

University of Miami Team

Studio Brief

Course: Envisioning a Resilient Nantucket (3 credit seminar elective)

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Course and Student Background:

The Envisioning a Resilient Nantucket course is a 3-credit elective offered to University of Miami students. Students participated in the weekly lectures and meetings with local experts for a total of three contact hours per week. As this is not a design course, their required final deliverable for the semester is to assemble recommendations for a comprehensive roadmap with short, mid, and long-term recommendations. Students were encouraged to supplement their proposals with visual representations. The UM team is composed of four students; two are in their first year of the new interdisciplinary Master of Professional Science in Urban Sustainability and Resilience program, Camila Zablah and Paula Christina Viala, and two are undergraduate students in the Bachelor of Architecture program, Thomas Long and Tanner Wall. Several of the students were previously enrolled in a fall 2020 course titled 'An Introduction to Resilient Building and Community Design,' where in the latter third of the semester they analyzed the town of Nantucket and contemplated potential resilient design interventions.

Proposal: Learning to Live with Water

The University of Miami team is recommending a holistic building block approach to tackling the increasing climate stressors and shocks Nantucket will face over the coming decades. Rather than a stand-alone project, the team suggests a master plan, composed of complimentary and interconnected elements, layered over time, can best serve the residents of the town, while catalyzing change to each of the three study areas. Such a plan connects strategies that in turn are part of a toolkit of tactics and policies aimed at ensuring Nantucket's adjustment to climate change. Instead of fighting the rising seas the overarching theme of the team is one of "living with water." The other concept is to phase the interventions, by coordinating the actions, each phase can become the foundation for the next set of actions. Generally speaking, these include buttressing natural defense systems with a variety of enhanced grey, green, and blue infrastructure systems addressing historic preservation issues for the short and long term and tackling current and upcoming housing and commercial stressors and shocks, while keeping the intersection between the image of the city and its coherent resiliency at the forefront of the chorus of propositions. The recommendations are place-based and informed by the nuances of the community and by successful precedents as well.

The UM toolkit proposes various design features across the study areas that lead to coastal resilience over different generations, while addressing current community in the present. The long term proposals envision reduced carbon emissions and greater connectivity for residents and visitors, as well greater housing variety through a new green spine along Orange Street, a New Nantucket neighborhood integrated to the urban fabric of the upland communities related to a transfer of development right program, complemented by a lowland's 'Stillsville' Fisherman's Village at the bay and floating pontoon islands to absorb commercial and civic functions, the port, and public spaces and parks. Along with architectural and

urban planning proposals, the team is including shoreline infrastructure that includes enhanced and engineered dunes, a boardwalk connecting the community and visitors to the beach, as well as breakwaters and barrier islands to protect the coastline from future erosion.

Short-term Strategies (dealing with 1-2 feet of sea level rise):

In the short term, the team proposes a battery of grey, green, and blue infrastructure actions, and the parallel development of policies linking preservation and adaptation to a transfer of development rights program, which together can facilitate forthcoming resilience measures, while protecting historic resources.

The initial recommended actions include protecting the Brant Point by enhancing its dune with low-tech reed insertions and adding an elevated boardwalk to reduce dune drift.

At the waterfront parallel to Washington Street, around the existing marsh, the team proposes introducing a performance-based hybrid shoreline, composed of 3-d printed disks capable of hosting and thereby enhancing the biological and ecological value of urban and coastal hybrid (green + gray) infrastructure.

In the Downtown area, the team proposes greater flexibility be introduced to the preservation ordinances and standards so 'dry-proofing' and 'wet-proofing' of existing buildings in their current location can take place, while for more historically significant buildings, a program be established to shepherd the relocation of these structures to designated 'receiving' areas in the uplands, including but not limited to, the proposed "New Nantucket" neighborhood, which would be envisioned and potentially laid out in this initial period.

A new linear park is envisioned along Orange Street, within the current right of way, and it introduces a more intimate and picturesque way to circulate around and to connect upland neighborhoods. This concept could be extended across all the upland neighborhoods, from one end of town to the other. This linear park can have either an informal character or a more formal one, depending on the expectations of residents. The team illustrates the more formal option, in which a canopy of trees can reduce the micro-climate during the warmer summer season.

As future sea-levels will near Union Street, the team proposes a re-imagining and repurposing of its street section and an examination of property vulnerabilities along the lower lying streets be completed to thereby engender an initial draft of a planned retreat plan. The team recommends that a 'New Nantucket' neighborhood plan be laid out and it become one of the 'receiving' sites as part of a needed 'Transfer of Development Rights' (TDR) program.

Mid-term Strategies (preparing for 3-4 feet of sea level rise):

After close examination of FEMA FIRM maps and the interactive Climate Central Surging Seas maps, and hearing local experts' concerns, the team identified the highest vulnerability sites within each neighborhood and determined that in the mid-term the framework for the needed longer-term set of interventions would have to be underway by this period.

Off shore, at the Coatue barrier island, by now largely under-water, a grey/green infrastructure system can be introduced to act as a breakwater, hosting underwater habitats for sea life. The 'sea-hive' system, designed by a UM College of Engineering faculty member, could easily be added to the barrier island, to buttress and enhance the performance of the breakwater system, thereby better protecting the town of Nantucket of future storm surge wave action, accompanying the increased number of Nor'easters.

In Brant point, due to the low-lying terrain between the coastline and the cliffs, many properties would be underwater or nearly so, by the time four feet of sea level rise has occurred. Thus, in preparation for that forthcoming reality, the team suggests the expansion of the Land Trust's acquisition power and the execution of a 'Transfer of Development Rights' (TDR) program between upland (receiving) and lowland (sending) sites, so as to mitigate the financial burden on property owners, while expanding the coastal green and blue infrastructure systems. This could potentially be funded in part by the current Infrastructure Bill making its way through Congress and with funding from the US Army Corp of Engineers. The new wetlands become part of a coastal park system and a new tourism destination capable of spurring related businesses nearby.

In the Washington Street area, the team proposes several coastal interventions, aimed at maintaining and expanding commercial waterfront activities and increasing mixed-use (Live/work) options. To achieve this goal, the team proposes three (3) complimentary initiatives. One entails the conversion of existing waterfront wharfs overtime to a string of floating islands, tethered to the 'mainland' with adjustable docks and composed of barges docked at concrete pylons, interconnected to each other to create a 'waterfront Main Street' and public waterfront plaza. These 'finger' islands can accommodate different uses and one of them can be dedicated to the larger ships, which dock at the harbor. This strategy learns from Hafen City, in the Netherlands, where an even higher density waterfront floating city has been successfully created.

As surrounding low-lying areas would become a part of the coastal green and blue network in this area as well, a second proposal for the Downtown waterfront calls for a 'live/work' fisherman's village, perched directly over the waters, similar in character to South Florida's "Stillsville," where the habitable spaces are lifted considerably above the mean sea levels, and below them, open decks can host a variety of commercial activities, including fish markets, craft shops, etc.

In the meantime, along the existing waterfront, existing buildings could be lifted to a new "Design Flood Elevation (DFE)" and new buildings would be required to meet the new DFE height for lowest habitable spaces. This may result in buildings perched above a rip-rap edge, similar to how houses in Lofoten, Norway interact with the shoreline. This string of buildings along this ridge would act as a breakwater of sorts, and would provide a very picturesque waterfront for visitors and residents alike.

In the Downtown area, the team determined a two-prong approach, one which would accommodate a commercial spine and an electric trolley along Union Street and a parallel linear green park along Orange Street to accommodate pedestrian and bicycle traffic; both building upon the lighter interventions proposed in the short-term phase. These interventions aim to reduce car-dependance, thus reduce carbon emissions, and should be seamlessly introduced into the current rights of way. Such adjustments to the urban fabric respect the scale of existing buildings and streets, while introducing alternate modes of transportation, which could be particularly useful during 'tourist seasons.' Buildings along these streets would be encouraged to raise their lowest habitable floor so as to be above any future storm surge wave action. This on average represents a vertical adjustment of between 1 and 4 feet, given their relation to current mean sea levels. Land uses in these areas could be adjusted to accommodate a degree of mixed-uses.

The FEMA FIRM maps again proved helpful in identifying future sea levels and it became evident that a new harbor would naturally result at the bottom of Union Street. The team proposes that plans be developed

to envision what a new harbor in this area would encompass. It would require a channel to connect it to open waters. This new harbor can compliment the tourist oriented activities at the floating islands.

Long-term Strategies (living with 6'- 9' of sea level rise)

By the end of the century, it is estimated that sea levels will rise considerably along the eastern seaboard, and today's Nantucket will be transformed into a new vibrant town, capable of living with the presence of water. This morphing will require actions, which currently seem untenable or unnecessary, but which will prove necessary if such a balance between the natural and the manmade environments is to be achieved with any degree of success.

In the Brant Point neighborhood, many of the inland plots of land have by now have disappeared, but as FEMA FIRM maps indicate, a string of parcels, along the current waterfront, will likely remain. The edges of their plots may now be encircled by water and need buttressing, making them more like individual islands, where one or a few plots remain. As these properties are of significant value, their property owners may want to consider lifting their existing buildings. This would require segmenting them, raising the habitable levels to a new DFE, buttressing and extending their foundations, re-attaching the segments of these historic assets and then raising the land below them, so the plots and the buildings remain habitable into the next century. This concept, known as 'ponders,' has been successfully employed in the Netherlands for centuries along the Wadden Sea and has been introduced into the bayous of Louisiana as well. Due to the related costs, it is only a viable option for high-value properties with deep pocketed landowners. Policies should be adjusted to allow for such resilient design actions.

Along the prior Downtown neighborhoods, the floating islands, the fisherman's village, and the waterfront business district are now active, complete, and contribute to the economic life of the town. The waterfront park system has been expanded over time and the early bio-tiles introduced to protect the shoreline have been effective and have been integrated into a waterfront trail through the wetlands.

Along Union Street, a new waterfront promenade has been created, expanding upon the concepts laid out in the mid-term. This new public promenade has been beautified and includes a seawall, landscape features and places for public events and pop-up businesses. The electrified trolley has been extended to outlying neighborhoods, and ends at the new harbor. The linear park along Orange Street has also been extended to reach new neighborhoods and in some locations, when empty parcels are made available, the park can be extended to include small playgrounds.

New Nantucket is by now home to several of the lowland historic buildings and by its design it is integrated into the fabric of the rest of the town.

Through this chorus of actions, Nantucket endures as a unique, picturesque, and historic town, attracting a robust number of visitors interested in experiencing its resilient neighborhoods and natural wonders. Nantucket indeed remains- viable, thriving, and an example of the balance which can be attained between innovation and traditions, between the natural and the manmade.