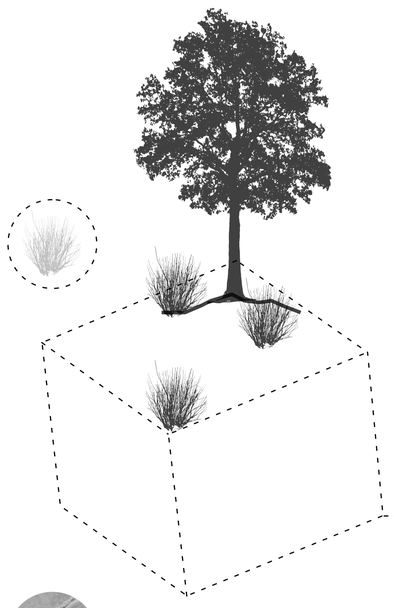
UNCERTAIN FUTURES

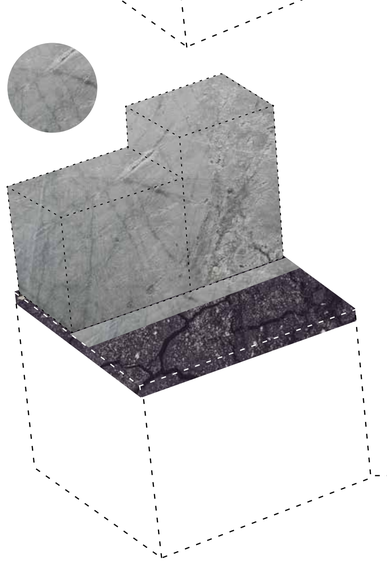
When it comes to tackling climate adaptation, it's important to recognize what conditions need to be addressed, where these conditions are, as well as when we should be taking action. Because the waterfront is such a large space and we're looking at it across four dimensions, knowing how to intervene is very complicated. This is particularly important as communities like Poughkeepsie prepare for change and investments that will need to be made in order to adapt towards the future effectively, appropriately, and strategically.

Because we're dealing with projections, there's a level of uncertainty about what climate change actually be like in the future.What will Poughkeepise actually need/want and how will that fit into the greater context of global climate change and interconnected systems at various scales? Will Poughkeepsie be a Hudson River hotspot or perhaps a post-apocalyptic wasteland...will humans even be living on earth? Change is imminent and unpredictable and given what Poughkeepise knows and envisions now, we should embrace that vision as well a the possibility of uncertain outcomes and intervene over time in a way that might prepare Poughkeepsie for alternative futures.



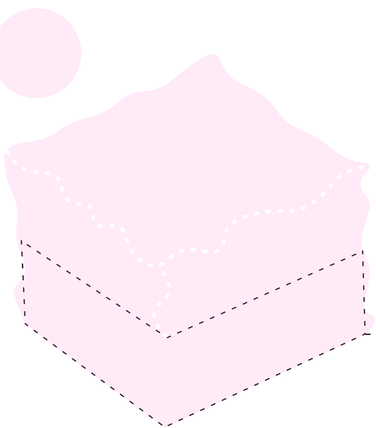
ACCESS

the physical and psycho-social characteristics of place. Things that help us define habitat, quality of life, home and our sense of belonging.



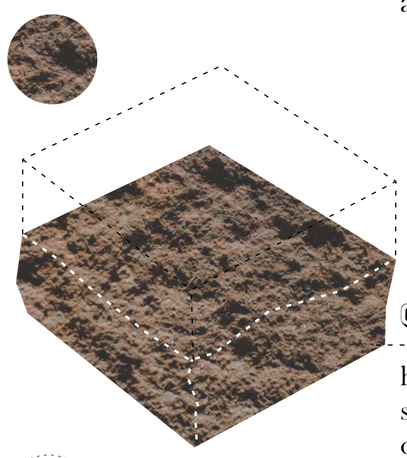
URBANIZATION

aspects of building, development, and construction having to do with the growth of a city as a material place.



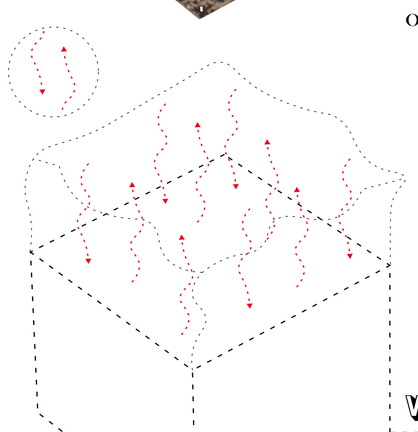
INUNDATION

where water is concerned as a condition such as sea level rise and permanent inundation, to flooding and stormwater or temporarily wet conditions.



CONTAMINATION

having to do with the pollution of land and water such as through brownfield/superfund designations or the combined sewer overflows, garbage waste, etc.



WARMING

the temperature of the atmosphere and the relationship between heat, air, and the material environment.

Permutations: Overlapping Concerns

+2 overlapping concerns

+3 overlapping concerns

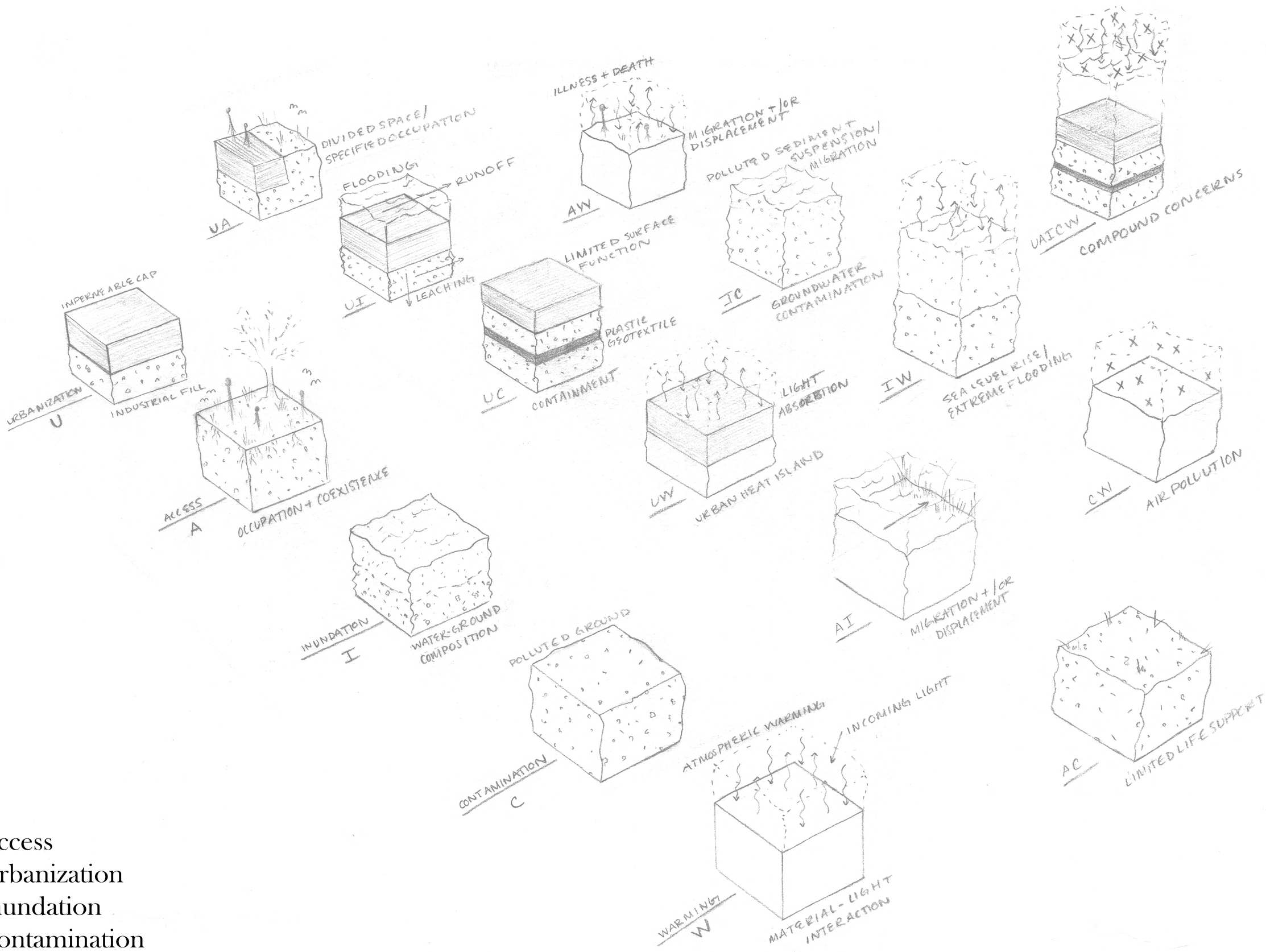
+4 overlapping concerns

+5 overlapping concerns

CONDITIONAL REGIMES

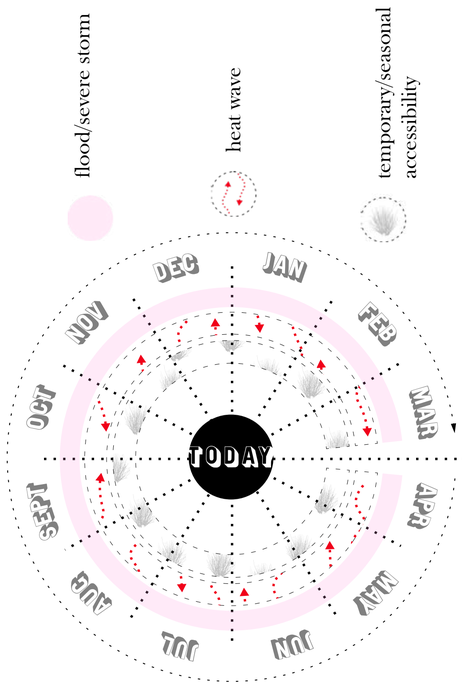
The waterfront is the sum of its divisible parts and its whole and comprehending how the whole and the parts will change over time and change differently due to evolving conditions is imperative. These conditional typologies can be used as a design tool to understand what might be design concerns and how these translate to strengths, weaknesses, and opportunities today and in the future.

These typologies can be contextualized at scale and in specific sites in order to make design decisions materially and programmatically. These typologies can be iterated to analyze compounded concerns beacuse they do not happen in isolation and will overlap to a greater intensity as this space transforms over time. These typologies can be used as a starting point to comprehend site complexities and create design interventions that address these concerns comprehensively. At the same time, work to integrate systems and vitalize services and performances to facilitate resilient and regenerative ecologies today and in the future.



+Access
+Urbanization
+Inundation
+Contamination
+Warming

PROJECT PHASING



ADAPTATION
adjust for inevitable change

sea level rise

global temperature rise

2050s 2080s 2100

habitat viability

urbanization/new development

contaminated ground + water resources

MITIGATION
minimize future impacts

Phase 1 current

Phase 2 2050s

Phase 3 2080s

2100

Iterative Phase

PHASE 1

sites located above sea level rise; under developed, under-programmed and/or underused; resilient long-term investments

walkway over the hudson

rip van winkle apartment complex

kaal rock

shadows on the hudson

delaval

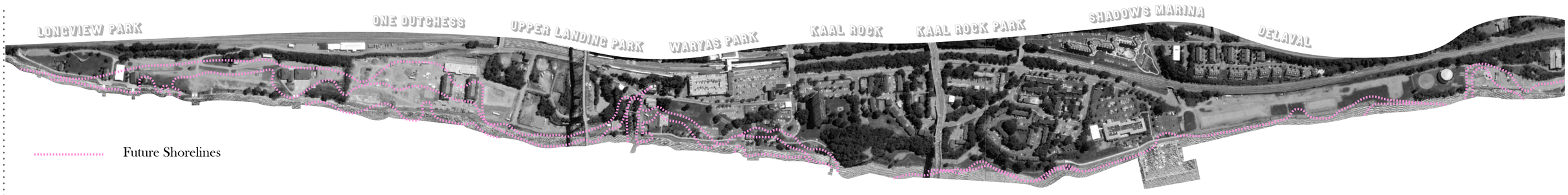
tunnel/path between delaval and amtrak

Waterfront Path | Waterfront Path/ Walkway Elevator | Waterfront Path | Historic Site | Waterfront Path | Children's Museum/ Farmers Market Pavilion/ Fishing Access/Parking | Skate Park | Picnic/Seating/ Gathering Space/ Waterfront Path/Parking | Ice House/ Playground | Public Art Installation/ Waterfront Path | Playground | Public Art Installation/ Waterfront Path | Fishing Access | Fishing Access | Parking/ Gathering Space | Picnic/Seating Gathering Space/ Waterfront Path | Waterfront Path/Parking | Marina Acess | Waterfront Path

One Dutchess | Upper Landing Park + Fall Kill | Waryas Park | Kaal Rock Park | Shadows Marina | DeLaval

PHASE 2

sites projected to be impacted by sea level rise; highly developed, highly programmed, and/or highly used; require strategic long-term investments



Future Shorelines

PHASE 3

ITERATIVE PHASE

Regional Development:
implement climate adaptive strategies employed along waterfront across Poughkeepsie city/neighborhoods and align goals regionally (Hudson River Valley, state-wide, nationally, etc.)

Community Engagement:

The ideas and opinions we have accumulated about the site are not static and because we have time to adapt this waterfront we should definitely revisit the community engagement process again and again and really try to reach everyone. As well community engagement is not just about surveying and feedback, it is also about recognizing the ways in which the community contributes to the success of the waterront and how design programs can enhance existing services and performances that have the capacity to contribute to resilient futures. Employing community engagement as more than a planning process but as a design strategy is an opportunity to engage with organisms and materials that might not have a voice or seat at the table such as the water, the ground, the birds, and the rebels or those that operate and perform ecosystem services spontaneously and are effectively contributing to the adaptive capacity of this community in the face of change.

"OYSTER" ESTUARY

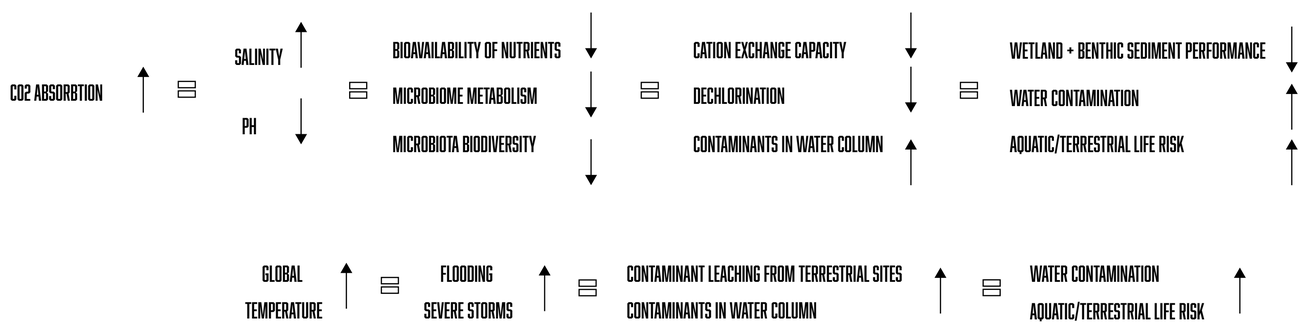
Site | Hudson River, Present + Future Shorelines

Importance of Benthic Ecologies

The Hudson River sediment profile near Poughkeepsie is nearly 90% silt/clay. Silt/clay sediments have higher surface area due to particle size and so have higher cation exchange capacity (CEC). CEC enables benthic sediment (sediment occurring under water) to act as a sink for contaminants by adsorbing chemicals from the water column. Adsorption (adhesion of contaminants to sediment surface) is aided by a diverse microbiome within the sediment which performs bioremediation (treatment of contamination using microorganisms) in the Hudson River channel and surrounding wetlands. The benthic ecology, or the sediment ecology, is imperative to maintaining water quality in the Hudson River. Wetland ecologies also rely on the performance of benthic ecology to act as contaminant sinks.

Climate Change and Contamination

Oceans are absorbing higher levels of carbon dioxide (C02), which contributes to sea level rise. Due to higher levels of C02 absorption, the water in the Hudson River Estuary is projected to become more acidic and saline further upstream. These changes will disrupt chemical processes within the estuary and have impacts across the ecosystem.

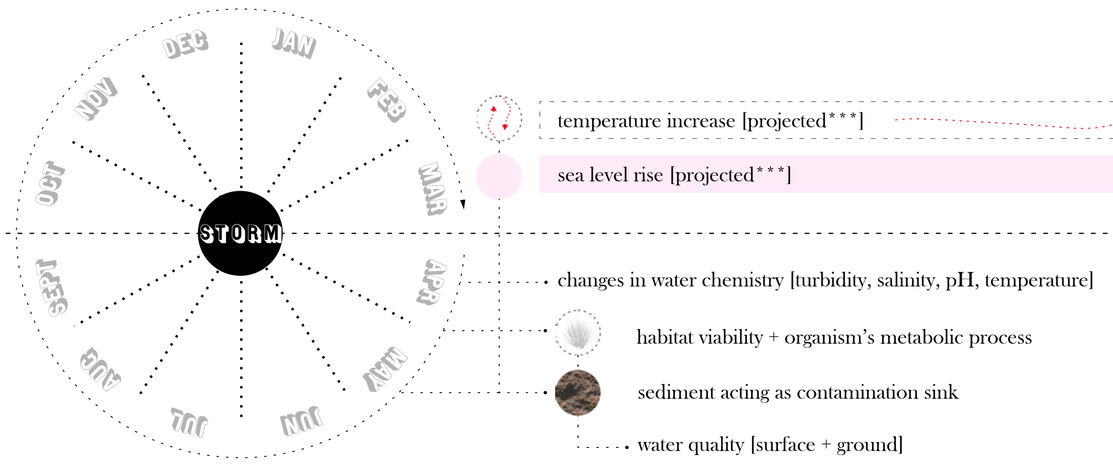


Heavy Metal Contamination Under Freshwater Conditions

Heavy Metal Contamination Under Saltwater Conditions

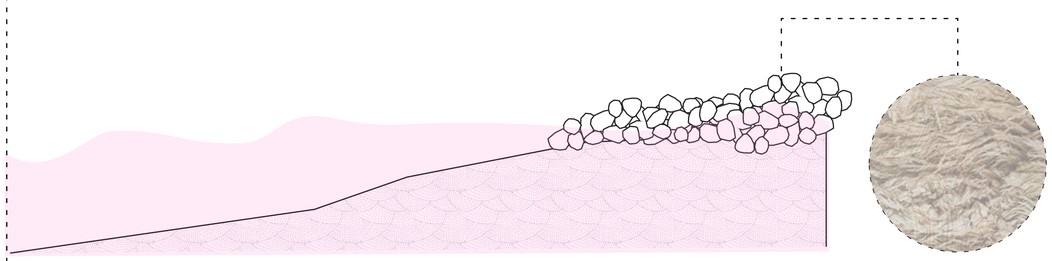
"Risk" is defined as contamination that poses a threat to aquatic life. Sediment Contamination Risk, for each heavy metal assessed, varies in degree dependent upon whether the water conditions are fresh or saline.

**GIS data from NYS DEC was cross referenced to the NYS DEC's Sediment Contamination Assessment



Hudson River Superfund Site

The Hudson River is considered classified as a "Superfund Site" due to heavy PCB contamination in benthic sediment and water column. PAHs, DDT, dioxins/furans, coal tar, nutrients, sewage, trash, invasive plants, and heavy metals (including alumnium, arsenic, cadmium, chromium, copper lead, mercury, nickel, silver, and zinc) are of water quality concern.



Living Shorelines Augmented with "Oyster" Mushroom

Material: recover spent mushroom substrate from local farms and create bricks to augment existing rip rap/shoreline material
Process: "Biosorption" [water-based remediation] spent mycelium has the ability to adsorb contaminants and store them in tissue
Post Process: Green Mining

Saprophytic

live on dead/decaying material
coexist with living plants

Salt Tolerance

flood/tide/sea level rise resilience

Widely Cultivated

local material availability

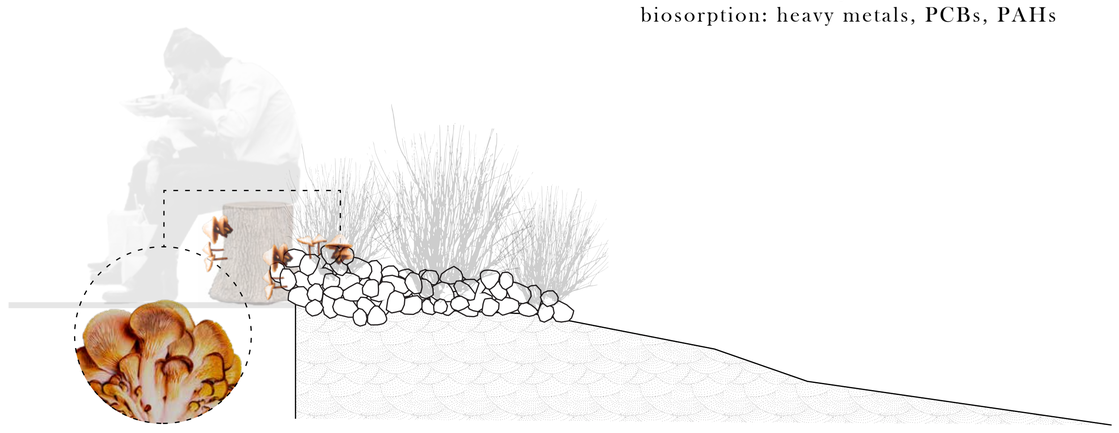
Fast/Vast Growing

large scale project applicability

Ability to Remediate

dead or alive; land + water based; site specific contaminants:

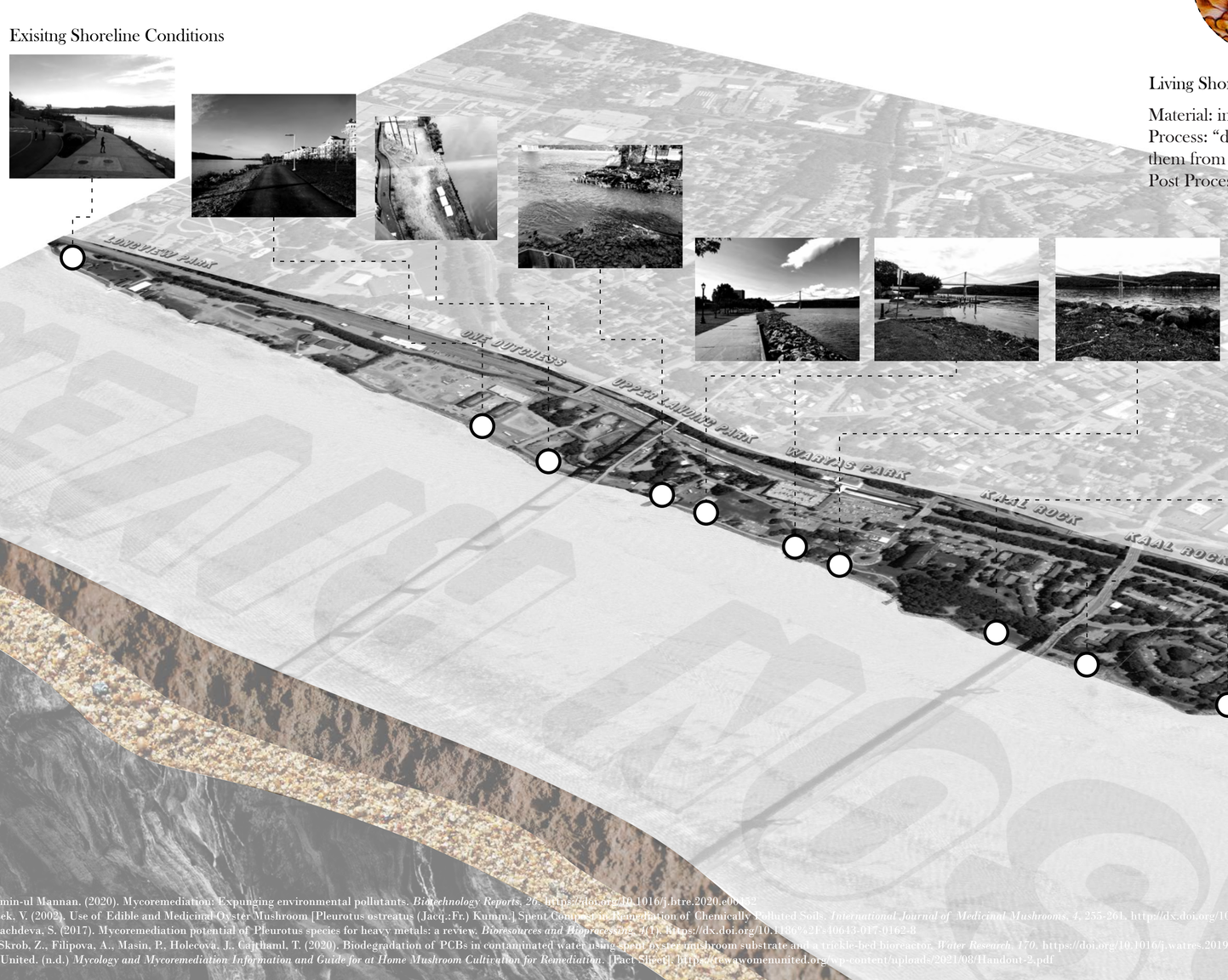
digestion: plastic, petroleum, PAHs, PCBs
translocation: heavy metals
biosorption: heavy metals, PCBs, PAHs



Living Shorelines Augmented with "Oyster" Mushroom

Material: in addition to living shoreline plant palette, inoculate dead wood/soil substrates with oyster mycelium along waterfront
Process: "digestion + translocation" [land-based remediation] live mycelium has the ability to metabolize contaminants and remove them from the environment as well as adsorb contaminants and store them in tissue
Post Process: Green Mining

Exisitng Shoreline Conditions



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MATERIAL FOREST

Site | Waryas, Kaal Rock, Kaal Rock Park

In the face of climate change, sea level rise and severe storms threaten waterfront infrastructures as well as those across the city of Poughkeepsie. Projected urbanization and new development plans also put pressure on the material economy. The necessity to build and rebuild, affordably, will become increasingly urgent. In setting the stage for future construction, what if Poughkeepsie grew their own? By practicing urban forestry along the waterfront and across the city, Poughkeepsie positions itself to not only be prepared for future needs, but addresses pressing concerns of the present.

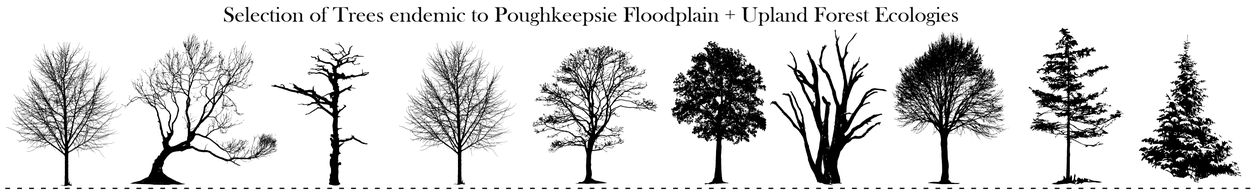
Urban Heat Island and heat waves pose a major health concern today. Much of the waterfront is devoid of shade and strategically sited forests could serve to offer heat related refuge during the summer months. The forest will also act as a carbon sink, sequestering carbon dioxide and improving local air quality.

If down the line, Poughkeepsie wants to build an elevated boardwalk, perhaps they could harvest the forest (slated to be underwater) for the raw materials. But even if they don't the submerged forest remnants may serve as vital habitat spaces for future wetland migration.

Flood Plain Forest [Waryas]

Upland Forest [Kaal Rock + Kaal Rock Park]

Selection of Trees endemic to Poughkeepsie Floodplain + Upland Forest Ecologies



today

Red Maple

Cottonwood

American Sycamore

Sugar Maple

Red Oak

Shagbark Hickory

Black Locust

White Ash

Hemlock

White Pine

time to lumber harvest [diameter breast height (dbh) 12"]

2050

2080

2100

24 years

54 years

48 years

48 years

66 years

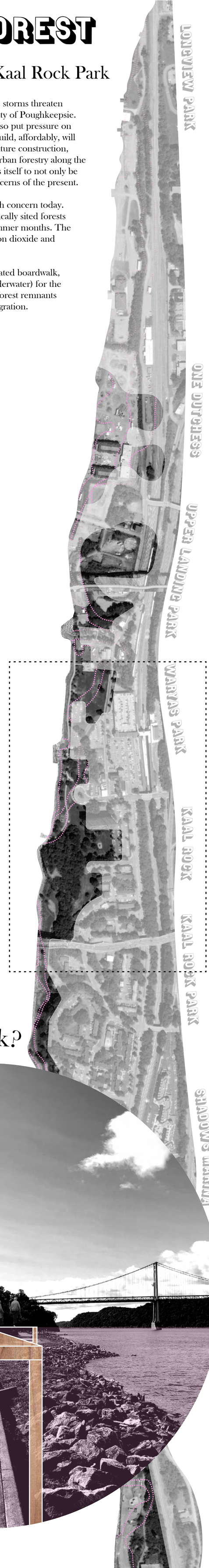
42 years

42 years

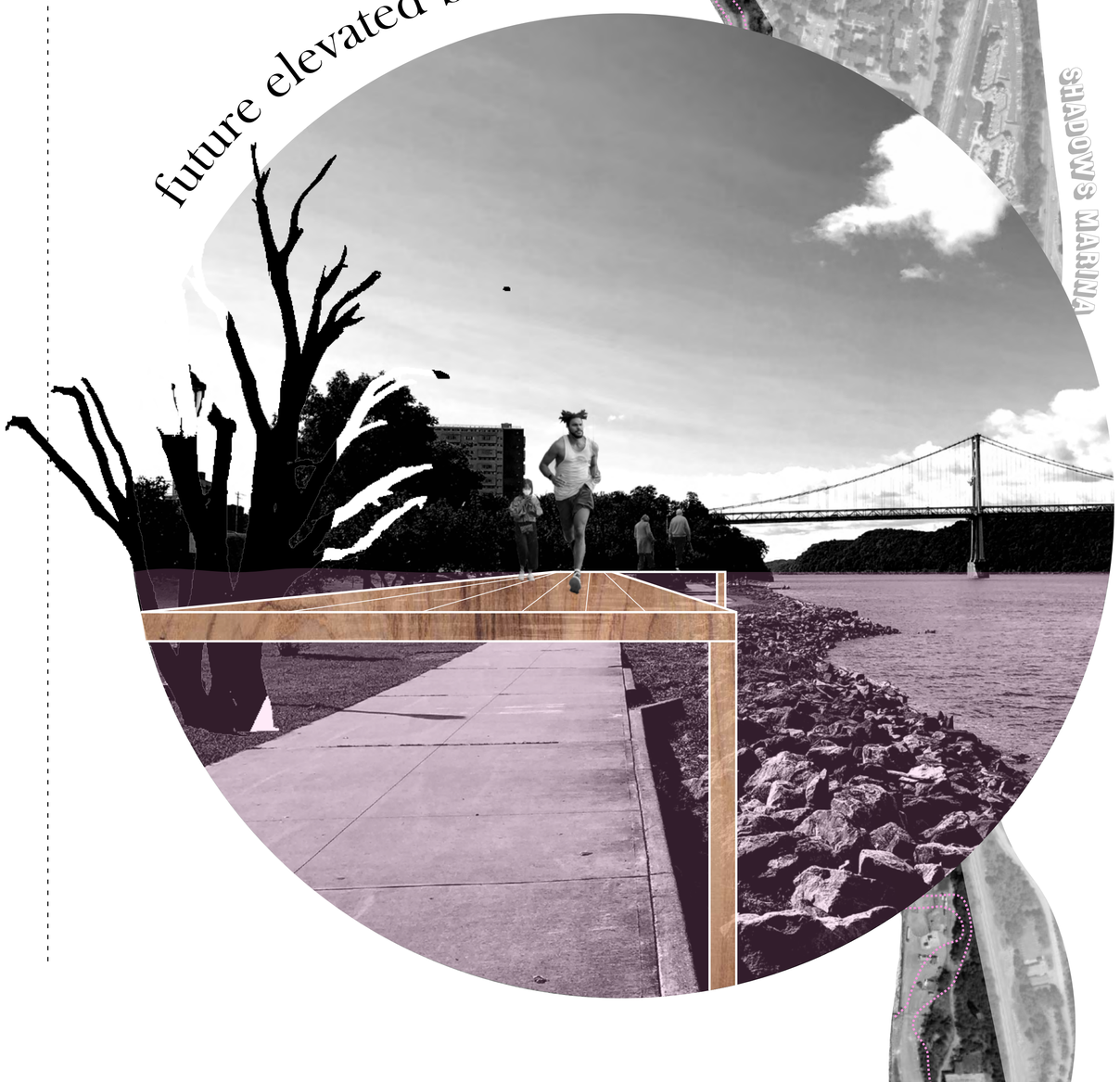
60 years

60 years

84 years



future elevated boardwalk?



GRAFFITI GARDEN

DeLaval, City-Wide

What we design Poughkeepsie to look like ultimately determines who gets to be there, and so we need to consider more than what inclusivity could look like, but how inclusivity performs. This means acknowledging that climate resilient strategies might be found in unlikely places. One such place might be with graffiti. DeLaval is serving as a graffiti park, and in many cases, painted surfaces maintain higher albedos than other built environment surfaces (asphalt, brick, concrete, etc.). While the City of Poughkeepsie and the State of New York have criminalized the act of graffiti, there might be an opportunity to reframe this narrative in the face of climate change, urban heat islands, and human health.

In many cases, graffiti is not about writing obscenities on the sides of buildings, it is about democracy, reclaiming and contesting space, free and anonymous expression, and artistic practice. In the wake of recent events, we need safe spaces for people to raise concerns and express emotions. This project proposes the construction of a cooperative program that brings together property owners, the municipality and graffiti artists to decriminalize and incentivize graffiti and graffiti parks as climate resilient strategy, free speech forum, and outlet for artistic and emotional healing. Just like the scenic waterfront, graffiti can be another cultural and visual resource worth preserving.

ECOSYSTEM SERVICE	PERFORMER	SPACE	CHALLENGES	INTERVENTIONS
Surface Reflectance	Graffiti Artists/ Artist Community	Hardscape	Criminalization/ Building Standards	Decriminalization/ Cooperative Partnerships

SURFACE REFLECTANCE ↑ = UV LIGHT REFLECTION ↑ / MATERIAL HEAT EMBODIMENT ↓ = URBAN HEAT ISLAND / HEAT RELATED ILLNESS ↓

white paint = highest reflectance

PAINT: SURFACE REFLECTANCE

MATTE → HIGH-GLOSS