

# Defining the City as a Commons: Mitigating Sea-Level Rise at the Intersection of Planning Policy Instruments and Public Space Networks

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## ABSTRACT

Public urban environments define a city as a commons, a place that is jointly shared. These environments make up the part of the city that is economically, environmentally, and socially advantageous toward the common good. In this study, we examine how the concept of urban commons can be characterized in the space of a city. The first part of the research is project-based. The project site is Fort Lauderdale, Florida where we utilize an alternative future scenario-based design model to examine urban environments in at-risk areas. The model can be defined as a plausible description of future climatic states which guide the reimagining process. Green infrastructure concepts and resiliency principles redefine public space opportunities. The project highlights the dynamics of the natural environment as a frame for reconfiguring public space as an open, permeable, and adaptive system that mitigates exposure to adverse conditions including pluvial flooding and storm surge events. The second part of the research presents a review of planning policy instruments and suggests how these instruments help shape long-term strategy toward the repair of natural habitat and the development of public space networks. The conclusions suggest that creating a rich and vibrant urban commons in synthesis with the evolution of a city hinges on the ability of designers and policy makers (in collaboration with other stakeholders) to choreograph and layer multiple scales of resiliency interventions. While interventions are site specific, when based on time-oriented planning of present and future conditions, land-use decisions and adoption of policy mechanisms can be applied across other land reform scenarios. At the scale of street, block, neighborhood, and region, efforts can intersect toward the development of unique urban environs that supports social and environmental resiliency.

## INTRODUCTION

Coastal flooding will undermine the ability of many communities to survive in their current form.<sup>1</sup> Human populations will be displaced, while the urgency to implement environmental clean-up and the repair of these ecosystems will become more acute. Consider Broward County in the South Florida region (figure 1) and its already high ground water levels in relation to porous

soils and low topography. Due to these two factors, the tipping point for the flooding of large urban areas could be significantly anticipated and exaggerated. Flooding and inundation will decrease property values and the tax basis, resulting in a decrease in city revenue. A failure to anticipate and adjust budgetary items to this decrease could result in a deficient shortfall and bankruptcy for municipalities. Such outcomes, Mike Kreidler argues, could precede actual flooding and inundation.<sup>2</sup> Financial institutions, which project climate change conditions 30 years or more into the future, could no longer offer mortgage and insurance for at-risk properties, eventuating a decline in property values<sup>3</sup> and the displacement and migration of at-risk communities. The public revenue factor also raises the question of the financial viability of long-term maintenance of the region's thousands of miles of road, water, sewage, and electrical infrastructure. The above factors highlight only some of the issues that will threaten low-lying coastal communities. Consider also freshwater resources, storm surge, rainwater run-off, flora and fauna, or all areas related to the ecosystem. These issues, among others, cause one to rethink the relationship between nature and urbanization, the inevitable transformation of many coastal urban environments, and the overlap of policy instruments best adapted to the reimagining of unique "blue-green" urban environments.



Figure 1. Broward County, Florida with 5 feet of sea-level rise; site location in red rectangle. Data source: National Oceanic and Atmospheric Administration. National Oceanic and Atmospheric Administration. <https://coast.noaa.gov/slr/>

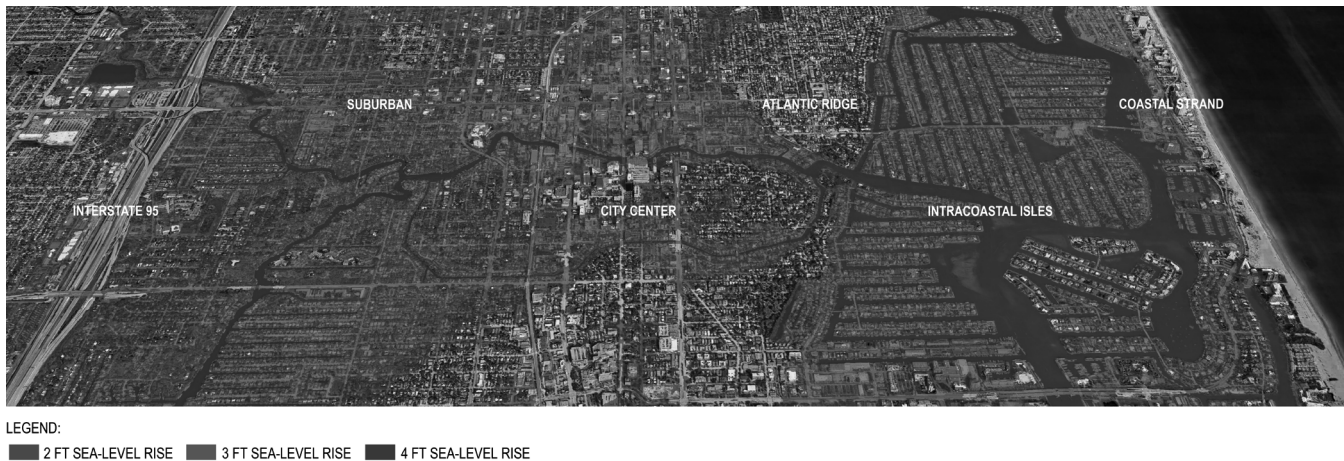


Figure 2. Aerial photograph of site study area. Data sources: Base image: Google; Data source for overlays: National Oceanic and Atmospheric Administration. National Oceanic and Atmospheric Administration. <https://coast.noaa.gov/slr/>

The future dominance of water from sea-level rise, I argue, opens the possibility to expand the commons on water and land, an opportunity to erase socio-spatial boundaries and aim toward a long-term goal of a robust natural system and social economy as the basis for the urban economy. A major obstacle to achieving this goal is the current model of urban growth based on a profit-oriented market economy and the accumulation of wealth from expansive land development. The perceived orthodoxy of the policies supporting this model and that has governed the majority of development patterns in the western world, reinforce a closed system and can result in the social division of neighborhoods, a reduction in commons, and a negative impact on natural systems and resources. This crisis present in many communities, and the coming crisis caused by sea-level rise, open an opportunity to rethink urban environments and the role of commons.

In this project, in Fort Lauderdale, Broward County, Florida (figure 2), we identify qualities established by a vision of public spaces integrated into a natural habitat (water and vegetation), features that will one day dominate the region. A managed retreat of human habitat, repair of future flooded areas, and the consolidation of buildings along the Atlantic Coastal Ridge are the major underlying conditions for the project. The project uses an alternative future scenario-based design model in order to study future urban environments in at-risk areas. A scenario-based model can be defined as a plausible description of future climatic states which guide the reimagining process and design options. It shifts attention toward nature and speculates on how an urban environment might best be rethought. Such projects are ideated with the understanding that they are used as one instrument to be analyzed together with environmental impacts, social equity issues, and economic challenges, metrics that can guide policy changes in anticipation of future climatic states.<sup>4</sup> Hence, in the design studies, we also hypothesize an overlay of environmental goals and policy instruments in order

to understand how alternative models of practice could aid the site area's spatial transformation over time.

The Southeast Florida Regional Climate Change Compact (a four-county organization), addresses sea-level rise and recommends broad multiple policy considerations including governance designed to assure coastal adaptation, maintain livelihood opportunities with diverse options, and reduce risks to human health and safety.<sup>5</sup> The recommendations include flood resiliency of structures and facilities, and coastal hazard planning. The latter encourages "planning to protect natural resources while fostering wise development in the coastal zone."<sup>6</sup>

Broward County's implementation strategies, the Priority Planning Areas for Sea Level Rise of the County's 2020 Land Use Plan, intersect with that of the Climate Compact.<sup>7</sup> It considers land use, including areas of potential population growth, natural system restoration, and infrastructure adaptation, and as stated, "long-term functionality of appurtenant infrastructure, especially water management, drainage, water supply, and water treatment systems, both coastal and inland."<sup>8</sup> Moreover, they recommend the "integration of green infrastructure and natural systems into urban environments as part of the resiliency strategy" and "delineating habitat zones from climate impacted areas..." They also suggest "preserving and protecting natural shorelines with an emphasis on expansion and preservation of sand dunes and beaches, and adopting land-use regulations to limit development in vulnerable areas and redevelopment in areas particularly vulnerable to flooding."<sup>9</sup>

Fort Lauderdale aligns resiliency efforts with those of the Southeast Florida Regional Climate Compact and Broward County. Their Climate Change Element of the Comprehensive Plan<sup>10</sup> currently addresses continued monitoring of evolving sea-level rise data<sup>11</sup> and the "adaptability of ground-level uses,"<sup>12</sup> to a periodic reassessment of its Comprehensive Plan. With attention to critical flood zones, the Federal Emergency Management

PRE-URBAN NATIVE VEGETATION ZONES

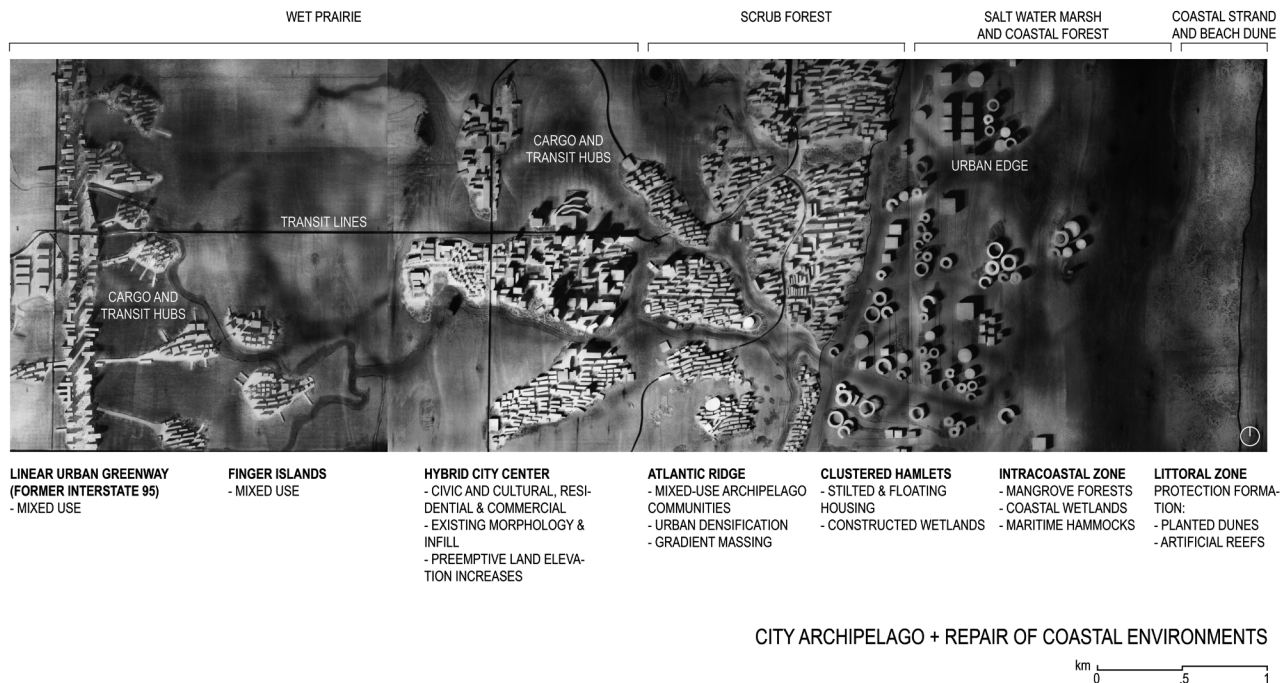


Figure 3. Site model: City archipelago illustrating pre-urban vegetation zones and key urban features. Focus site area location in red rectangle.

Agency (FEMA) has recently revised flood zone maps effecting an increase in design flood elevations required by the Florida Building Code in some areas of the county.<sup>13</sup> However, the few policy adoptions that are in place at this time, protective (defensive) and accommodation (adaptive) measures are destined to be short-term fixes with a limited impact over time.

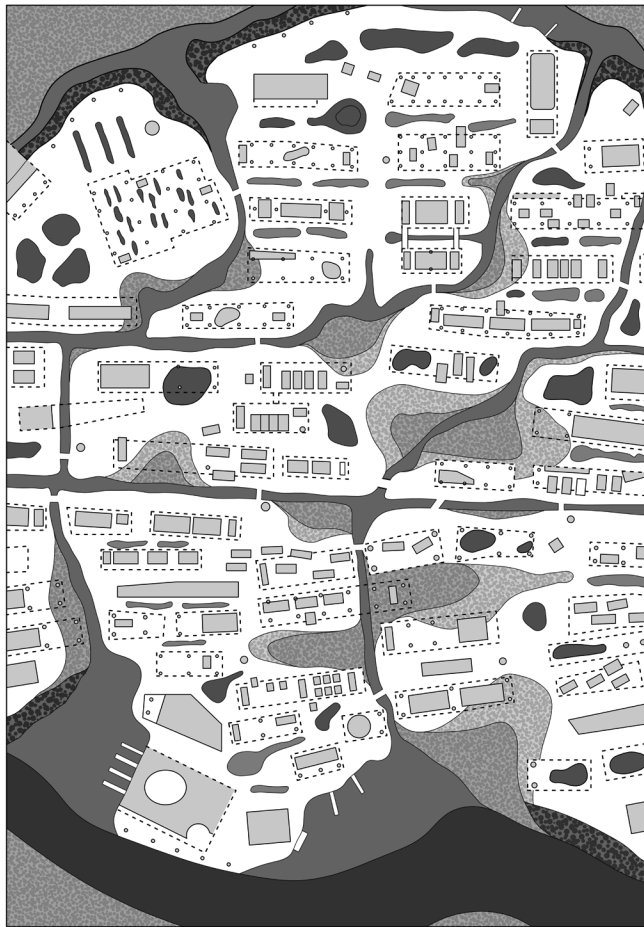
The recommendations outlined above at the regional, county, and local levels reflect the complexity of urban ecology and advance biodiversity in support of sustainable and resilient ecosystems. Such goals underscore the value of environmental stewardship in cross-disciplinary research that can frame urban design projects.<sup>14</sup> The goals also question the efficacy of current land-use practices, norms, and codes. They point toward a design strategy and planning instruments that direct project designs to better anticipate and evolve with changing natural conditions.

The project conceptually adopts flood adaptive (accommodation) strategies. Adaption moves away from developing in at-risk areas such as low coastal and inland areas and therefore hypothesizes strategic relocation (figure 3). It conceptualizes the use of some structurally hard interventions such as flood-proofing by raising streets in some low-lying areas and moving existing structures onto plinths. This strategy also entails soft interventions referred to as protection measures, including natural buffering, flood basins, bio-swales, and pervious surfaces to absorb the impacts of tides, storm surge, and rain.<sup>15</sup> Yet we further the adaptive to hypothesize both anticipatory avoidance of vulnerable properties and transformative strategies. Transformative

strategies include strategic relocation, and as Lennon, Scott and O’Neill suggest, work with the effects of climate change rather than trying to manage, avoid or dominate them.<sup>16</sup> Such strategies advocate an urban design approach that embraces a dynamic situation imposed by nature (seasons, cycles, sea-level rise, and extreme events) and refers to concepts of resilience and source efficiency as a means of incorporating multifaceted functions into built environments.<sup>17</sup>

**POLICY INSTRUMENTS: PATHWAYS TOWARD BUILDING COMMUNITY RESILIENCY**

Policy instruments aimed toward building resiliency and sustainable practices must be considered from the scale of the region to the neighborhood and block. The FSU College of Law document “Emerging Legal and Institutional Responses to Sea-Level Rise in Florida and Beyond” outlines concepts of protection, accommodation, strategic relocation, avoidance, and procedural recommendations. It includes policy instruments such as “the transition of vulnerable land from private to public ownership, transfer of development rights, purchase of development rights, buy-outs, and rolling easements.”<sup>18</sup> The document further recommends that new development is directed away from vulnerable lands to safer areas and includes instruments such as land conservation, conservation easements, and coastal setbacks. The Urban Land Institute Resilience Panel Focus Group<sup>19</sup> explores issues of the transfer of development rights as part of a climate adaption strategy for flood-prone areas while supporting more inclusionary participation asserting a common interest in the shaping of zoning priorities in communities. Yet, in order



Legend:  
 Buildings / Mobile Markets    Canal    Tree Island    Bioswale  
 Garden    Navigable Waterway    Wetland    Living Shoreline

Figure 4. Partial ground plan of focus area: Archipelago illustrating the overlay of built fabric and green infrastructure.

to limit the use of large-scale expropriation in the short term and competitively control the qualitative features of any development, a wider range of instruments must be implemented and experimented with as part of a comprehensive approach to building resiliency into city environments. Thomas Ruppert argues that the development of community land trusts, for land acquisition, restoration and conservation projects as well as the preservation and restoration of land to natural habitat, affordable housing / housing security and wealth-building opportunities need to be integral and considered part of a shared equity model.<sup>20</sup> Bonnie Malloy emphasizes wetlands conservation.<sup>21</sup> This element will most certainly expand by 2070 and must include permanent retreat and relocation plans coordinated with a substantial repair of natural habitat and wetlands conservation programs. One example of a large-scale habitat repair project is Daniel Williams’ and Tom Singleton’s 1995 South Dade (Florida) Watershed Project.<sup>22</sup> They propose a regional systems approach outlining broad guidelines for long-term environmental restoration, sustainable water resources, and land-use development. Adaption and retreat including the conversion of large suburban

properties to natural parkland are among the key strategies in the project proposal. The report also recommends the gradual transfer and consolidation of built communities in the city of Miami to elevated areas along the Atlantic Coastal Ridge.

Other instruments could also be utilized in support of a shared and resilient commons. These range from right of pre-emption/expropriations and public-private long-term leases to cooperatives, concept tendering procedures, non-commercial foundations, tenement syndicates, social environment protection areas, and urban development contracts and measures. Concept tendering procedures, for example, grant communities the right to lease or sell property according to the best-suited concept for the realization of predetermined goals based on a set of criteria, (architecture, urban design, life-cycling principles, energy conservation, preservation of natural environment, etc.). Tenement syndicates grant the purchase of real estate for the purpose of turning it into public property, creating affordable housing in the long term and initiatives oriented toward the public good.<sup>23</sup> The instruments can be tailored to specific situations, the latter creating the availability of public land and the former allowing the municipality to negotiate redevelopment expectations and management processes in partnership with a broad range of active participants. While differing in structure and purpose, the above policy tools demonstrate options that are neither exclusively private or public; policies that can be used to bring together community stakeholders, in a collaborative design process based on a principle of shared urban and natural resources.

**DEFINING THE COMMONS**

A commons, or a place shared by all, is defined as land, its resources, and the urban environment that belong to or affect the entire community. As Milica Topalovic states, “Land is always a cultural, social and therefore political product.”<sup>24</sup> The goal is to make a city, and the make-up of the city economically, environmentally, and socially advantageous toward the common good. In the context of this project, the most apparent project qualities include the repair and preservation of natural habitat, a regional commons of pedestrian communities connected by waterways, and a multi-modal system of transport. It suggests the clearing of low-lying, low-density areas and repairing land to natural habitats. Within the built areas, the development of flexible spaces at the ground plane, agile to climate impacts and the dynamics of economic changes, could increase the rate of adaptability in city environments. In support of this goal, islets are conceived as pedestrian communities. Gardens, canals, bioswales, tree islands, and shoreline mangroves infiltrate within islets (figure 4). The islets are connected by a network of urban waterways and rail. Waterways link back to the larger navigable New River and Intracoastal. Among the marshland, passenger and freight rail systems link together islets suggesting multi-modal transport networks across regions.

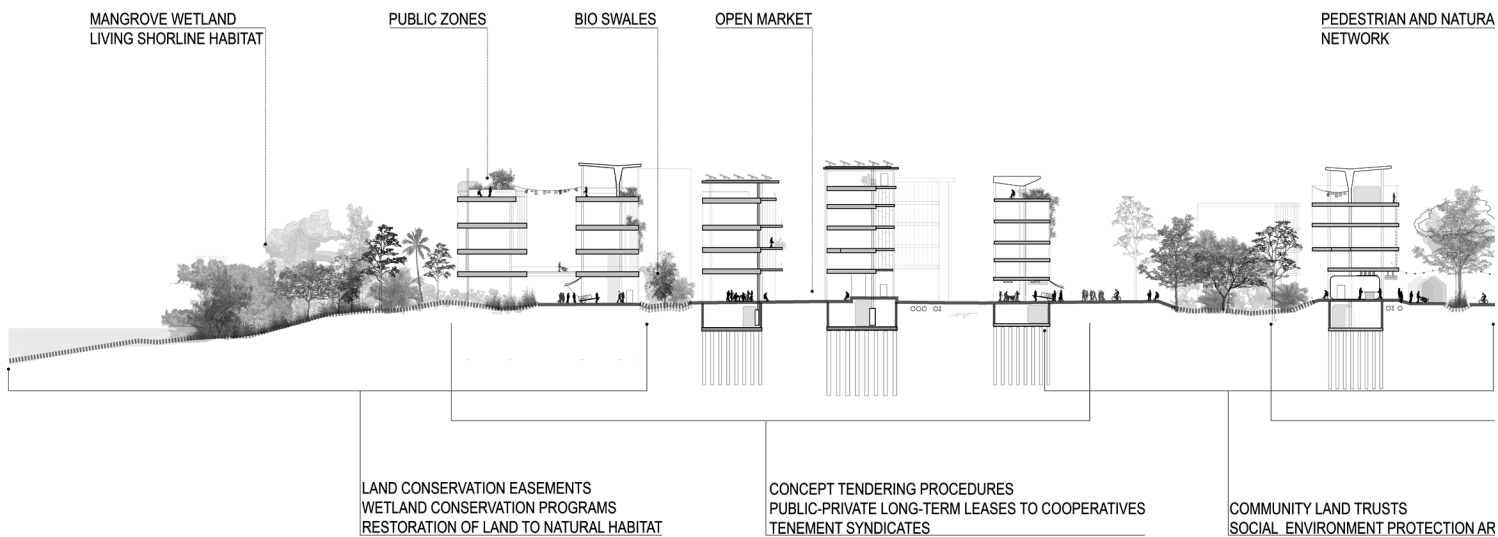


Figure 5. Section drawing: Archipelago and hypothetical zonal patchwork application of policy instruments.

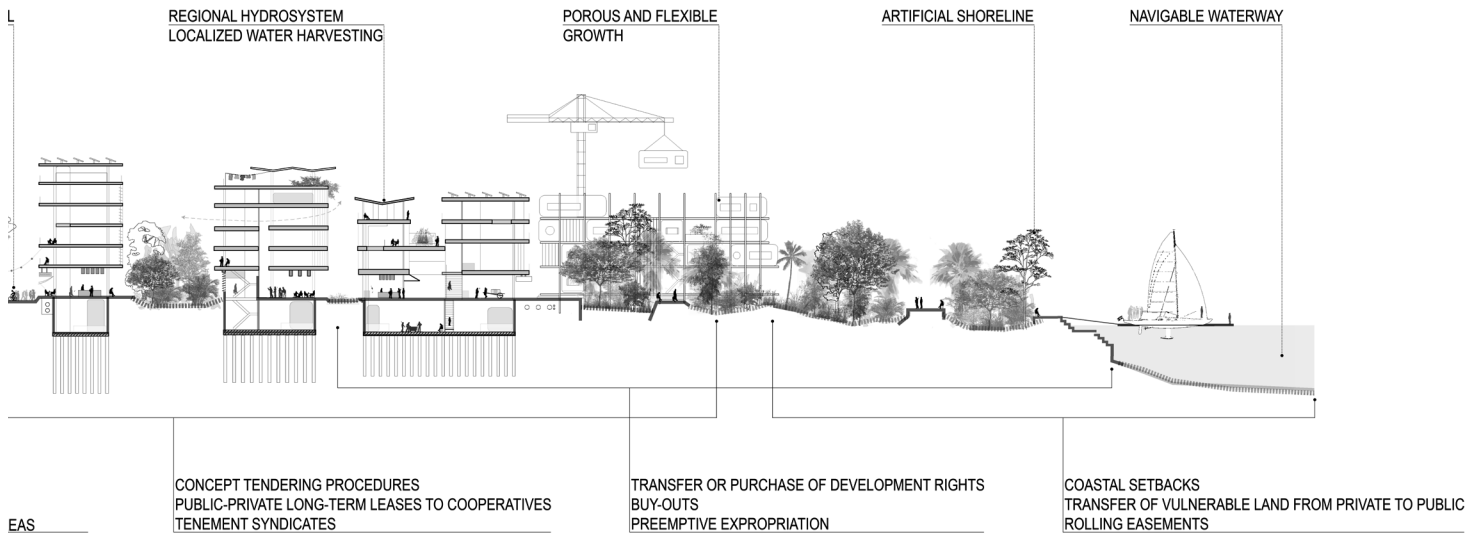
The interchange among these diverse networks of public space is fluid rather than static, allowing for changes in use and intensity. Flexible use of landscape spaces with a range of functions amplify the importance of such interchanges. For example, urban green areas can benefit the health of the ecosystem when designed to accommodate changing flood levels with natural habitat, grey water filtration, and park settings. Such functions need not be isolated within but can be connected at different scales to larger hydrological units that allow the system to filter and clean the region's hydrology, adapting to changing currents and tide levels. Benedict and McMahon emphasize "connections between parks, preserves, riparian areas, wetlands, and other green open spaces" as critical to properly functioning natural systems.<sup>25</sup> The connections extend to fluvial and surface water, flooding and storm surges, flow paths and tides from the permeability of surfaces to tidal impacts along a coastline. As such, these hydrological units can form integrated networks that can be read as a cohesive part of the architecture of the city and help maintain healthy diversity of plant and wildlife within an ecosystem.

As ground-space boundaries transition, the policies governing future built fabric can evolve. Building orientation and typologies could be designed to respond to seasonal changes, air, and light in order to increase human comfort of spaces for living, leisure, and work. A flexible, yet compactly built pattern can perform to prevailing breezes and augment the integration of public space at the ground plane. The integration highlights a porous urban fabric where the elements of urban space – path, street, court, arcade, terrace, porch, and square – could blend and overlap. The strategy accounts for site as layered and interconnected. It treats natural habitat and open spaces, infrastructure, and buildings, as distinctive and contrasting yet with the intention of allowing for continuous adjustment. The reconfiguring process

foregrounds nature's dominant role in the ideation of changing conditions, resource limits, and the resultant urban patterns. The process undertaken in this hypothetical project considers the politics of spatial transformation as somewhat messy and reliant on tailoring instruments to neighborhood needs in the projection of commons (figure 5). Each zone suggests land divisions that deviate from the existing grid pattern. Rather than the city as citadel, shuttered and private, an open and agile building pattern, works with air flow, sun and shade, and topography. The changes impact ownership rights to the land and the commodification of a city's collective resources. It repositions ownership and management principles as a central question in relationship to an at-risk municipality's ability to adapt.

## DISCUSSION & CONCLUSIONS

With the goal of advancing urban ecology research to support the strategies of improving urban sustainability and resilience, conserving urban biodiversity, and promoting human well-being,<sup>26</sup> this project identifies broad urban qualities for reimagining the future transformation of region and neighborhood. Nature is considered a territorial dependency providing an opportunity to reconsider the purpose of ground space. The integration of resiliency measures with a transformative strategy provides flexibility in the development of future built morphologies. It aims to understand the city as commons and the legibility of such that defines place through the creation of unique public environments. Part of the program addresses human comfort, accessibility to services, and the goal to drastically reduce emissions and overall energy use by consolidating population and the deployment of blue-green networks. As policy instruments including economic incentives are rethought, the radical democratization of public space in support of social and environmental resiliency can shift public perception of the city as commons. Just



as procedural strategies generating public awareness through community outreach are critical to policy reform, multiple time-oriented project-based design scenarios conceived in tandem with a broad array of policy instruments play a critical role in mapping out future trajectories and assisting anticipatory governance frameworks more inclusive of neighborhood voices and social, economic, and environmental experts.

The policy instruments make for a complex redevelopment game. It suggests diverse models of ownership by municipalities and private entities and layered use of policies that are open and flexible with changing needs over time. The consideration of diverse kinds of policy instruments establishes an expanded dialogue during the design process. Overlapped with nature’s role, the dialectic opens alternative discourses in the projection of space combined with a layering of the kind of policies supporting the revisioning of urban ground-space and its surroundings. Sheila Foster and Christian Iaione embrace “urban common-based experimentation which has both a governance component and a resource-sharing component.”<sup>27</sup> They characterize a cooperative structure as an “urban collaborative governance”<sup>28</sup> moving beyond a normative representative democracy in which “heterogenous individuals and institutions can collaborate together to co-create or co-govern the city, or parts of the city as a common resource.”<sup>29</sup> The “co-city” models in Italy, the Co-lab in Germany or the Living Lab in Sweden and at MIT are some of the examples of “instantiating urban collaborative governance ideals because of its user co-creation approach to identify and integrate the most innovative approaches to planning and for navigating the constraints posed by existing institutional frameworks.”<sup>30</sup>

A time-oriented assessment and policy implementation work hand-in-hand with community-managed flexible-use spaces and

rezoning, and their incorporation into Adaption Action Areas. Municipalities will need to map the intersections among current public land ownership and future acquisitions as part of long-term land conservation; vulnerable areas by degree at the scale of region and neighborhood; vulnerable communities based on economic data; population densities in areas deemed viable as part of a long-term development plan; the life-cycle of the past building stock and current redevelopment plans; economic impacts; and repair of the environment. When measured against sea-level rise projections, the above can act as part of a framework toward the timing of policy implementation. The perceived severity of policy changes can be countered with development opportunities for healthy, resilient communities. They can be gauged against their impact on a community versus economic loss, social injustices, and pollution of the environment.

The range of instruments is considered incrementally across changing site conditions. As a city transforms into islets and population densities change, the choice in policy instruments changes. Neighborhood to neighborhood, the transition from a segregate planning model of live, work, and leisure activities toward a more open and inclusive model of policy applications increase the patterns of common space and anticipates changing environmental conditions. Redevelopment plans aim more toward the inclusion of policy changes that erase land divisions and limit ownership rights at the ground plane. Acquisition programs such as the buy-back of vulnerable property following natural disasters,<sup>31</sup> for example, could increase the rate of retreat, ensure the availability of property for future development, and transform edge conditions of islets back to a blend of natural storm buffers, slips and ports, and rezoning for small industry. Ownership of disposition and ownership of usage would be transferred to municipalities. According to Florian Hertwick,

terminable or limited ownership of usage of each area is established by means of contracts that stipulate the type of usage, the usage fee, and duration of the right to use.<sup>32</sup> Leasehold rights could be tailored to meet the timing of area transformations and concept tendering procedures (a form of public-private collaboration) could award projects competitively to those that best meet environmental, public space, and social goals outlined by the city and county.

Above the ground plane, tenement syndicates and cooperatives allow for a more flexible development of the city's housing and workplaces. Housing cooperatives in Sweden, for example, make up 50% of all multifamily buildings. Although not free of design flaws related to building resource usage, they are a key means of promoting a cooperative form of governance promoting the survival of a long-term resource.<sup>33</sup> At the scale of architecture, Kristien Ring and Franziska Eidner's study of the "self-made city" demonstrates how small community cooperatives in Berlin can transform building use into flexible live-work concepts through cooperative financing, design, and management.<sup>34</sup> The potential social benefit of a visioning project can be measured against projects such as these, and as a response to a major dilemma: the transfer of people from vulnerable neighborhoods to new housing while minimizing disturbances and keeping communities intact. Community Land Trusts, another shared equity model, aim to maintain affordable housing through limited equity cooperatives, housing associations, deed restrictions, and sales mechanisms for owners.<sup>35</sup> Ownership of land and ownership of real property are separated. Land is community-based and leased. When appropriate, it could become part of a formula for increasing the space of the commons at the ground level.

The above means of exchanges can increase the transfer of ownership disposition and incrementally reshape the purpose of its architecture while redefining the space of the commons. The expansion of the commons and the conceptualization of planning instruments, therefore, present themselves as inseparable aspects of the design process. The guardian of such processes remains nature and its territorial dominance and dependency. It naturally carries over to those who share resources in the governing of the commons and their collective actions. Elinor Ostrom reminds one that cooperative strategies among private citizens and public agencies, especially at the local level where the issues are best understood, can offer a rich set of alternative applications for resolving resource management. Citing Robert McC. Netting and his research on the Swiss alpine village of Törbel, Ostrom writes: "Communal tenure promotes both general access to and optimum production from certain types of resources while enjoining on the entire community the conservation measures necessary to protect these resources from destruction."<sup>36</sup> Her eight design principles aim to facilitate cooperative governing through the "congruence between appropriation, provisional rules, and local conditions" in collective-choice arrangements.<sup>37</sup>

As an operational strategy, design moves toward the use of a wider array of planning instruments for expanding the commons. It questions the ability of orthodoxies engrained in political bodies and that persist in current economic mechanisms to allow diverse concepts of zoning to evolve with time intervals synchronized and in anticipation of sea-level rise projections.<sup>38</sup> The choice of policy instruments and design of communities considers the most appropriate time-oriented strategies that aim to benefit the common good. The institutional and community governance of transformation of the urban fabric replaces any fixed ideology. It is based instead on nature's changing conditions and the broader modes of interpreting knowledge derived from social, cultural, and environmental values. The process is messy, a back and forth, and reflective of the patchwork of built morphologies present in the project's hypothesis. It underscores how Henri Lefebvre generally defines representations of space: "shot through with a knowledge (savoir) i.e. a mixture of understanding (connaissance) and ideology – which is always relative and in the process of change. Such representations are thus objective, though subject to revision."<sup>39</sup> Sea-level rise will oblige the agencies of political power and their mechanisms of control to a revisioning. It also obliges the collective voices of communities including architects and environmental scientists to play a more pivotal role in social and political practices. The instrumentality of new policies, in dialogue with and during the process of designing neighborhoods, acts as a frame for reconfiguring public space as an open, permeable, and adaptive system. Together they create the possibility to sense and discern their interrelationship embedded into the space of the city, including their congruencies and oppositions.

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