or future condition) and from various ecological and social perspectives. They are defined as follows:

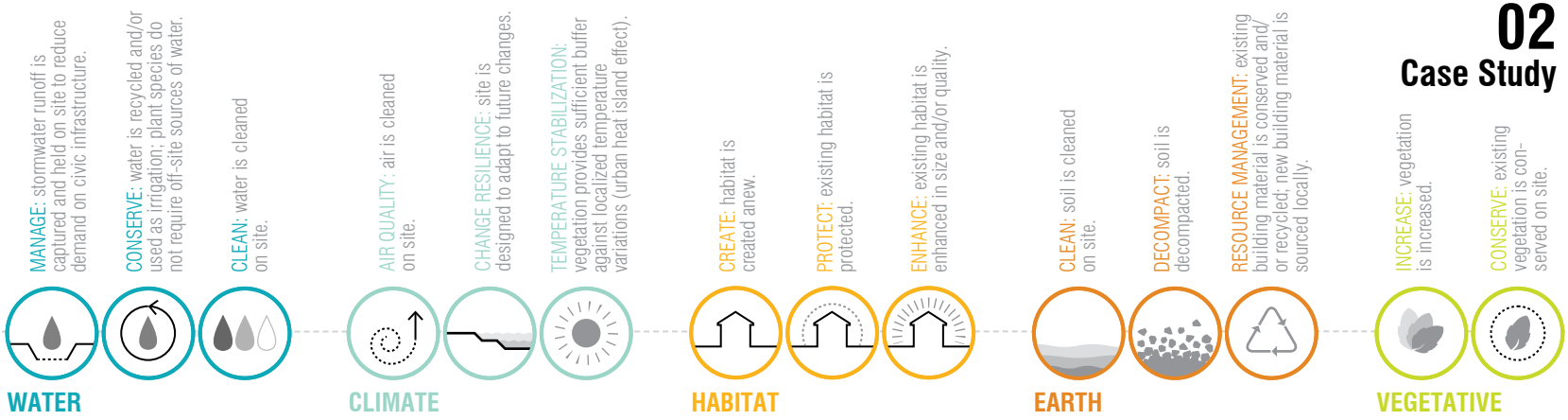
Historical Layers: The driving forces that influenced the current ecology.

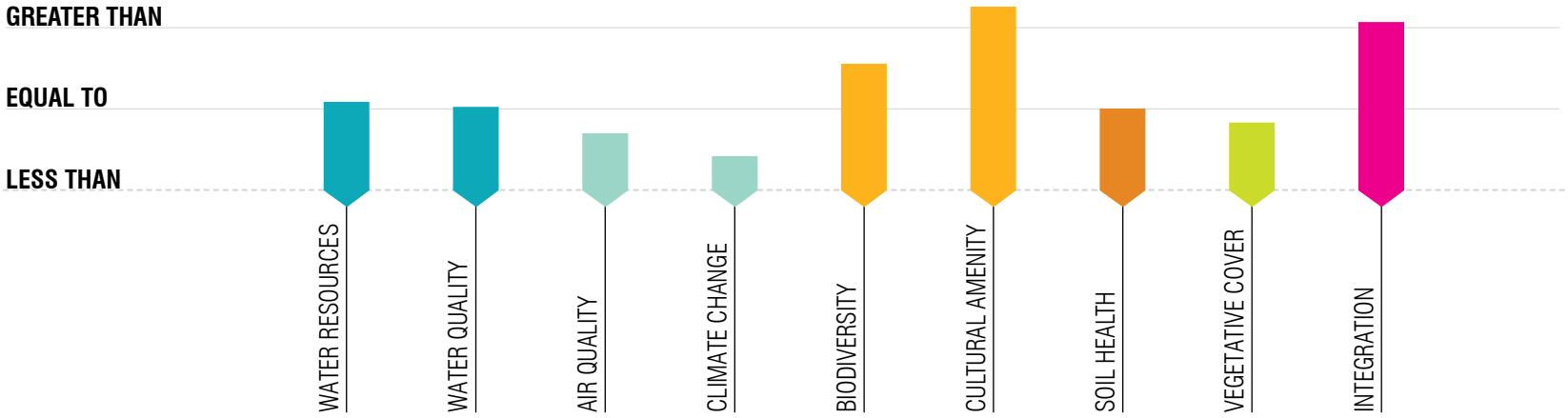
Natural Process Values: Component values of the site over time.

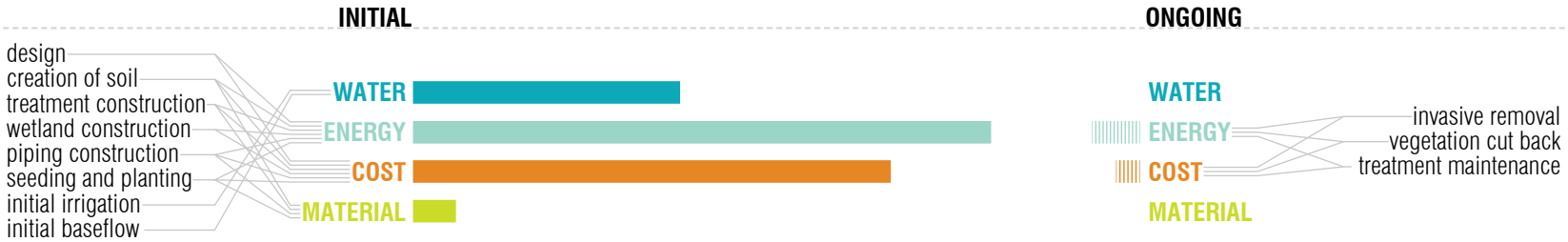
Ecological Function: Function in terms of water, climate, habitat, soil and vegetative cover.

Performance: Current status of ecological and social elements of the site compared to that of the natural or pre-urbanization condition.

Inputs: Water, energy, cost and material of the initial construction and ongoing maintenance of the site.


MANAGE: stormwater runoff is captured and held on site to reduce demand on civic infrastructure.
CONSERVE: water is recycled and/or used as irrigation; plant species do not require off-site sources of water.
CLEAN: water is cleaned on site.
WATER
AIR QUALITY: air is cleaned on site.
CHANGE RESILIENCE: site is designed to adapt to future changes.
TEMPERATURE STABILIZATION: vegetation provides sufficient buffer against localized temperature variations (urban heat island effect).
CLIMATE
CREATE: habitat is created anew.
PROTECT: existing habitat is protected.
ENHANCE: existing habitat is enhanced in size and/or quality.
HABITAT
CLEAN: soil is cleaned on site.
DECOMPACT: soil is decompacted.
RESOURCE MANAGEMENT: existing building material is conserved and/or recycled; new building material is sourced locally.
EARTH
INCREASE: vegetation is increased.
CONSERVE: existing vegetation is conserved on site.
VEGETATIVE


GREATER THAN
EQUAL TO
LESS THAN
WATER RESOURCES
WATER QUALITY
AIR QUALITY
CLIMATE CHANGE
BIODIVERSITY
CULTURAL AMENITY
SOIL HEALTH
VEGETATIVE COVER
INTEGRATION


INITIAL
design
creation of soil
treatment construction
wetland construction
piping construction
seeding and planting
initial irrigation
initial baseflow
WATER
ENERGY
COST
MATERIAL
ONGOING
WATER
ENERGY
COST
MATERIAL
invasive removal
vegetation cut back
treatment maintenance

MAGNUSON PARK
NATURALIZED
UNNATURAL

Image: Jasmeen Bains

MAGNUSON PARK Seattle WA

DESIGNERS: Berger Partnership (ongoing)
ECOLOGICAL SYSTEM: Wetland hydrology, wetland ecology

With the 1916 construction of the Lake Washington ship canal, the level of Lake Washington dropped nine feet. This dramatic change in water level dewatered a peat bog and lake on the site which were then filled for the construction of a Naval airstrip and buried under a layer of buildings, paving and turf.

When the airstrip officially closed in 1995, the question of ecological restoration arose. The land, forever altered, could not be returned to any previous state due to both the historic lake lowering and filling of the peat bog. Furthermore, there was a desire for enhanced human use and access to the site as one of the few remaining large open spaces in the city. An argument needed to be made for an amplified ecology, one that would provide greater ecological function and human recreation.

The result is ecologically rich bird, dragonfly and aquatic habitats that integrate human use facilities. Contrary to their organic (natural) appearance, the wetlands are entirely designed and constructed. The high degree of input necessary for construction resulted in a low input and responsive maintenance regime.

HISTORICAL LAYERS

Glacial ice sheet erodes a ribbon lake

Alder/cedar/douglas fir grove, Mud Lake

Peat bog

Logged and bog filled in

Naval airstrip

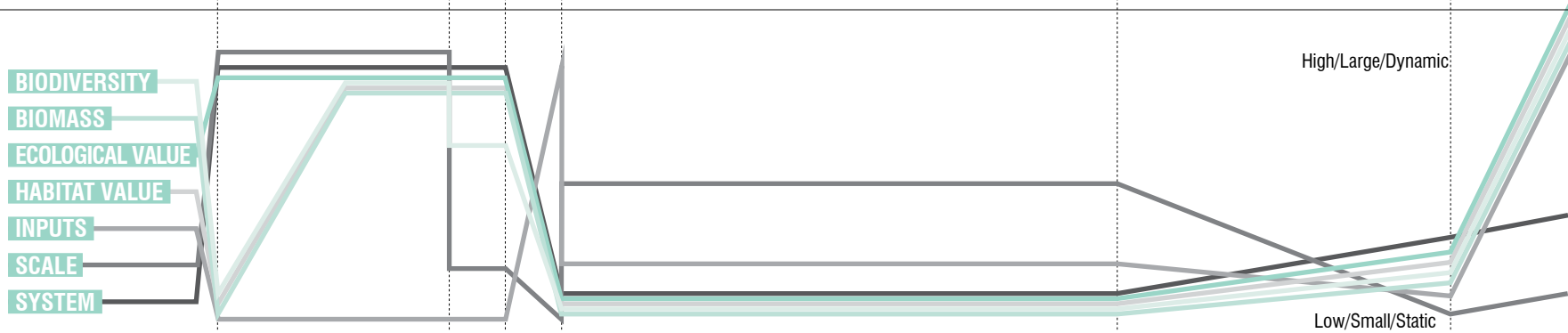
Deconstruction

Park built

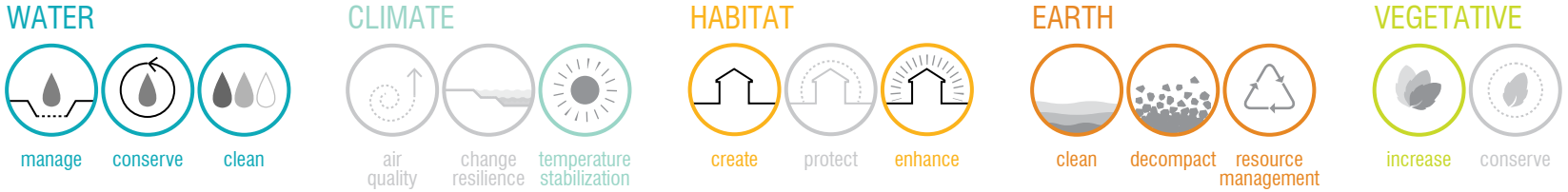
Wetland succession

~12,000 years ago | 1916 | 1920 | 1926 | 1974 | 2008

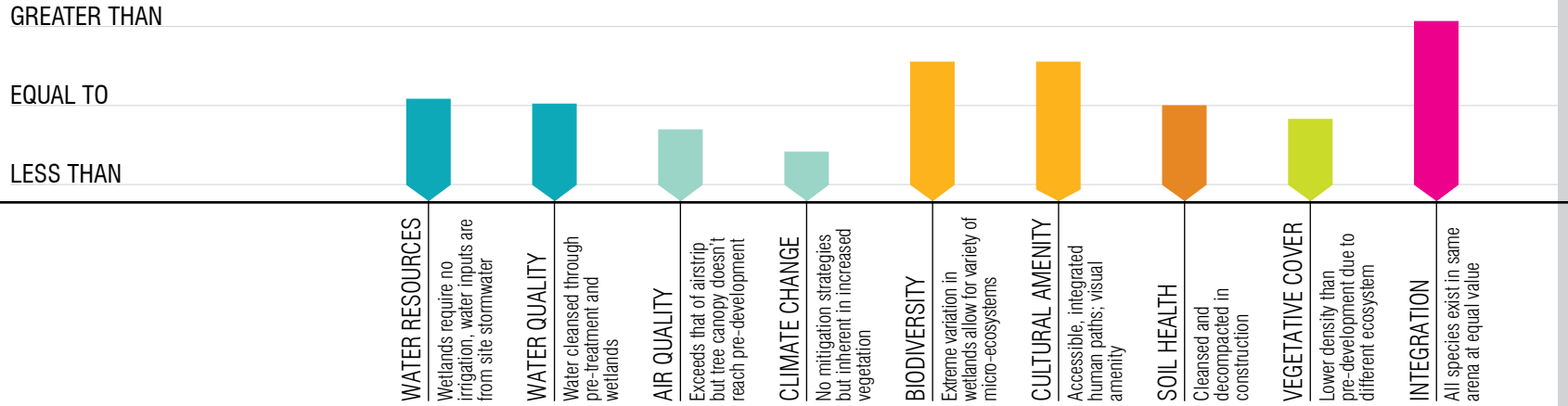
NATURAL PROCESS VALUES



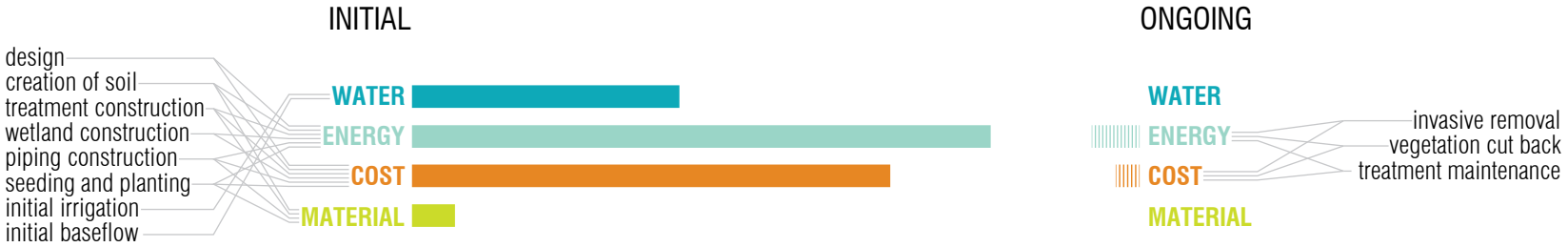
ECOLOGICAL FUNCTION



PERFORMANCE Relative to Pre-Human Development Condition



INPUTS



Site: 1957

Site: 2008
Image: Andrew Buchanan

Image: Doug Scott

02
Case Study

EVERGREEN BRICK WORKS

NATURALIZED
UNNATURAL

Image: Christopher Higgins

EVERGREEN BRICK WORKS Toronto ON

DESIGNERS: Du Toit Allsopp Hillier, Claude Cormier A. P., The Planning Partnership, Toronto Region Conservation Authority (2010)
ECOLOGICAL SYSTEM: Fluvial hydrology; upland, riparian, stream, and wetland ecologies

The Evergreen Brick Works serves as an example of rethinking urban spaces in pursuit of maximum function. Planned, designed, and constructed as the confluence of "Nature, Culture and Community," the Brick Works and surrounding gardens create a framework for ecological engagement.

Initially functioning as a paper mill, the site was converted into a quarry to supply bricks for the construction of a growing city. Demand for bricks eventually declined and the site faded into a decade of natural succession. The site was soon revived with the filling of the quarry, construction of wetlands, and the planting of native vegetation. The industrial brickworks buildings were repurposed to house cultural programs.

The quarry garden and reclaimed buildings have become an environmental learning center with teaching gardens, farmer's markets, native plant nurseries, expos, bike shop, gardening and stewardship events—all the while remaining a functional part of a larger ecosystem.

HISTORICAL LAYERS

Glacial ice sheet erodes river; mouth of glacial river

River valley; white and red oaks, white pines, hemlocks

Paper mill

Clay quarry and brickworks

Hurricane Hazel

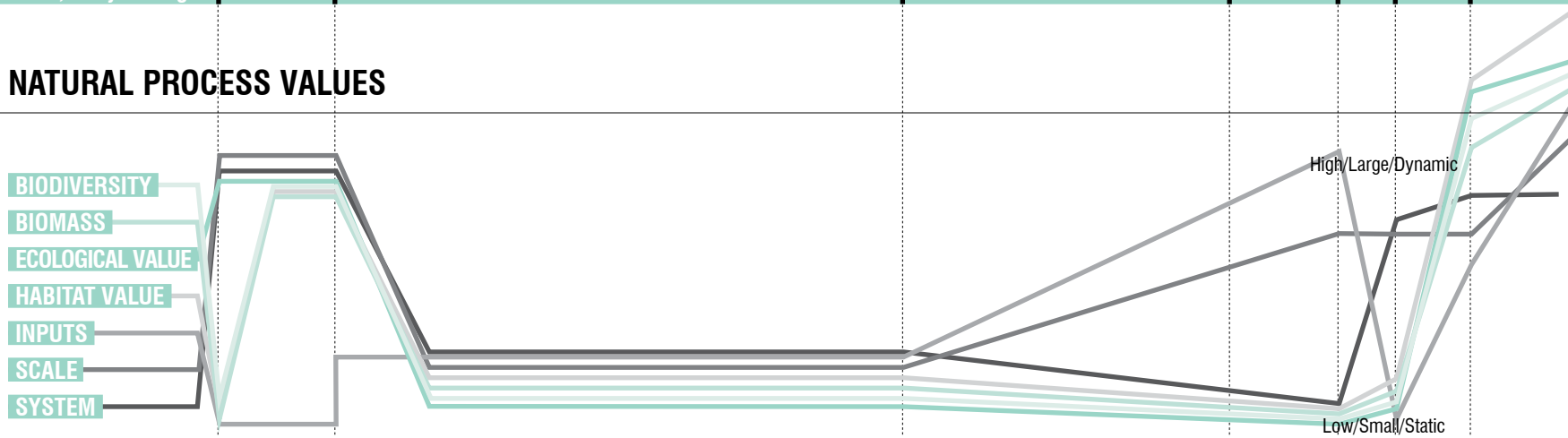
Works abandoned

Volunteers plant wildflowers and trees; Weston Gardens and wetlands constructed

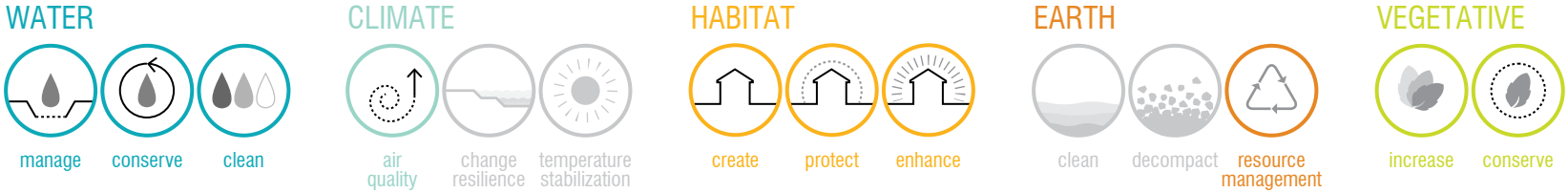
Building and park master plan

~12,500 years ago | 1790 | 1889 | 1954 | 1984 | 1992 | 2010

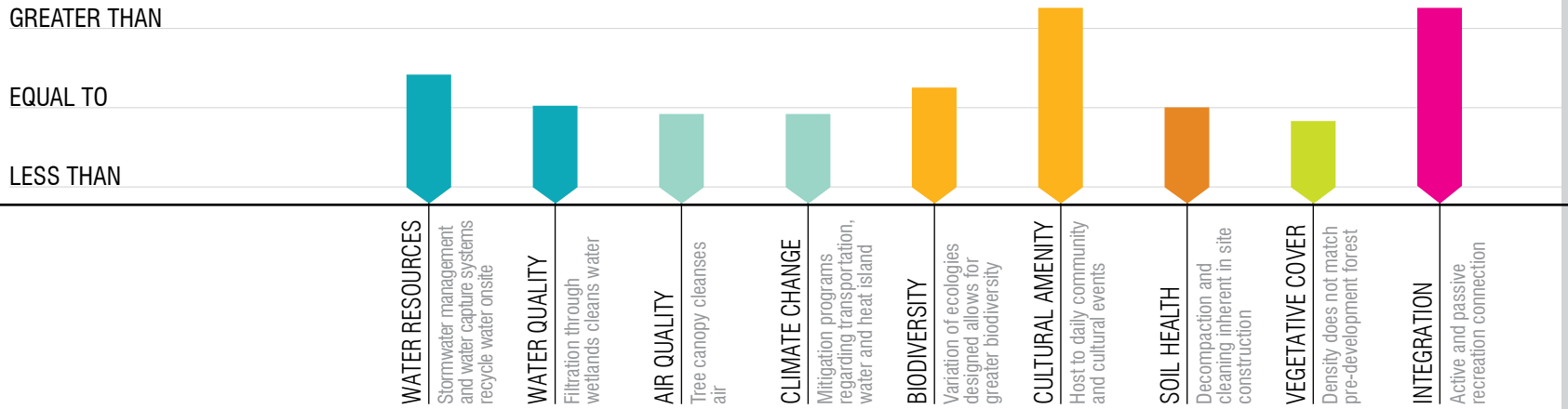
NATURAL PROCESS VALUES



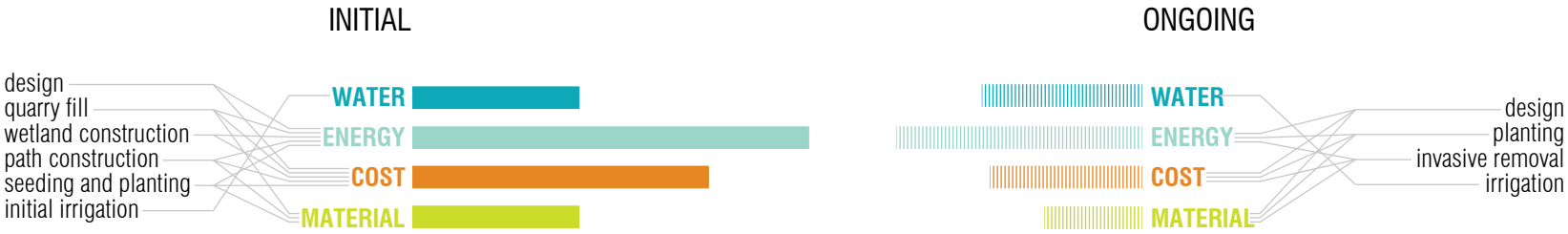
ECOLOGICAL FUNCTION

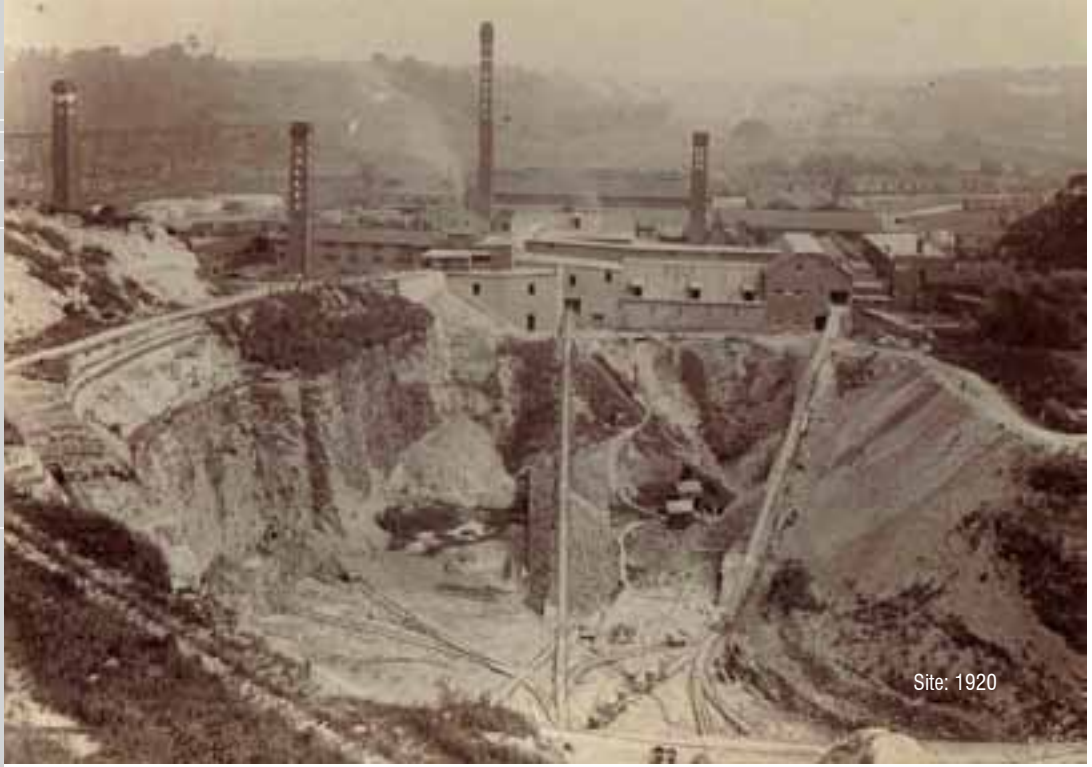


PERFORMANCE Relative to Pre-Human Development Condition



LANDSCAPE INPUTS





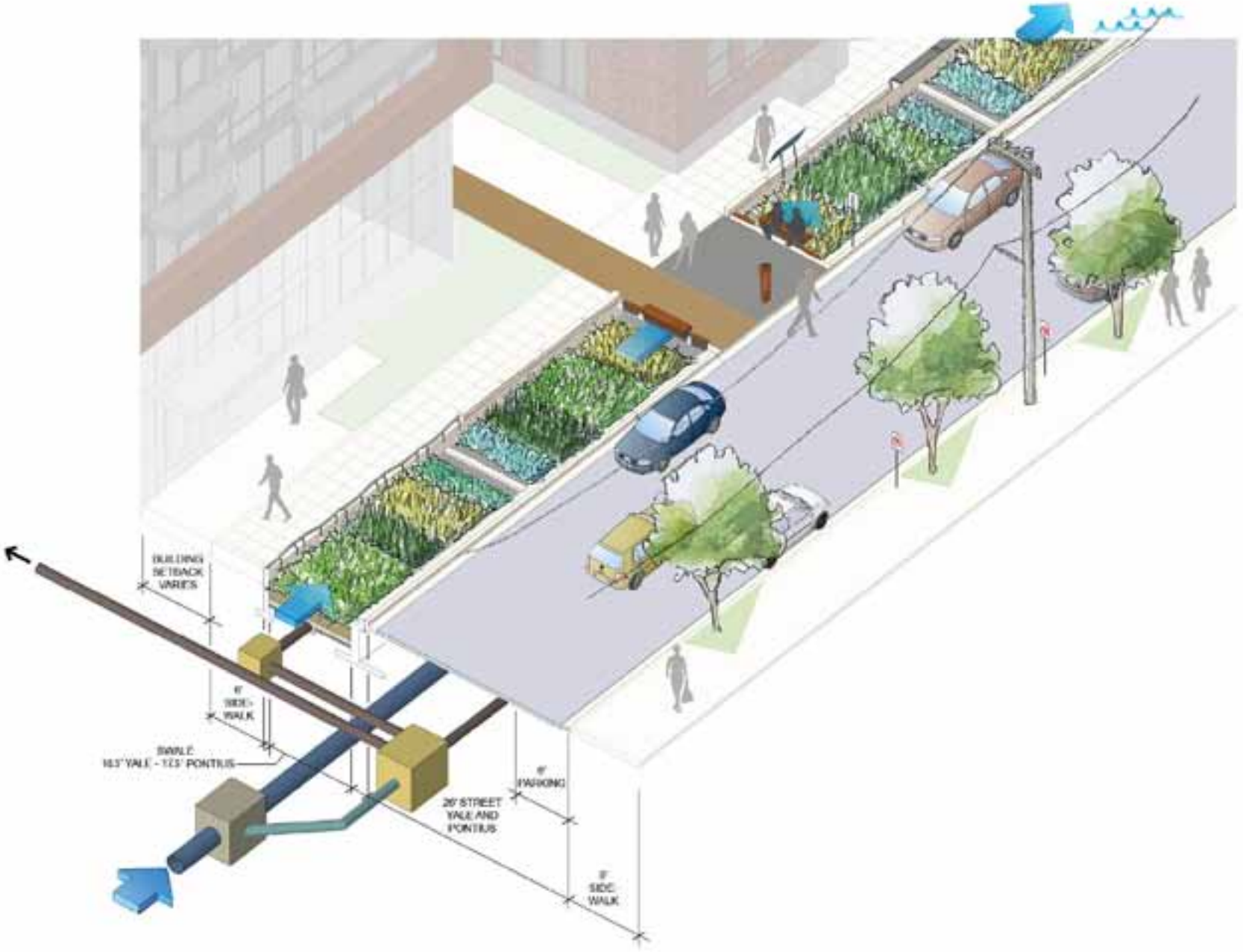
Site: 1920

Site: 2008
Image: Peter Thomson

Image: Maarten Outlet

SWALE ON YALE
STRUCTURED ECOLOGIES

Image: Phuong N. Nguyen, KPG


BUILDING SETBACK VARIES
6' SIDE WALK
SWALE 10.5' YALE - 12.5' PONTIUS
8' PARKING
26' STREET YALE AND PONTIUS
6' SIDE WALK

SWALE ON YALE Seattle WA

DESIGNERS: KPG, KPFF, Runberg, Berger Partnership (ongoing)
ECOLOGICAL SYSTEM: Wetland hydrology

Each year Seattle's Capitol Hill neighborhood sends 190 million gallons of stormwater into Lake Union. Conveyed by this barrage of water are silt, oils, heavy metals, and other pollutants that contribute to Lake Union's status as one of the most deteriorated water bodies in the city. The stormwater is currently routed through an underground pipe for direct discharge into the lake.

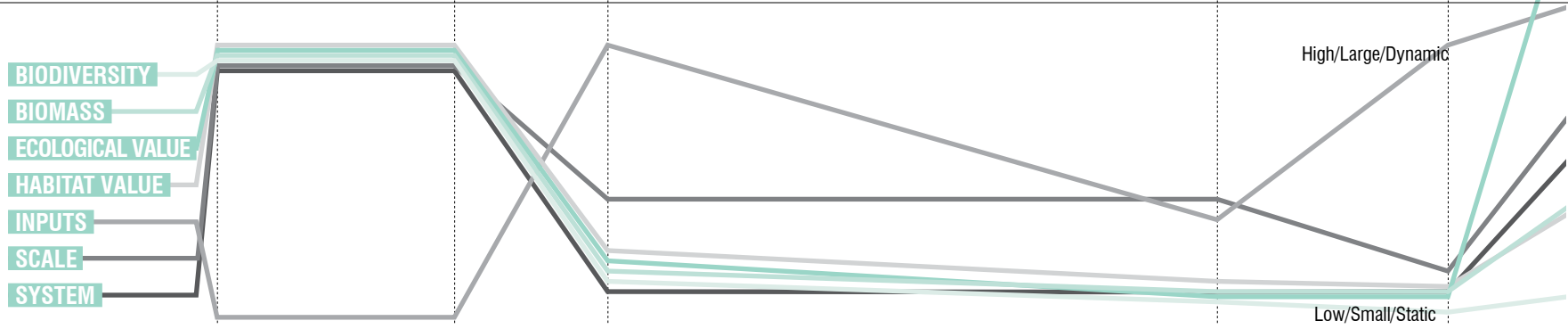
The Swale on Yale was conceived as a localized solution to the issues of water quality and conveyance in a highly developed urban neighborhood. Based on the process of wetland filtration, the swale is engineered to treat large volumes of stormwater before releasing it into Lake Union. The swale utilizes specific vegetation in a particular pattern and mechanical control structures to perform at a higher level than that found in a natural condition. Once completed, the bio-engineered swales will look very structured and constructed. Yet contrary to their appearance, they will provide high ecological value to the city.

HISTORICAL LAYERS

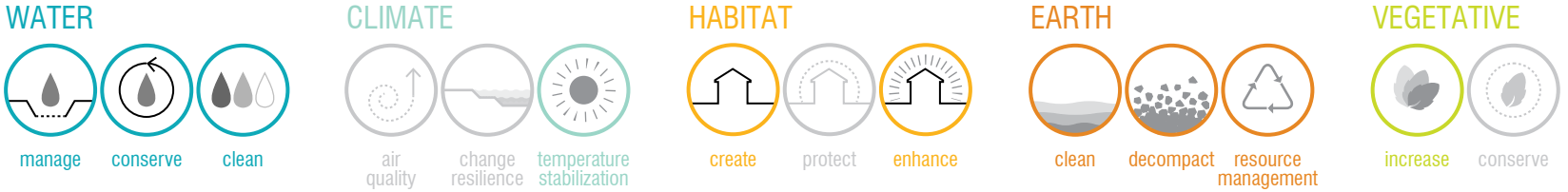
Glacial ice sheet erodes Lake Union
Alder/cedar/douglas fir forest
Logging and mills
Residential/Industrial area with large laundry block
Demolition and construction
Swale construction

~12,000 years ago
1880
1900s
1980s
2012

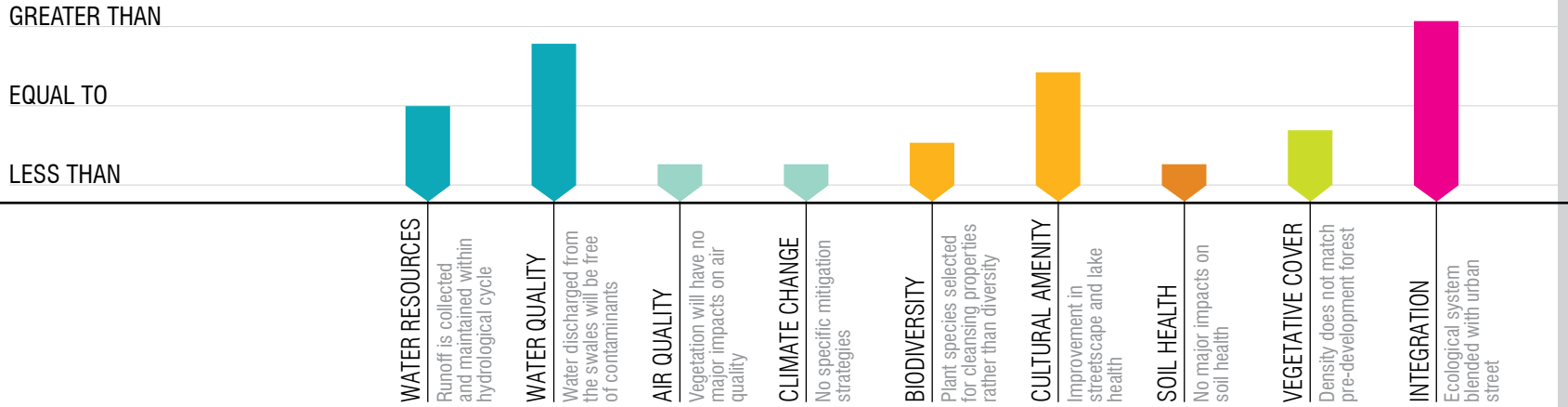
NATURAL PROCESS VALUES



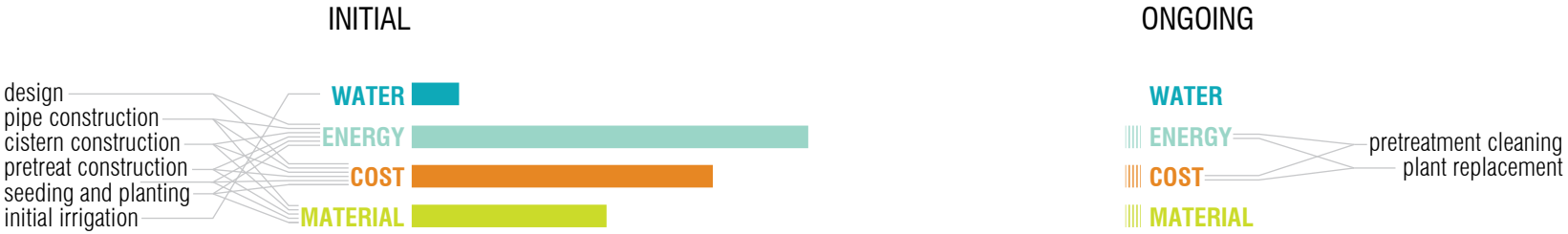
ECOLOGICAL FUNCTION



PERFORMANCE Relative to Pre-Human Development Condition



INPUTS



THE NORMAL CIRCLE
STRUCTURED ECOLOGIES

Image: Scott Shigley

THE NORMAL CIRCLE Normal IL

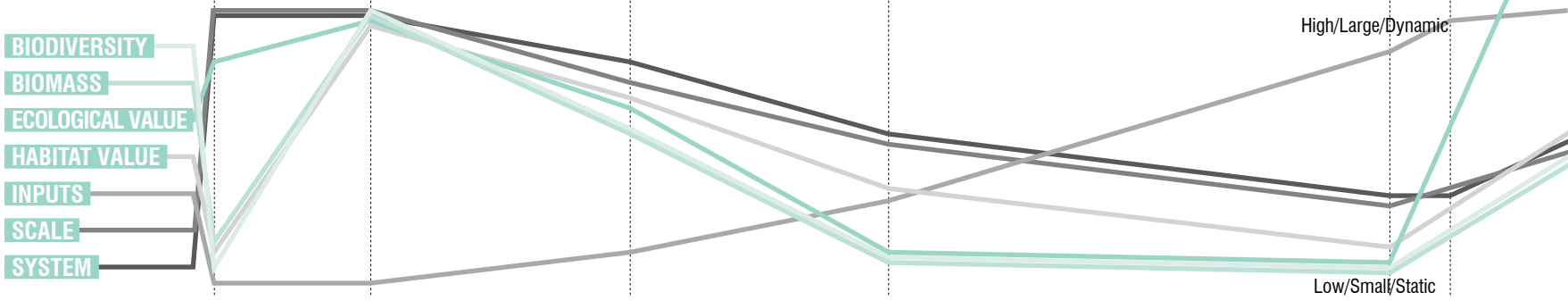
DESIGNERS: Hoerr Schaudt Landscape Architects (2010)
ECOLOGICAL SYSTEM: Wetland hydrology

Similar to the Swale on Yale, the Normal Circle utilizes mechanical systems and vegetation to achieve optimum ecological performance. Biofiltration via gravel and a vegetated bog is combined with UV filtration to treat stormwater and create a water feature that is safe for public engagement.

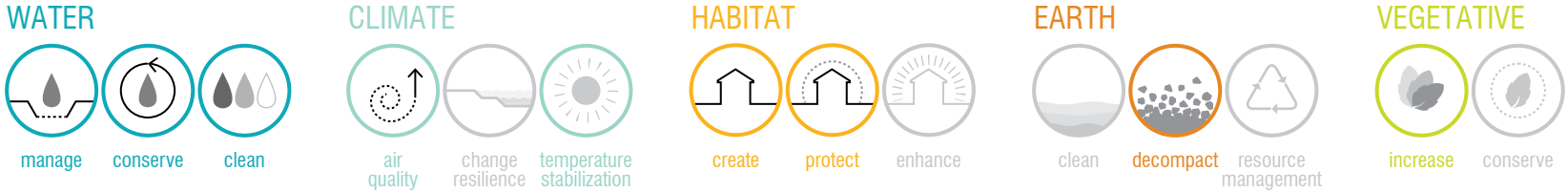
In this layered approach, the circle not only provides stormwater management but also serves as a visual amenity, community space and traffic control measure. Spaces for daily passive recreation easily convert to host festivals and markets. The interaction with water, both in the revealing of the biofiltration system and the accessibility of the water pools, reinforces the integration of ecological function and public space in the Normal Circle.

HISTORICAL LAYERS

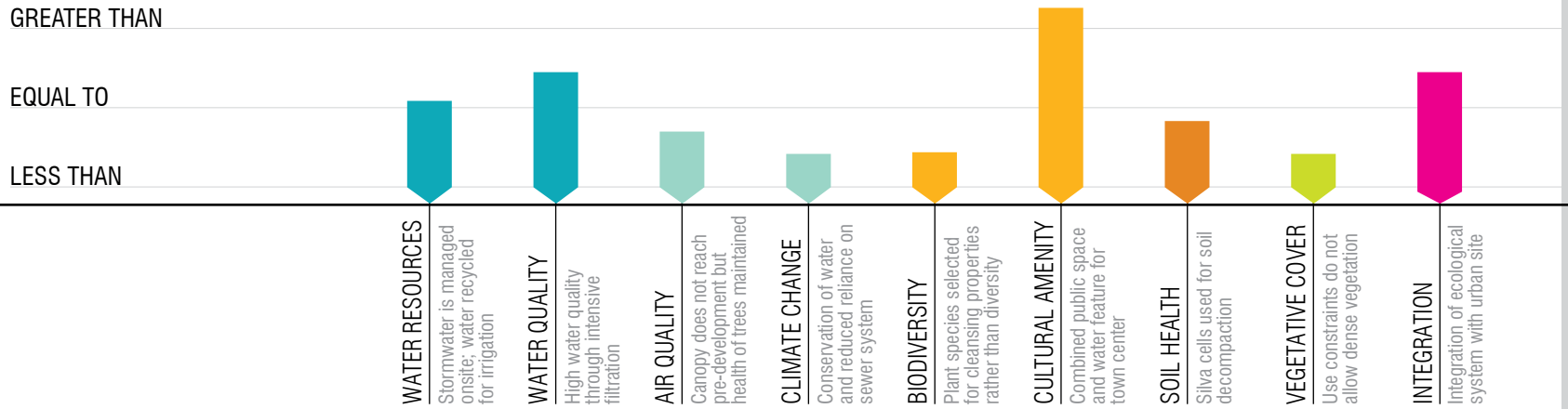
NATURAL PROCESS VALUES



ECOLOGICAL FUNCTION



PERFORMANCE Relative to Pre-Human Development Condition



INPUTS

Image: Scott Shigley

Image: Scott Shigley

SHANGHAI HOUTAN PARK
BEYOND DIAMETRICISM

Image: Kongjian Yu

02
Case Study

SHANGHAI HOUTAN PARK Shanghai China

DESIGNERS: Turenscape (2010)
ECOLOGICAL SYSTEM: Wetland hydrology, wetland ecology

The narrow, linear band that is Shanghai Houtan Park borders the Huangpu River, which is one of the most polluted and degraded ecologies in China. The site formerly housed a steel factory, shipyard, and landfill for industrial waste storage.

Design for the park was undertaken as part of Expo 2010 and had to balance the public space needs of the expo with the desire to create a healthy ecosystem and waterfront habitat. Special focus was also given to demonstrating ecological technologies.

The resultant park displays an ecological and historical narrative that is both aesthetically natural and evidently constructed. The structured arrangement of wetlands and the integration of constructed paths convey the ecological function of the park; the cleansing of water is revealed through water walls and terraced ponds.

HISTORICAL LAYERS

Alluvial plain/flats

Agriculture

Irrigation, fishing, salt extraction, trade

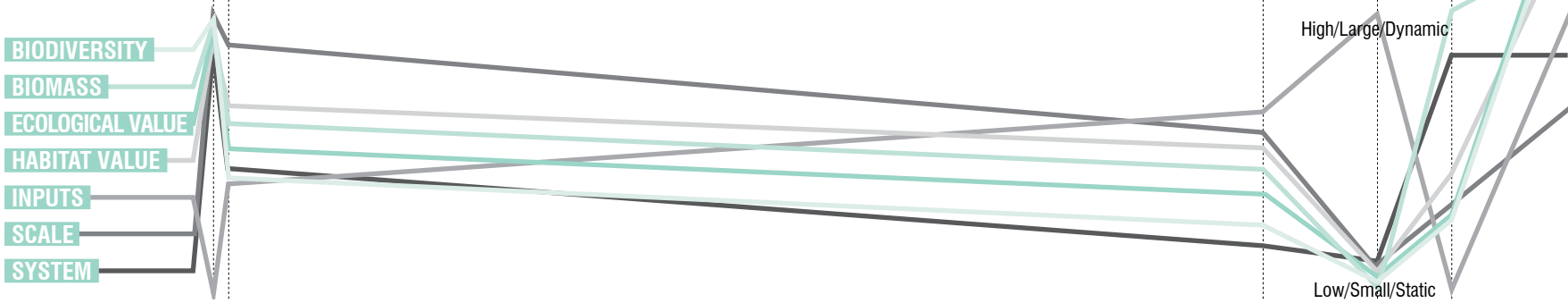
Steel factory and shipyard

Landfill/industrial waste storage/ armored river edge

Wetland park built

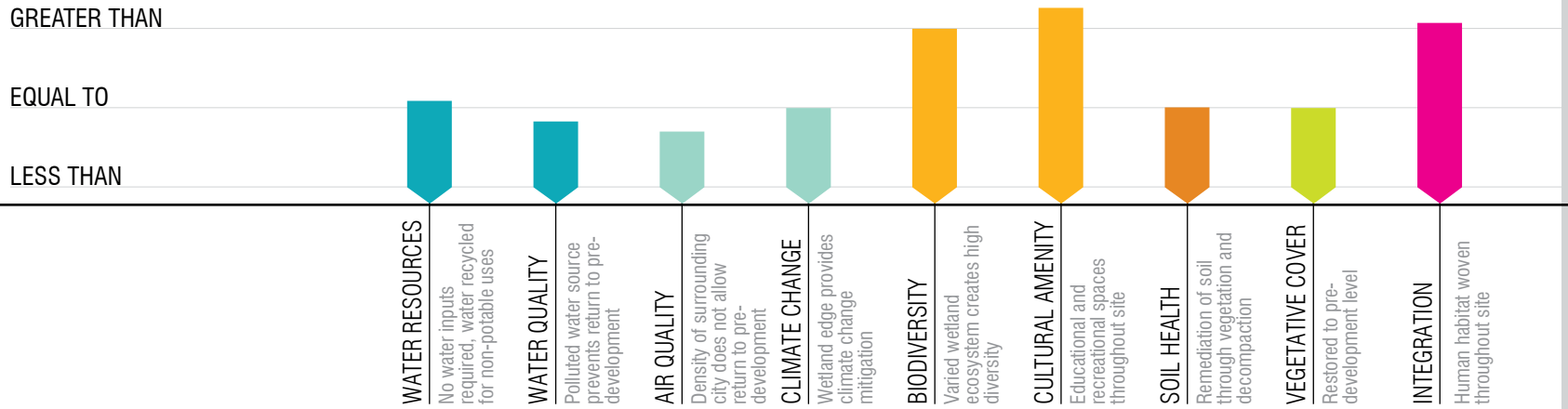
mid-1900s | 1980s | 2010

NATURAL PROCESS VALUES



ECOLOGICAL FUNCTION

PERFORMANCE Relative to Pre-Human Development Condition



INPUTS

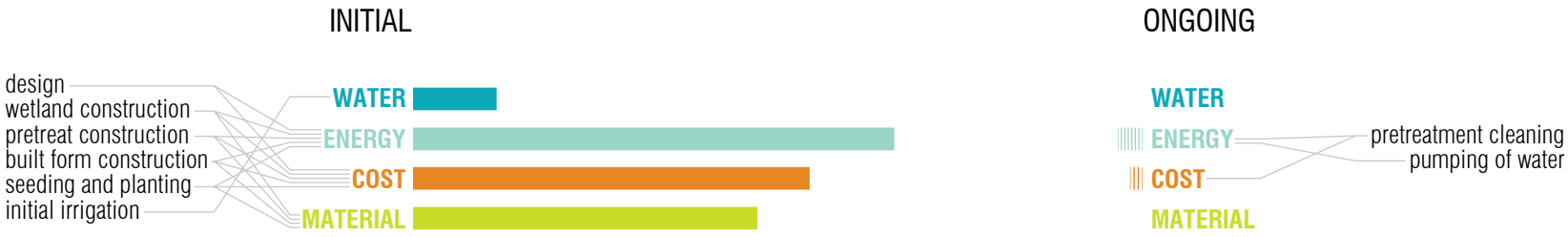


Image: Kongjian Yu

Image: Kongjian Yu

03 GOALS & ASPIRATIONS

Ecological function is the degree of performance and interaction of living organisms and their environment. The design of cities must address the needs of human and animal populations while also balancing the performance requirements of natural systems. Such systems must be recognized as integral drivers of design—the flow of water is valued alongside the flow of traffic. This connection to ecology is greater than the common perception of “sustainability”; it operates at a larger scale, reaching beyond the enhancement of pieces, to consider performance of the whole . When cities directly respond to localized site conditions (i.e. geographic features, environmental factors), the results are rich places uniquely suited for life in a specific environment.

THE CONCEPT OF CITY HAS SEPARATED HUMAN PROCESSES FROM ECOLOGY...

CONNECT THE DESIGN OF CITIES WITH ECOLOGICAL FUNCTION

The visual definition of what looks “natural” must be expanded to include the structured and constructed look of contemporary urban ecosystems. The question “What does it look like?” is no longer sufficient. Equal consideration must be given to the ecological function or performance of a place: What does it do? This approach is not stylistic. Rather it is flexible and based upon objective measures of ecological function.

WE CONSIDER NATURE OUTSIDE
OF THE URBAN REALM...

Cultivate a new aesthetic
✓ *WHAT DOES IT LOOK LIKE*
AND
✓ *WHAT DOES IT DO*

Recognizing the intertwined relationship of nature and cities is a critical first step in the sustainable health of built and un-built environments. With this understanding, urban spaces can be designed to address the needs of both: humans have a place for gathering and meaning; stormwater is given a place to gather and infiltrate; plant species have room to grow and evolve; wildlife gains critical urban habitat. As cities and urban populations continue to grow, so too does the importance of urban spaces. In response to this added pressure, urban spaces must increase their capacity for ecological and social performance.

THIS DISCONNECT DENIES A MORE INTEGRATED RELATIONSHIP WITH ECOLOGICAL FUNCTION...

Increase ecological AND social capacity of urban spaces for MAXIMUM INTEGRATED URBAN FUNCTION

04 APPLICATION POSSIBILITIES

UNNATURAL POSSIBILITIES

Exploring emergent urban ecologies

The concept of ecologically based urbanism has long been discussed in the design field and the products of that discussion have begun to take physical shape. If we accept that natural processes and cities are not mutually exclusive, then what are the possibilities? The following Application Strategies seek out opportunities for enhanced or hyper applications of ecology in the Seattle region. In the process, they present steps to restructure the relationship between the natural and unnatural realm.

“Exploring the agency of ecology: Not as a palliative but as an INSTIGATOR [!]”
(Chris Reed)

FLOATING ECOLOGIES New land for natural landscapes

URBAN APPLICATIONS: Restoration of emergent habitat, remediation of altered hydrology/polluted waterbodies, visual/educational amenity
ECOLOGICAL SYSTEM: Emergent and riparian ecologies

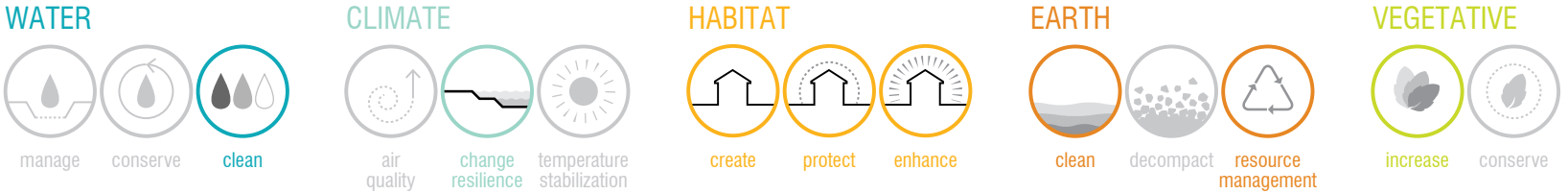
The great ecological richness of our urban lakes and shorelines is often challenged by their similarly great economic value. Historically, the economic forces have won out over ecology. Urban shorelines have been forever altered by fill, structure and pollution that result in the elimination of the richest ecological area of any water body: the emergent edge. These historic changes, along with commercial pressures, prevent large-scale restoration of the emergent edge.

With Seattle's Lake Union as a test site, we can see the impact of humankind on the altered shoreline, as well as the very unique condition of dam-controlled reverse hydrology. The reversed condition creates low winter water levels and high summer water levels, which decimates emergent and scrub/shrub vegetation that requires a typical hydrology pattern.

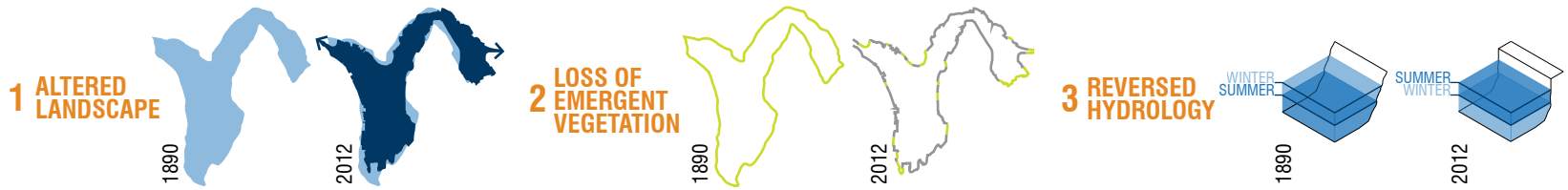
Floating Ecologies provides the opportunity to recreate the emergent edge in a most engineered and unnatural way, by floating this function in the middle of water bodies where development pressures are decreased and habitat is partially buffered from the activity of the developed shoreline.

By salvaging concrete pontoons, planting them with a range of vegetation, and locating them where they provide the most ecological benefit, Floating Ecologies provides the ecological functions lost in the development of the shoreline.

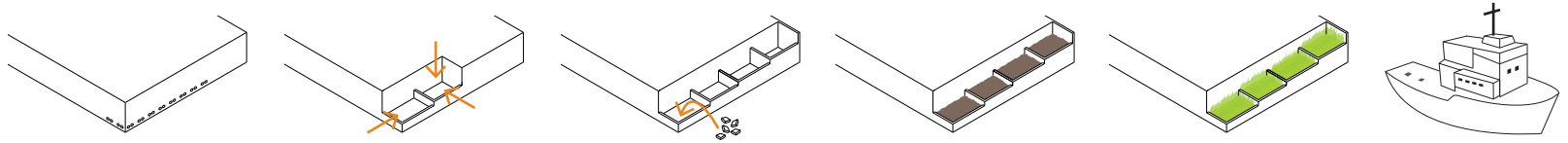
ECOLOGICAL FUNCTION



WHY?



HOW?



1/ PUNCTURE

2/ ERODE
specific edges and cells

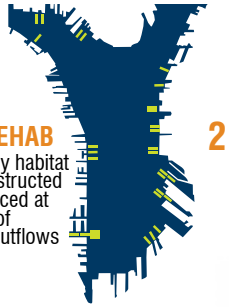
3/ RE-USE
deconstructed concrete as ballast and fill

4/ FILL
variably with soil or buoyancy cells

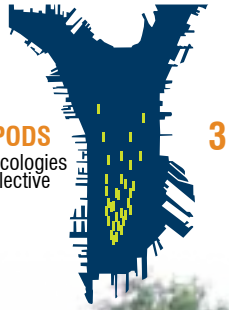
5/ VEGETATE

6/ LOCATE
creating shoal, reef, beach, emergent, or upland ecologies

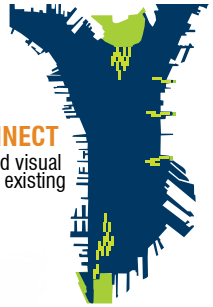
TYPOLOGIES



1 EDGE REHAB
Provide key habitat along constructed edges; placed at locations of pollution outflows

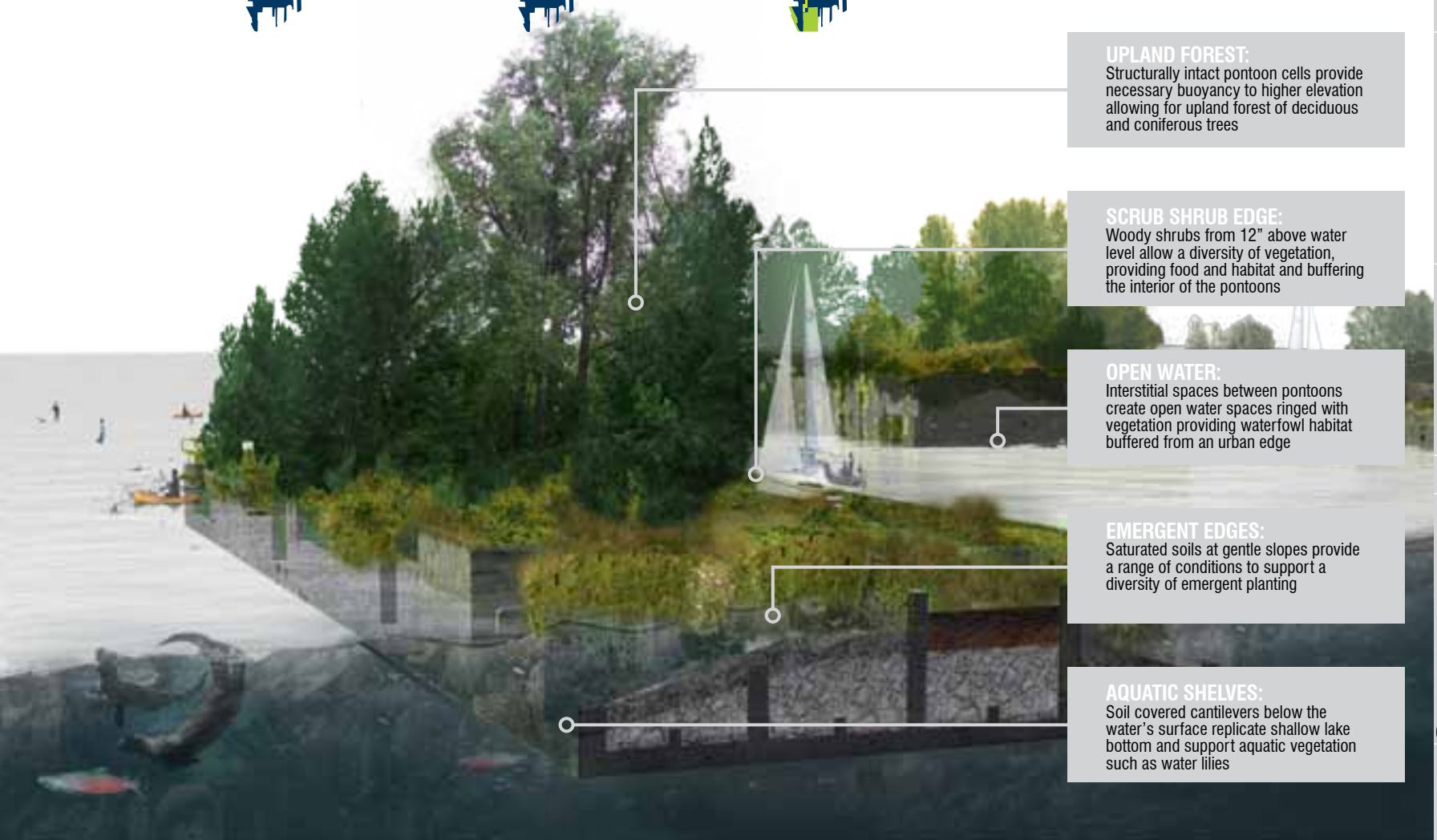


2 HABITAT PODS
Assembled ecologies providing collective habitat value



3 PARK CONNECT
Ecological and visual extensions of existing park space

Floating Ecologies assures that emergent, aquatic and upland vegetation, all notoriously dependent upon hydrology, can remain at required levels of water inundation no matter how the lake level rises or falls. This solution is developed to be scalable, ranging from repurposed old canoes and kayaks, to docks and salvaged highway pontoons from the highway 520 floating bridge.



UPLAND FOREST:
Structurally intact pontoon cells provide necessary buoyancy to higher elevation allowing for upland forest of deciduous and coniferous trees

SCRUB SHRUB EDGE:
Woody shrubs from 12” above water level allow a diversity of vegetation, providing food and habitat and buffering the interior of the pontoons

OPEN WATER:
Interstitial spaces between pontoons create open water spaces ringed with vegetation providing waterfowl habitat buffered from an urban edge

EMERGENT EDGES:
Saturated soils at gentle slopes provide a range of conditions to support a diversity of emergent planting

AQUATIC SHELVES:
Soil covered cantilevers below the water’s surface replicate shallow lake bottom and support aquatic vegetation such as water lilies

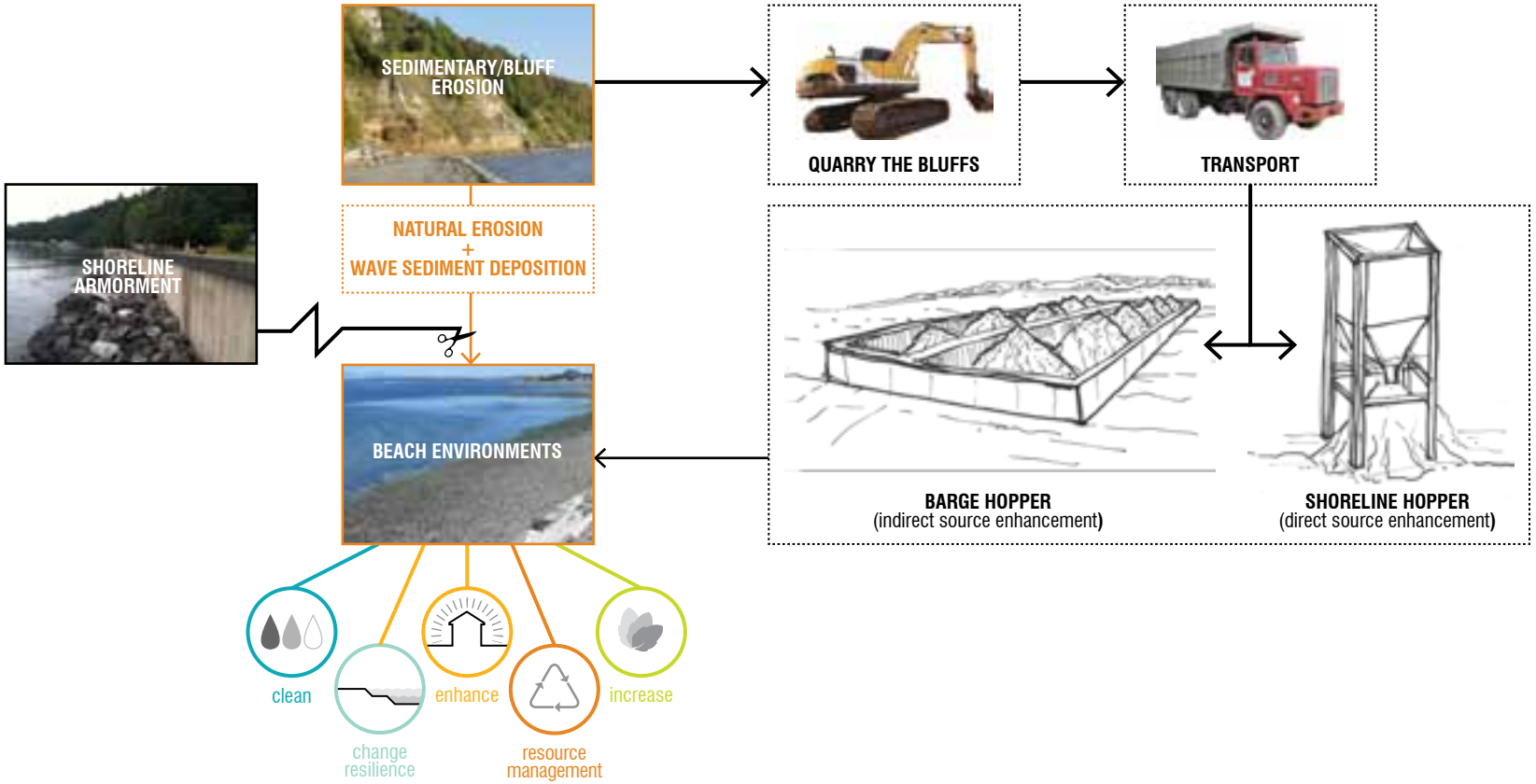
SEDIMENT HOPPER Feed the beach!

URBAN APPLICATIONS: Restoration of emergent habitat, remediation of altered hydrology/polluted waterbodies, visual/educational amenity
ECOLOGICAL SYSTEM: Emergent and riparian ecologies

Shoreline Erosion is typically viewed as a negative process: it damages property and interferes with navigation. However, when viewed as part of a larger natural system, erosion is a critical element in shoreline ecosystems. As we have armored our shorelines to protect property and allow maritime activity, we have starved shoreline ecosystems of the sediment supply critical to their health. Today nearly 30% of Puget Sound's shoreline is armored from the erosive factors that are necessary to produce and sustain shoreline ecologies, disrupting the natural process of net-shore drift. As shorelines continue to develop, human interventions will become a necessary element for the sustained beach ecologies that provide life and habitat vital to all the communities (flora, fauna and human habitats).

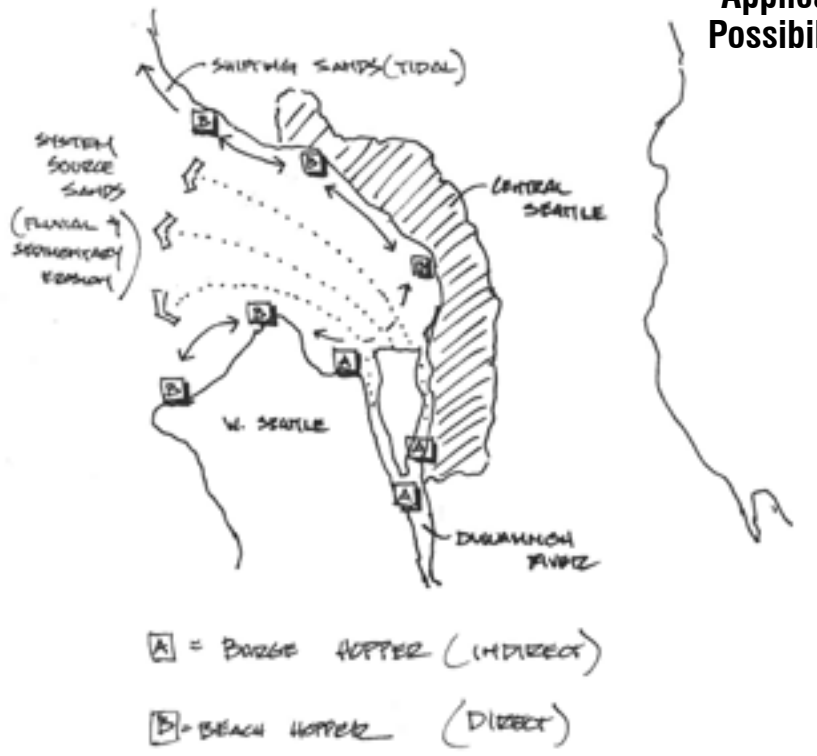
Sediment hoppers replicate natural erosion, traditionally fed by bluffs, river sediment and mudflats, with mechanically dispensed sediments that can once again provide a steady stream of sediment supply to shoreline habitats. These hoppers seek not to obscure but rather to celebrate the unnatural intervention to restore natural function. While opportunities to enhance urban shorelines are typically limited to small stretches, the resupplying of sediment enhances the ecology of the whole water body and extends beyond the sites where hoppers are located.

The resupply of sediments enhances critical near-shore habitat for fish and wildlife populations and also feeds and affects many other ecological systems. Restoring sediment supply to beaches also provides an adaptable and self-regulating system for the management of sea level rise by mitigating wave action and building new shoreline.



In order to resupply the natural inputs necessary to maintain beach ecologies, we propose the introduction of sediment hoppers to Puget Sound's most urban beach ecology, Elliott Bay. Our proposal is to supplement the net-shore drift in two parts:

1. Barge Hoppers located in the Duwamish River, the forever altered and managed river that once fed the bay. These barges can provide controlled dispersal of sediments based on ideal tidal patterns (outflowing tides) when currents are strong enough to deliver sediment to the bay, providing long-shore drift sediments normally transported along the coast, while avoiding slack tides or incoming tides when sediment might otherwise settle and clog maritime channels.
2. Bluff Hoppers placed at strategic locations along the bay on existing or proposed beach environments will provide sediment for wave-induced beach drift, working with the tides to replenish the supply of sediments once supplied by bluffs that ringed the bay, but have long since been altered, starving the bay of their supply of sediment.



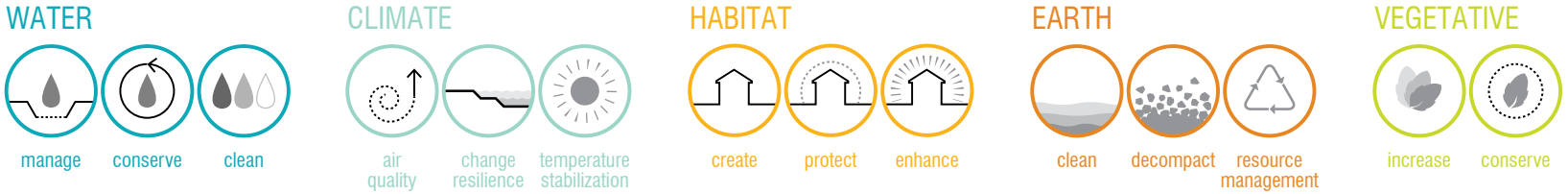
ELWHA RIVER RESTORATION TRAIL Honoring memory

APPLICATIONS: Interpreting large-scale ecological interventions
INTERPRETIVE SYSTEM: Revealing massively scaled alterations of landscape impacting and (re)creating ecological systems

The removal of two dams that had blocked the Elwha River on Washington's Olympic Peninsula for nearly a century is the biggest dam removal project ever. The over 300 million dollar effort illustrates a watershed event in our society's shifting values toward nature and ecology. The Elwha River restoration is a rare and welcomed example of ecological strategies driving a project to its inevitable success. Conversely, what the Elwha River restoration lacks, and what intrigues us, is the cultural story of the damming and undamming of the river.

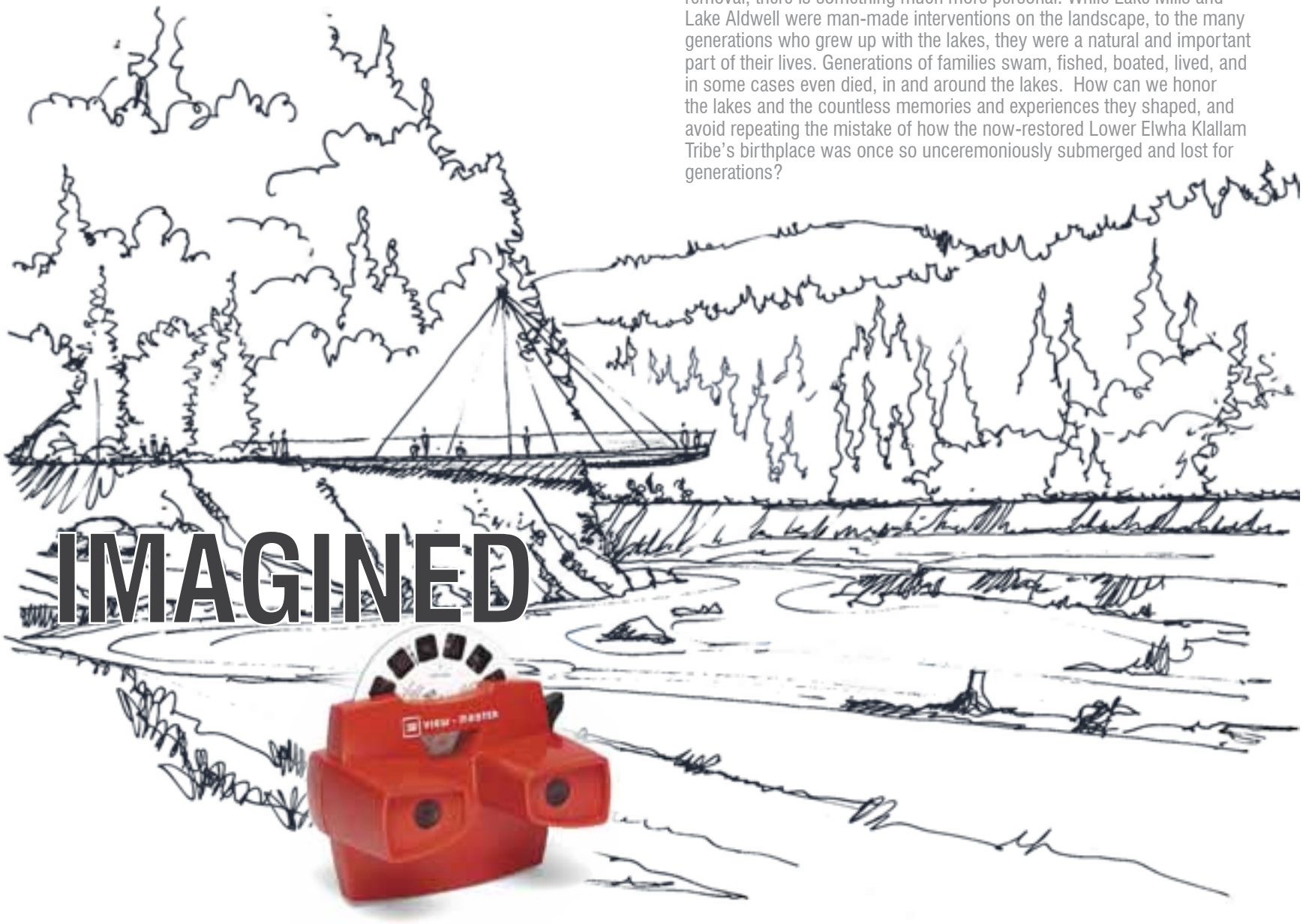
Lake Mills and Lake Aldwell are now gone. The otherworldly landscape that has emerged from dropping waters—silt deltas with constantly shifting rivulets and streams, emerging stumps of logged ancient forests, and the relic "lake ring" that so strikingly marks the lake's high water mark—all will be visibly short lived. In a very short period of time, just years, vegetation both naturally occurring and as part of planned restoration efforts, will reclaim the lake bottom. The dramatic story of transition will be lost to the untrained eye. It is important for visitors who will one day come to visit this seemingly natural watershed to understand the landscape they see is one that has been unnaturally manipulated by man over time.

ECOLOGICAL FUNCTION



Application Possibilities

Beyond the ecological, societal and historical interpretations of the dam removal, there is something much more personal. While Lake Mills and Lake Aldwell were man-made interventions on the landscape, to the many generations who grew up with the lakes, they were a natural and important part of their lives. Generations of families swam, fished, boated, lived, and in some cases even died, in and around the lakes. How can we honor the lakes and the countless memories and experiences they shaped, and avoid repeating the mistake of how the now-restored Lower Elwha Klallam Tribe's birthplace was once so unceremoniously submerged and lost for generations?



ELWHA RIVER RESTORATION TRAIL Honoring memory

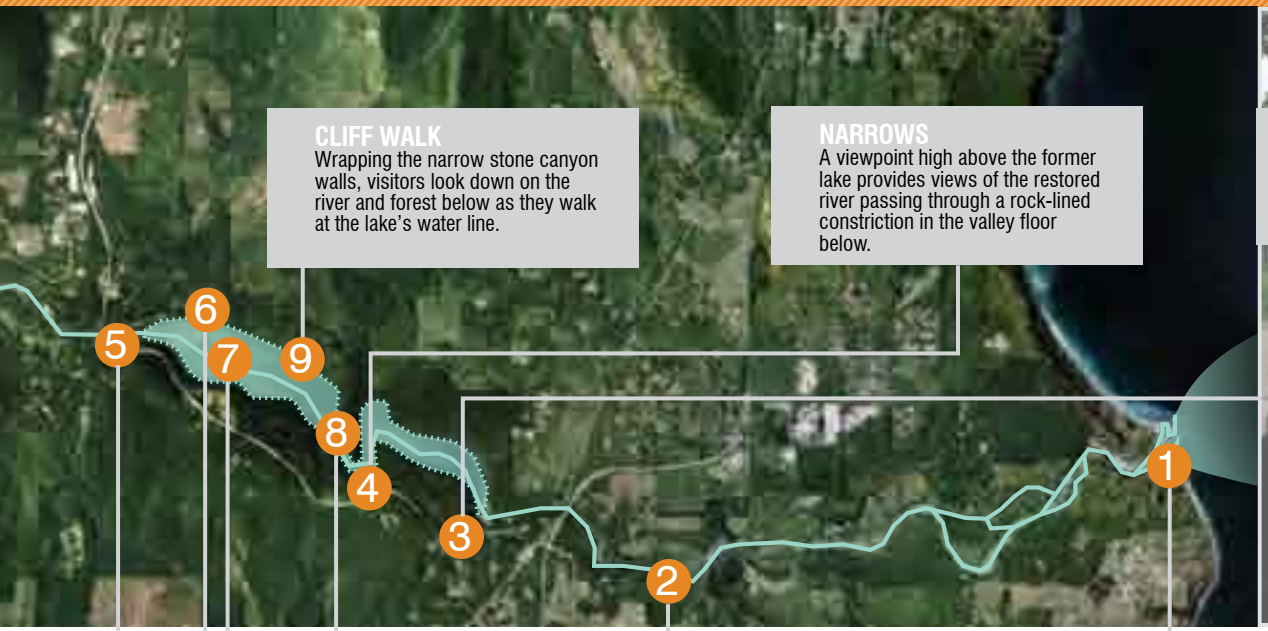
SPILLWAY PROW
Moving to Lake Mills, the trail's most dramatic element allows visitors to walk on the only remaining piece of the Glines Canyon Dam and look down nearly 200 feet at the river and forest below.

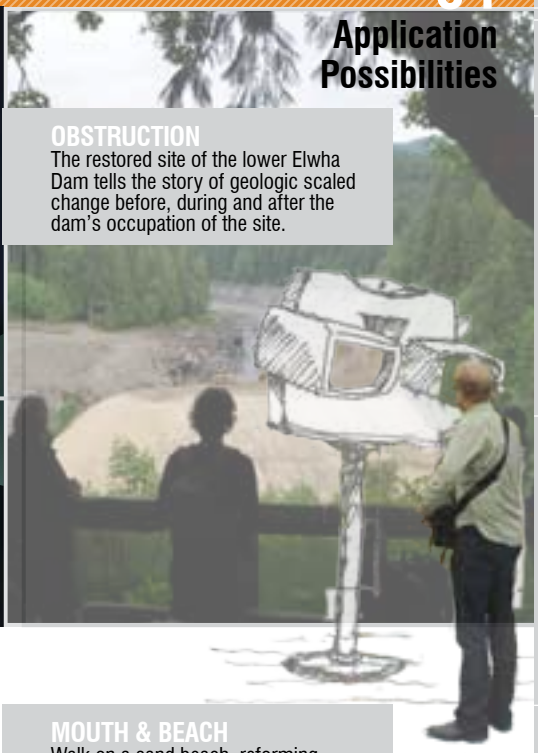
GLINES CANYON DAM:

Where the top of the dam once rose above the rim of the canyon, all that remains is the spillway gates and structure topped with a narrow catwalk. This catwalk in its existing state is a striking site and is no doubt a powerful place; it should be preserved and accessible. Beyond keeping the dramatic perch, what interventions can be added to enhance the experience or tell the story of man's manipulation of the Elwha? It's easy to imagine this spot becoming a dramatic destination on the Olympic Peninsula for decades to come, perhaps the reward at the end of a short (or long!) hiking trail that interprets the human impact.

ELWHA DAM:

The legendary birthplace of the Lower Elwha Klallam Tribe, site of the gangly and low-slung Lower Elwha Dam that stretched across a canyon and larger valley, is already well on its way to being a fully vegetated restored site. But must this engineered restoration be completed in a natural aesthetic? What if the restored landscape acknowledges man's interventions? Geometric planting of linear offset species could mark where the dam once stood across the valley. Over time this marking will become increasingly disguised and absorbed by nature.





CLIFF WALK
Wrapping the narrow stone canyon walls, visitors look down on the river and forest below as they walk at the lake's water line.

NARROWS
A viewpoint high above the former lake provides views of the restored river passing through a rock-lined constriction in the valley floor below.

OBSTRUCTION
The restored site of the lower Elwha Dam tells the story of geologic scaled change before, during and after the dam's occupation of the site.

ANCIENT STUMP GARDEN
Old growth stumps that were logged and submerged are again exposed with art interventions to tell the history of the site.

LAKE TOWER
In the middle of the silt plane that was once the bottom of the lake, a lookout tower allows visitors to climb to the "surface" of the lake and overlook the forest taking hold around them.

BOAT LAUNCH
The lake gone, the boat launch invites visitors to walk at the former lake level.

CROSSING
Passing drivers crossing what was once the upper reaches of the lake now see canoes seemingly floating in mid-air, marking high water of the former lake.

MOUTH & BEACH
Walk on a sand beach, reforming for the first time in nearly 100 years, replacing the eroded cobbled beach once starved of the river's sediment.

LOWER ELWHA
The trail connects the Elwha Klallam Tribe to the river and its restoration.

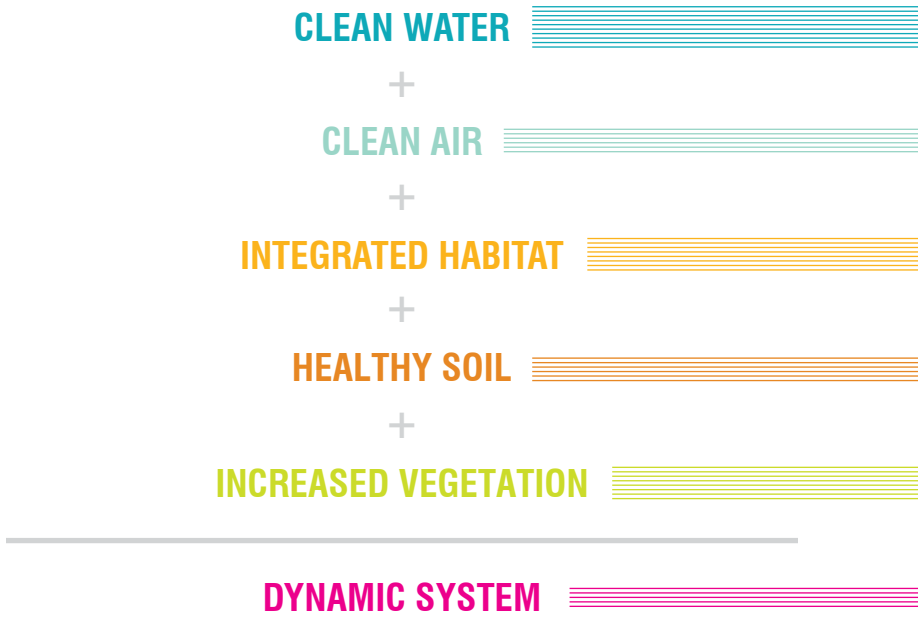
The trail helps visitors who will one day come to visit this seemingly natural watershed understand that the landscape they see is one that has been un-naturally manipulated by man over time. The trail also celebrates generations of families, who swam, fished, boated, lived, and in some cases even died, in and around the lakes. The trail allows us to honor the absent lakes and the countless memories and experiences they shaped, and avoid repeating the mistake of how the now-restored Lower Elwha Klallam Tribe's birthplace was once so unceremoniously submerged and lost for generations.

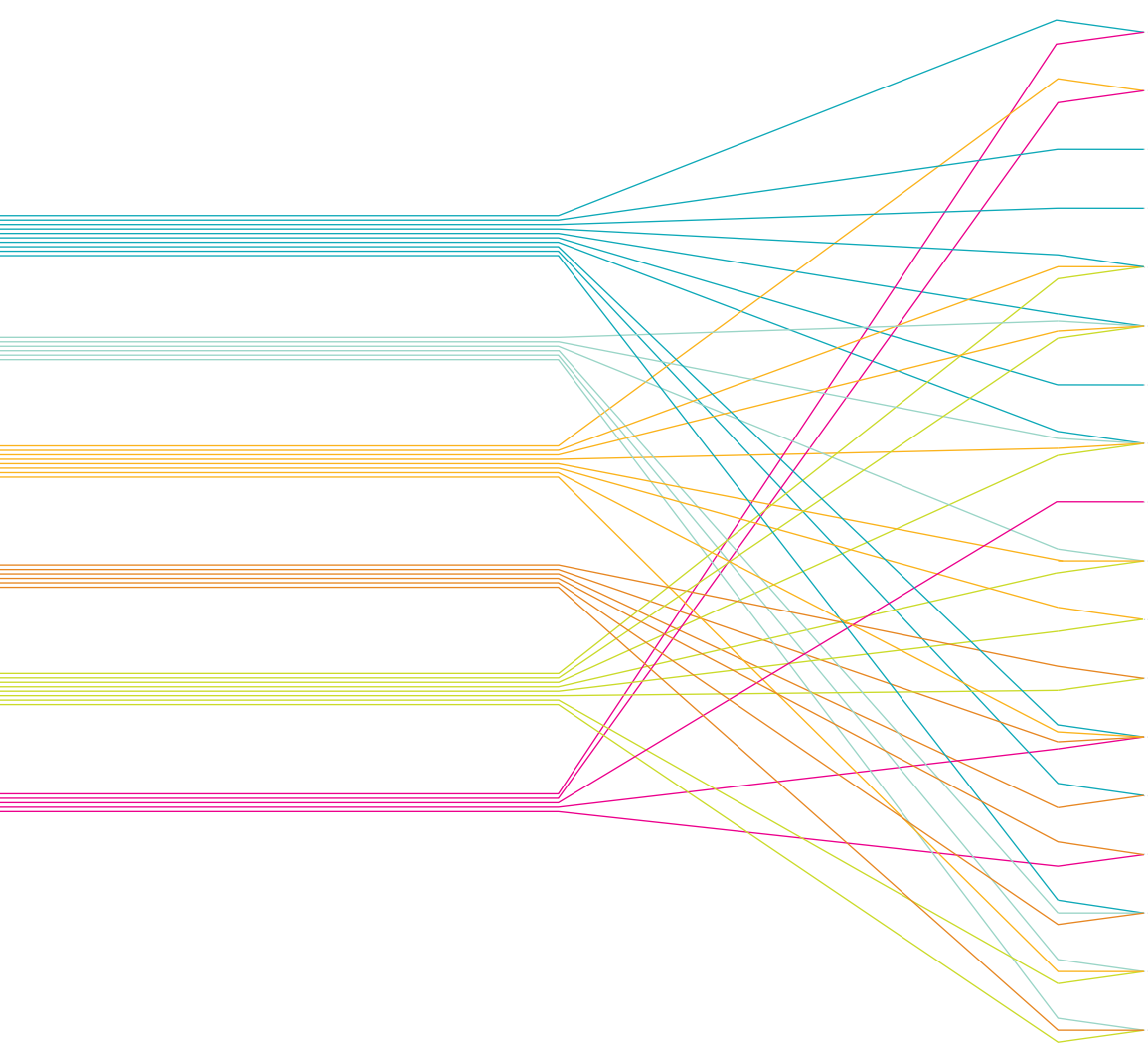
05 STRATEGIES FOR URBAN ECOLOGY

ACHIEVING FUNCTIONAL URBAN ECOLOGIES

Unnatural strategies for natural processes

The construction of a functioning ecology in the urban realm requires a systems-based approach. The following section presents a toolkit of methods for jump-starting a healthy system that is composed of key components: clean water, clean air, an integrated habitat, healthy soil and vegetation. A resultant dynamic system is the product of integrating and layering a variety of systems from a vehicular right-of-way to a connected pollinator habitat. These strategies are a collection of ideas that can be expanded, joined, layered, and sliced together to create site-specific urban ecologies.





ADAPTATION PALETTES

ADAPTIVE MANAGEMENT

BIOFILTRATION

- Canal Sponge
- Floating Wetlands

ENVELOPE ECOLOGIES

- Blue Skins
- Green Skins

FLOOD RESILIENCE

GREEN NETWORKS

- Habitat Connectors

LAND IMPRINTING

MATERIAL CHOICE

PHYTOREMEDIATION

POROUS GROUND COVER

SKINNY STREETS

TEMPORARY VEGETATIVE COVER

TREE HEALTH SYSTEMS

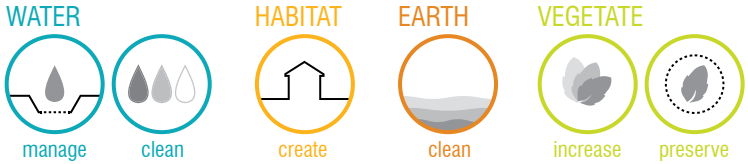
ADAPTIVE PALETTES

DESIGN: Turenscape

WHAT:
Depressions are constructed at varying depths which can both collect varying amounts of stormwater and fill with groundwater depending on elevation. Water both infiltrates via the depressions and creates hospitable soil for vegetation growth. Planting can occur via seed dispersal, responding to the ecological conditions of the surrounding area, or be planted with specific species, creating habitat as required. Ecologies naturally evolve depending on moisture conditions of each palette.

NATURAL PROCESS:
Wetland succession and topography

ECOLOGICAL FUNCTION



POSSIBLE URBAN ECOLOGIES:
- Palette swales
- Front yard wetlands
- Pocket park depression typologies
- Palette parkscapes

Tianjin Qiaoyuan Wetland Park [Tianjin, Turenscape]

Image: Turenscape

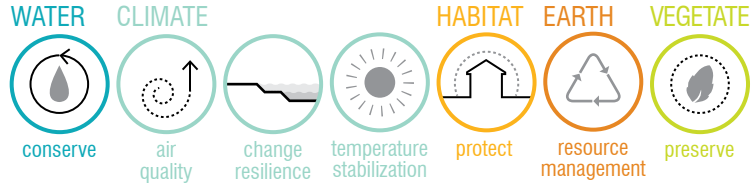
ADAPTIVE MANAGEMENT

DESIGN: not applicable

WHAT:
Management that continues through and adapts to ecological and social changes rather than static, one-time decision making. Changes in water and air quality, temperature, water levels, climate, and culture are anticipated or adapted to throughout the lifetime of ecological space.

NATURAL PROCESS:
Dynamic systems

ECOLOGICAL FUNCTION



POSSIBLE URBAN ECOLOGIES:
- User generated public space
- Adaptable parks

Downsview Park proposal [Toronto, James Corner and Stan Allen Team]

Image: James Corner and Stan Allen team

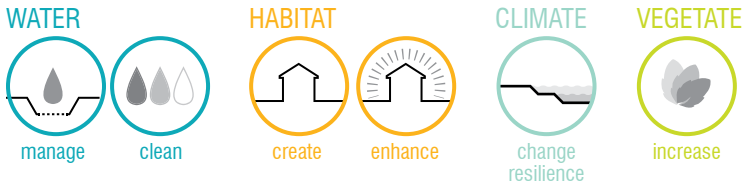
BIOFILTRATION

DESIGN: not applicable

WHAT:
A technique to control and remove pollution using vegetation and soil to capture and degrade pollutants such as chemicals, bacteria, and silt. Biofiltration is applicable to a number of scales and configurations and can act as a renewable form of pollution management.

NATURAL PROCESS:
Wetlands, vegetated areas of watershed, uncompacted soils

ECOLOGICAL FUNCTION



POSSIBLE URBAN ECOLOGIES:
- Filtration roofs and walls
- Bioswales
- Treatment ponds and fountains
- Living machines

Lemieux Library [Seattle, Berger Partnership]

Image: Jasmeen Bains

CANAL SPONGE

DESIGN: dlandstudio

WHAT:
Extreme biofiltration of sewer drainage at point of outflow into water body. The concentration and design of filtration sequence allows for a small area of intense cleansing combined with public amenity.

Gowanus Canal Sponge [Brooklyn, dlandstudio]

Image: dlandstudio

FLOATING WETLANDS

DESIGN: not applicable

WHAT:
Floating mat of emergent vegetation that can clean water and provide vital aquatic and wetland habitat. The application of floating wetlands can also protect and reverse degradation of endangered marshes and act as a visual amenity and education tool in highly urbanized waterways.

Lincoln Park Floating Garden [Chicago, Moore Landscapes]

Image: dlandstudio

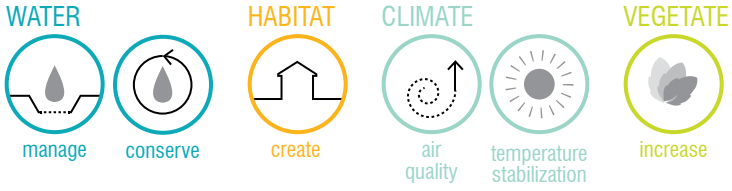
ENVELOPE ECOLOGIES

GREEN SKINS

WHAT:
Vertical and horizontal planting systems that can be free-standing or attached to building walls and roofs. Envelopes can act as visual amenities, habitat, temperature reducers, productive systems and boasters of air quality. As a city-wide system, green skins can create an ecological network.

NATURAL PROCESS:
Restoration of natural ground cover

ECOLOGICAL FUNCTION:



POSSIBLE URBAN ECOLOGIES:
- Green walls
- Green roofs
- Fire escape ecologies
- Retaining wall ecologies
- Bus stop ecologies

MFO Park [Zurich, Raderschal Landschaftsarchitekten AG]

Image: hayal oezhan via Flickr, Creative Commons License

BLUE SKINS

WHAT:
Vertical and horizontal systems of water management, conservation and cleansing. This strategy maximizes space in the city while prioritizing water health.

NATURAL PROCESS:
Watershed processes (streams, tree canopy interception, wetlands)

ECOLOGICAL FUNCTION:

POSSIBLE URBAN ECOLOGIES:
- Wetland roofs
- Balcony bogs
- Water collection walls

Bullitt Center wetland roof [Seattle, Berger Partnership / Miller Hull]

Image: Miller Hull

FLOOD RESILIENCE

DESIGN: not applicable

WHAT:
Integration of site-specific flooding plains, earthen levees, vegetation choice, and/or water level rise allowance structures as a replacement for traditional waterfront armoring. Strategic urban planning can take water level rise and extreme weather conditions into consideration, creating a sustainable solution to coastal settlement; public space design can allow different and increased programming depending on water level.

NATURAL PROCESS:
Natural water systems

ECOLOGICAL FUNCTION

POSSIBLE URBAN ECOLOGIES:
- Flood plain parks
- Integration of waterfront flooding
- Integration of shoreline ecology with human use and habitat

Dwyer Canal Revitalization [New Orleans, Spackman Mossop Michaels]

Image: SMM

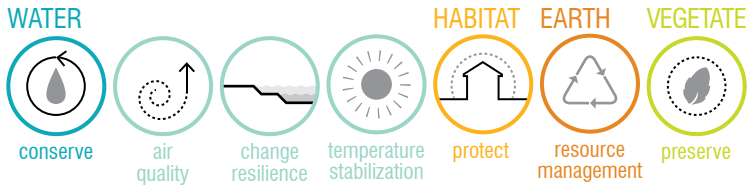
GREEN NETWORKS

DESIGN: not applicable

WHAT:
Strategic connection of larger habitat areas with high vegetative density corridors. As networks are formed, a habitat-net can be created over the city, allowing for a well connected habitat for wildlife and a recreational and health amenity for humans. General environmental health would be amplified with increased vegetation and urban-integrated ecologies. These green networks can also be layered into infrastructure and built form.

NATURAL PROCESS:
Ecological and possible hydrological processes

ECOLOGICAL FUNCTION



POSSIBLE URBAN ECOLOGIES:
- Green strip pathways
- Boulevard connectors
- Urban canopy networks

Pollinator Pathway [Seattle, Sarah Bergmann]

Image: Jasmeen Bains

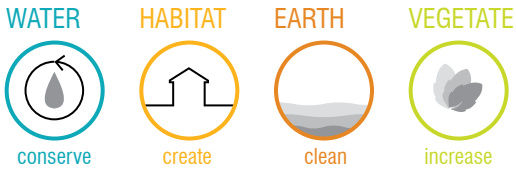
LAND IMPRINTING

DESIGN: Various; Dixon Machine by Dr. Richard Dixon

WHAT:
Low-input method of imprinting arid land or degraded soil with depressions to allow rapid, large-scale vegetation growth. Depressions collect rainfall, creating hospitable environments for seed growth. Habitat and more intensive vegetation is created as succession advances.

NATURAL PROCESS:
Natural succession

ECOLOGICAL FUNCTION



POSSIBLE URBAN ECOLOGIES:
- Abandoned lot eco-parks

Land Imprinting
Image: Dixon

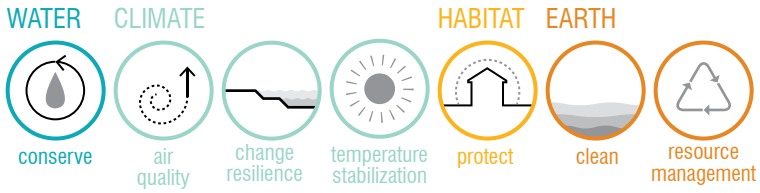
MATERIAL CHOICE

DESIGN: not applicable

WHAT:
Material selection based on site-specificity, fabrication methods, and locality. Plants and construction are chosen on the basis of clean construction and clean degradation as well as a sensitivity toward native ecologies and climate change.

NATURAL PROCESS:
Natural ecosystem creation

ECOLOGICAL FUNCTION



POSSIBLE URBAN ECOLOGIES:
- Applicable to any site

Navy Yard recycled materials [Philadelphia, D.I.R.T. Studio]
Image: Brad McGuirt

PHYTOREMEDIATION

DESIGN: not applicable

WHAT:
Removal of toxic substances from soil and water using specific planting that are able to uptake heavy metals and pathogens.

NATURAL PROCESS:
Not applicable

ECOLOGICAL FUNCTION

POSSIBLE URBAN ECOLOGIES:
- Re-colonization of industrial and Superfund sites

Landschaftspark Duisburg-Nord [Duisburg Nord, Peter Latz and Partners]

Image: Holger Loiseau via Flickr, Creative Commons License

POROUS GROUND COVER

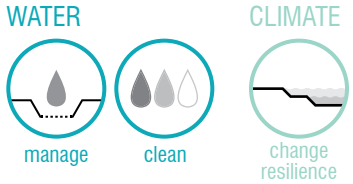
DESIGN: not applicable

WHAT:
Ground cover that allows the infiltration of water. This may take the form of porous asphalt or interlocking pavers. Soil type must be taken into consideration in terms of permeability.

Porous ground cover allows ground water recharge and runoff cleansing, and can take pressure off traditional sewer infrastructure.

NATURAL PROCESS:
Natural soil permeability within the hydrological cycle

ECOLOGICAL FUNCTION



POSSIBLE URBAN ECOLOGIES:
- Porous sidewalks, driveways, parking lots, lanes, streets, plazas, etc.

Porous concrete [Seattle, Highpoint]

Image: Michael Wolcott, Flickr

SKINNY STREETS

DESIGN: Dan Burden and others

WHAT:
Narrowing street widths to create more pedestrian, habitat and/or storm-water management space. Skinny streets minimize impermeable asphalt while increasing permeable, productive green space within the public right-of-way.

NATURAL PROCESS:
Natural ground cover

ECOLOGICAL FUNCTION

POSSIBLE URBAN ECOLOGIES:
- Greenways and habitat connectors
- Productive agriculture green strips
- Streetside parks
- Swales
- Increased bicycle network

Main Street [Greensburg, BNIM]

Image: BNIM and Farshid Assassi, asla.org

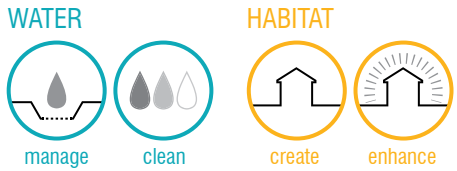
STREAM FREEDOM

DESIGN: not applicable

WHAT:
Daylighting and de-channelizing urban streams, reintroducing aquatic and riparian habitats and natural filtration of runoff and stormwater. Instead of burying water movement in expensive infrastructure, daylighting and/or de-channelization integrates human needs with wildlife habitat and water health, slowing water flow and decreasing pollution.

NATURAL PROCESS:
Natural hydrological processes

ECOLOGICAL FUNCTION



POSSIBLE URBAN ECOLOGIES:
- Streetside swales
- Front yard streams
- Pocket park daylighting networks

The Dell [University of Virginia, Nelson Byrd Woltz Landscape]

Image: Nelson Byrd Woltz Landscape

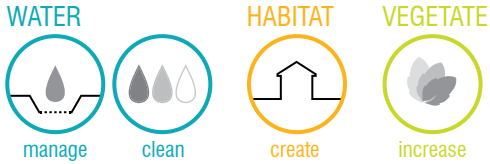
TEMPORARY VEGETATIVE COVER

DESIGN: Freecell

WHAT:
Seed and soil filled rolls of biodegradable mesh. Rolls can be rapidly deployed as temporary installations on roofs, walls, abandoned lots and guerilla gardening spaces or more permanently if allowed to root and grow. The temporary cover can also act as stormwater management, erosion control, habitat creation or protection in degraded areas, as a visual and educational amenity.

NATURAL PROCESS:
Replication of grassland processes

ECOLOGICAL FUNCTION



POSSIBLE URBAN ECOLOGIES:
- Temporary installations
- Building envelope covers
- Abandoned lot covers
- Stalled construction project installations

Earth Cinch [Brooklyn, Freecell]

Image: Freecell

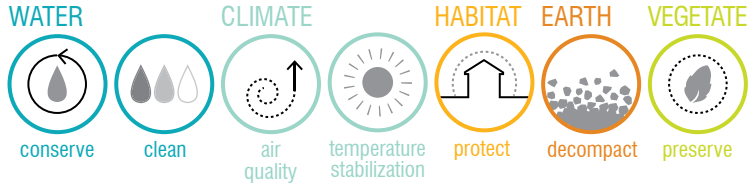
TREE HEALTH SYSTEMS

DESIGN: various

WHAT:
Use of structural elements that allow healthy root growth in areas of high compaction. As trees grow and roots are unable to expand in urban areas, trees are either stunted or often die at a young age. Root systems can both prevent costly replacements but also ensure a healthy tree canopy for clean air and habitat value. Examples include structural soil, Silva Cells (below), large and combined tree pits, and suspended pavement.

NATURAL PROCESS:
Natural soil structure

ECOLOGICAL FUNCTION



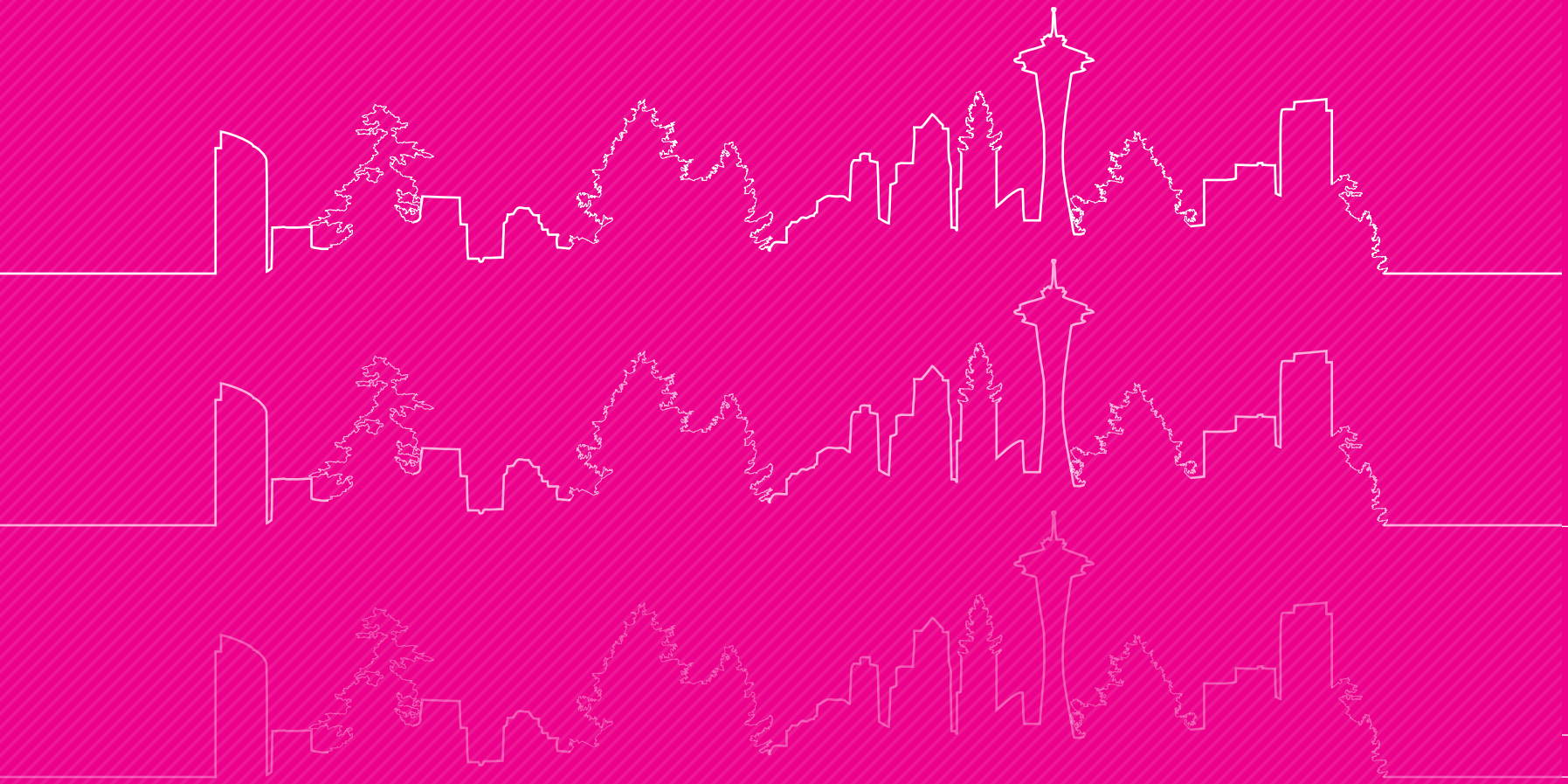
POSSIBLE URBAN ECOLOGIES:
- Applicable where soil is compacted

Silva Cells [DeepRoot]

Image: DeepRoot

06

CONCLUSIONS



Bottière Chênaie Eco-district
By: Atelier de paysages Bruel-Delmar
Image: Atelier de paysages Bruel-Delmar

THE CONCEPT OF CITY
HAS SEPARATED HUMAN
PROCESSES FROM ECOLOGY...

A BALANCED ECOLOGY SUPPORTS HEALTHY HABITATS FOR ALL

The High Line
By: James Corner Field Operations
Image: Iwan Baan

WE CONSIDER NATURE OUTSIDE
OF THE URBAN REALM...

NATURAL PROCESSES AND CONSTRUCTED ENVIRONMENTS ARE NOT EXCLUSIVE

Rooftop Haven for Urban Agriculture
By: Hoerr Schaudt Landscape Architects
Image: Scott Shigley

THIS DISCONNECT DENIES A MORE INTEGRATED RELATIONSHIP WITH ECOLOGICAL FUNCTION...

IN ORDER TO INTEGRATE FUNCTIONAL ECOLOGY IN URBAN SPACES, AN AMPLIFIED, HYPER ECOLOGY IS REQUIRED

CONCLUSION

Where to go from here

Contemporary urban spaces must perform multiple functions. They must address the needs of a diverse population while simultaneously accommodating the functional requirements of natural systems. Only by breaking down the perceived opposition of the city and nature can we liberate new opportunities and design strategies to achieve such integrated solutions. Urban spaces can then be designed to leverage and augment natural processes for the increased benefit of both human and animal populations as well as the environments they call home.

Urban interventions must take an active role in establishing robust ecological systems. The passive planting and stormwater approaches of the past are no longer sufficient to meet the demands of urban development. In order to integrate functional ecology in urban spaces, an amplified, hyper-ecology is required. The influence of this hyper-ecology must extend beyond the boundaries of any one site and contribute to a larger system—a new civic infrastructure.

As integrated solutions grow into prevalence, so too will public awareness and understanding. Awareness is a critical first step in sustaining this new civic infrastructure. If a population recognizes its interaction with natural systems as part of daily urban life, it is well positioned to understand the value such systems provide and, furthermore, take an active role in sustaining their health.

There is no one strategy to achieve the integrated solutions discussed in [UN] Natural. While various strategies are presented as part of a toolkit, this kit is neither exhaustive nor final. Rather, it is a starting point intended to bridge the gap from idea to action. Fundamental to the application of strategies is the realization that sites must be evaluated on a case-by-case basis: if a site faces stormwater issues then design to address stormwater; if a site contains contaminated earth then design to address contamination.

As there is no one strategy for success, there is no one site that can satisfy the needs of natural systems and the human population. Each site must be recognized as part of a larger system. And while singular sites cannot address the myriad issues in a comprehensive manner, they can make strategic and cumulative contributions.

Our exploration of unnatural landscapes allows us to better understand the role of nature and city, and to better articulate the opportunities for nature in our cities. Born of frustrations and missed opportunities for urban ecology, [UN]Natural becomes a catalyst for us. With it , we advance a design attitude that conveys the unnatural relationship of the city and nature. Through form and experience, we seek to highlight the unnatural qualities and expose the juxtaposition of natural and created. We carry forward great enthusiasm for how an urban nature will provide hyper-ecological performance even as it embraces the presence of humankind.

00 APPENDIX

TERMS
What we mean

Ecology
01. Branch of Biology that studies the relationships between organisms and their environments.
02. Specific environment as it relates to living organisms

Urban Ecology
01. Study of relationships between organisms and the urban environment.

Ecological Systems
01. Group of interconnected organisms (plant, animal/human) and the environment in which they occur.

Ecological Function
01. Degree of performance and interaction between living organisms (plants and animals, including humans) and their environment.
02. *Related:* Functional Ecology is the branch of ecology that focuses on the roles, or functions, that species play in the community or ecosystem in which they occur. *(Wikipedia)*

Integrated Solutions
01. Design proposals/interventions that address/accommodate a wide range of needs.

Nature
01. The phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations. *(Google)*
02. For the purposes of our discussion, nature is focused to mean the collection of natural processes.

Natural Processes
01. Processes found in or brought about by nature.
02. Physical and quantifiable manifestations of a more broadly defined nature (hydrologic cycle, erosion, transfer of energy, etc.).

Natural Systems
01. The varied collection of systems active in nature. *(See also: Natural Processes)*

System
01. A set of connected things or parts forming a complex whole. *(Google)*

Cultural Processes
01. Processes found in or brought about by humankind (the construction of cities, the flow of goods, etc.)

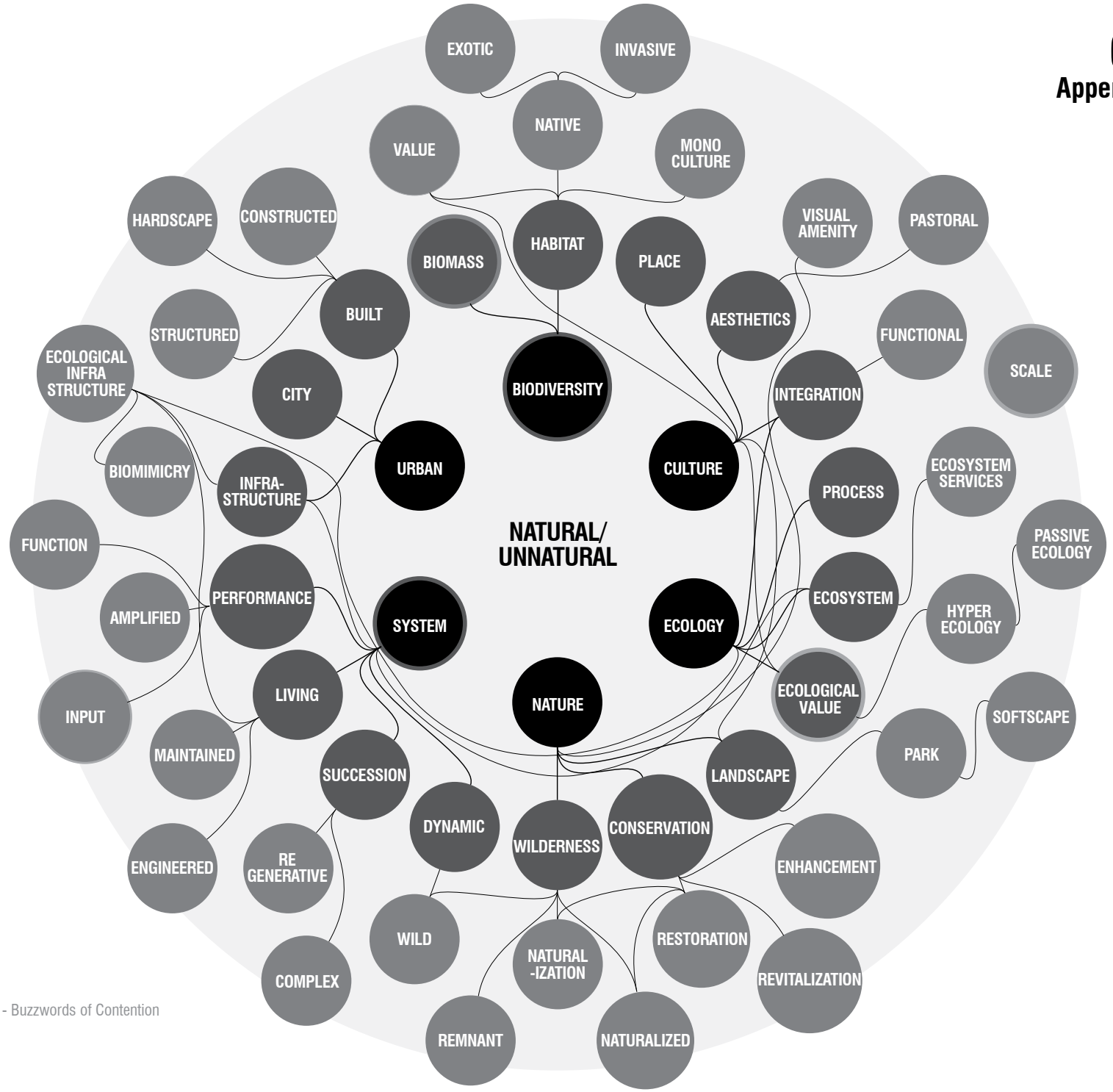


fig. 02 - Buzzwords of Contention

TIMELINE

A look back

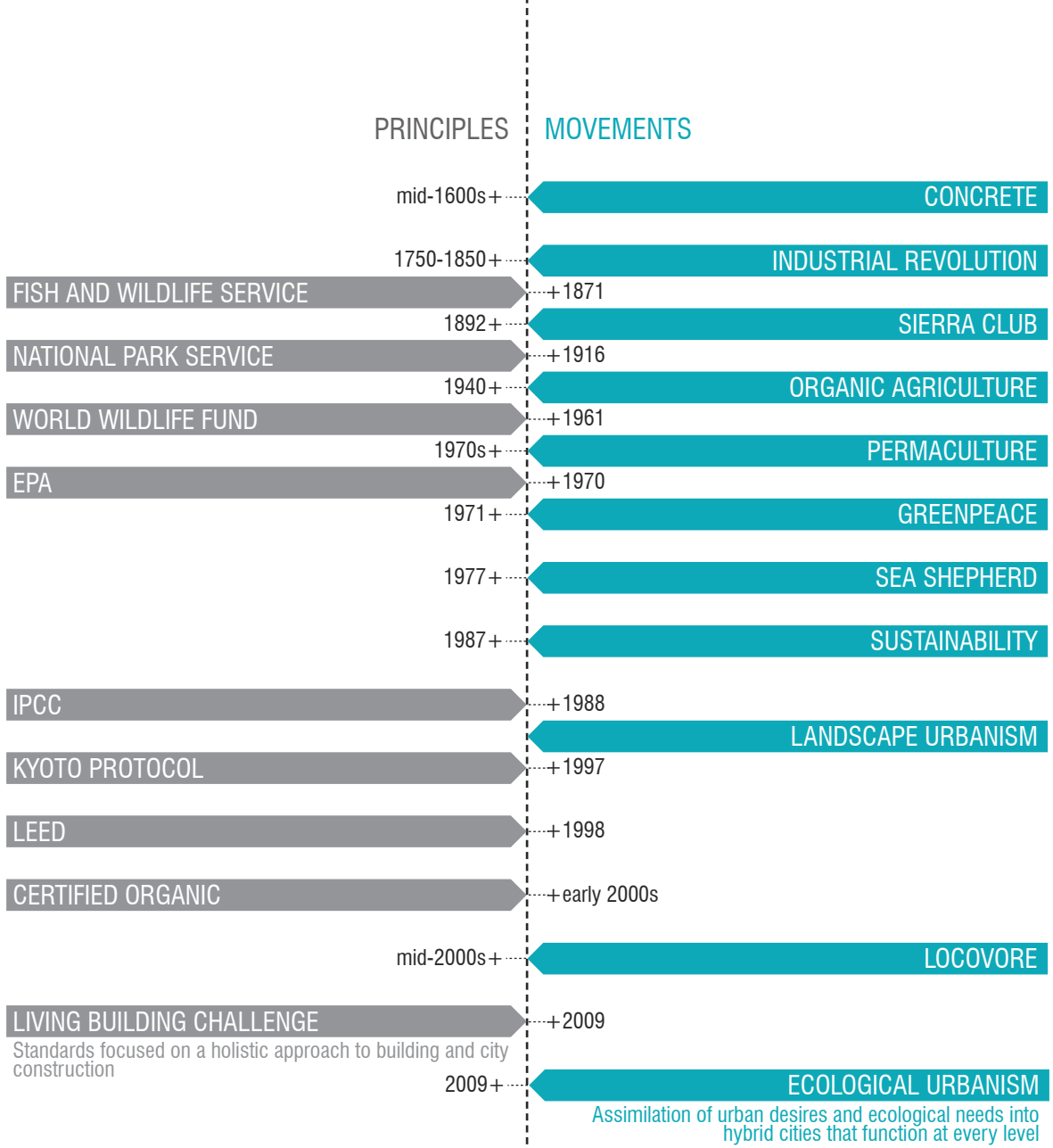


fig. 01 - Incomplete Natural/Human Timeline

FURTHER READING

Sources of Ecological Inspiration

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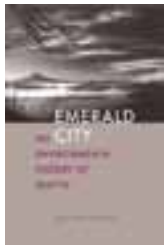

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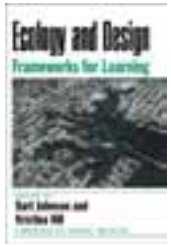

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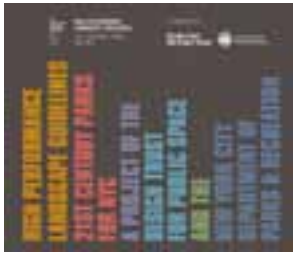

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LABS & INSTITUTES

Green Futures Lab
www.greenfutures.washington.edu/

Resilient City
www.resilientcity.org

Terreform ONE (Open Network Ecology)
www.terreform.org

Urban Ecology Institute
www.urbaneco.org

Urban Landscape Lab
www.urbanlandscapelab.org

OUR THANKS

Colleagues, coworkers, and collaborators

Berger Partnership Team

Charrette collaborators:

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Dennis Haskell, SRG Partnership
Peter Hummel, Anchor QEA
Carolyn Law, Artist
Wendy Pautz, LMN Architects
Alexandra Ramsden, Rushing
Iain Robertson, University of Washington
Nancy Rottle, University of Washington

IMAGES
The Fine Print

[UN]Natural presents a vision for nature and cities. To help illustrate this vision, the document makes extensive use of character photos that are intended to inspire beyond the written narrative and drawings. The character photos are sourced from a wide variety of locations. Berger Partnership is in no way trying to claim the design work or the photography as its own (unless specifically noted as such). The document makes great effort to credit the photographer and location of these character photos.