



# Restoring coastal wetlands for climate resilience:

**A CASE STUDY AT NAVAL BASE VENTURA  
COUNTY POINT MUGU**

August 2021





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# I Executive Summary

The U.S. Congress and the Department of Defense (DoD) have determined that climate change is a threat to national security and have required military installations to develop plans to improve the climate resilience of both military installations and key supporting civilian infrastructure. A recent Navy report, co-authored by The Nature Conservancy, indicates resilience could be significantly increased at a naval base in southern California by consolidating vulnerable infrastructure on higher ground and restoring wetlands, dunes, and beaches, which buffer the base from storms and absorb floodwaters.

The approach to resilience described in the “Naval Base Ventura County (NBVC) Point Mugu Coastal Adaptation Vision” report (2020)<sup>1</sup> hinges upon the growing awareness within DoD that while flooding and other natural processes can wipe out roads and other built assets, the same natural processes contribute to resilient ecosystems that, in turn, offer long term protection to those same built assets. This alternative of buffering infrastructure with coastal habitats instead of coastal hardening serves as a model for other coastal military installations tasked with improving resilience. If natural infrastructure and coastal restoration strategies are adopted more broadly and supported through substantial DoD investment, it could significantly increase the buffering capacity of a portion of the world’s coastal lands, bolster long-term protection for billions of dollars of military and key supporting civilian assets, and reduce the need for costly repairs.

Using natural coastal infrastructure to buffer NBVC Point Mugu from rising sea levels and hazardous storms offers many benefits over traditional approaches. Pre-emptively moving military assets further from the many hazards along the shoreline is a strategic, forward-thinking military readiness tactic. And, when given the space, natural infrastructure such as beaches, dunes, and wetlands are relatively resilient to storms and floods. After a disturbance, natural systems often build themselves back, and can continue to serve as buffers to assets located behind them. Relocating assets away from the shifting coastline also creates a pathway for beaches and wetlands to adjust and migrate with sea level rise. This approach further safeguards all the other benefits provided by natural coastlines—as water purifiers, nurseries for fish, habitat for threatened and imperiled plants and animals, and carbon sinks.

Implications of NBVC’s use of natural infrastructure for climate resilience extends far beyond this singular base. Increasing resilience to military installations contributes to regional coastal resilience. The military can also be a powerful partner for communities and conservation organizations in realizing nature-based solutions for resilience. Recent legislation—including updates to the Readiness and Environmental Protection Integration (REPI) statutes that authorizes DoD installations to partner with nearby towns, other agencies, NGOs on conservation – expanded DoD’s approach and funding to include nature-based resilience projects.

<sup>1</sup> Environmental Science Associates. Coastal Adaptation Vision for Naval Base Ventura County Point Mugu. (Prepared for The Nature Conservancy and Naval Base Ventura County, 2020).

## KEY TAKEAWAYS:

- If no action is taken, a large portion of NBVC Point Mugu’s built assets and wetlands would convert to open water by 2060 due to sea level rise and associated erosion and flooding.
- Certain base assets, such as the airfield, need to be defended in place; removing and relocating other assets and infrastructure provides room for the shoreline to naturally maintain and migrate with sea level rise, ensuring the continued existence of beach and wetlands that serve as critical buffers to base assets.
- Wetlands at NBVC Point Mugu are among the largest remaining salt marsh habitats in southern California, supporting a great diversity of species, including imperiled species.
- Removing and relocating assets at the base would create over 700 acres of space to restore to wetlands and natural habitats, bolstering nature’s capacity to absorb the impact of storm surges and flooding.
- Relocation with restoration is the only option that meets the military mission and ecological goals – ensuring beaches and coastal habitats will continue to thrive and provide protection in the long-term.



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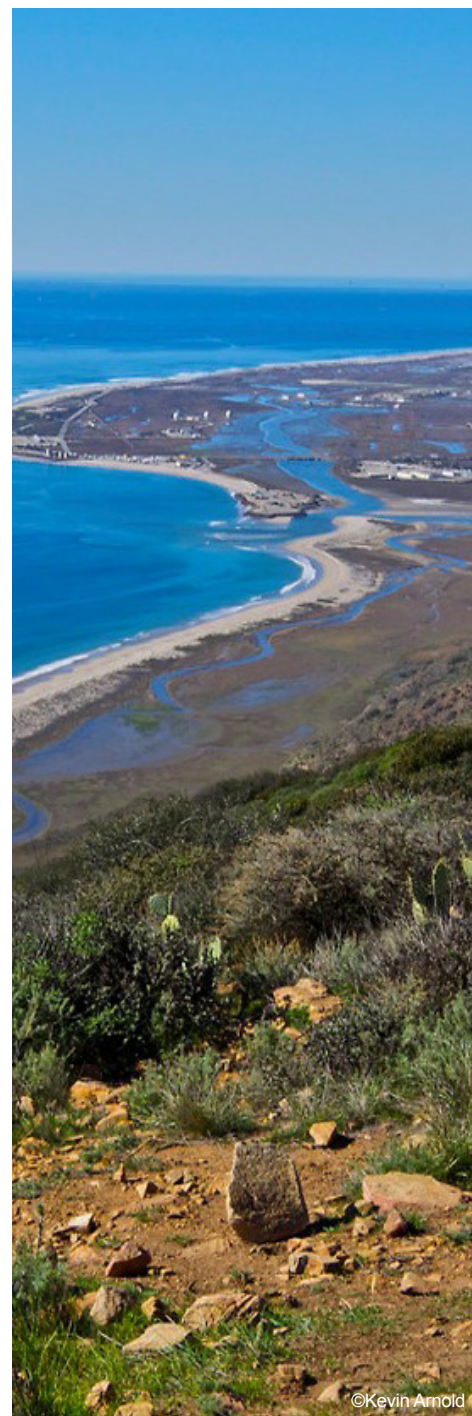
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Beyond the region, these pioneering efforts at NBVC can also serve as a model for other similarly at-risk coastal installations.<sup>2</sup> While the investment required to relocate infrastructure is significant, doing so creates a pathway for a carefully managed process, versus waiting for disaster to strike before taking protective actions, with the resultant training and operational interruptions and costly repairs to damages. For example, Hurricane Florence in 2018 damaged hundreds of buildings at Marine Corps Base Camp Lejeune and Marine Corps Air Station New River in North Carolina, with repairs estimated at \$3.6 billion,<sup>3</sup> and that same year Tyndall Air Force Base in Florida incurred an estimated \$4.7 billion in hurricane damage.<sup>4</sup>

The nature-based approaches and collaborative, science-based planning process represented by the NBVC Adaptation Vision can be replicated locally, regionally, and globally, to ensure that beaches and wetlands continue to thrive and provide protection to coastal communities and critical infrastructure. Making room for natural infrastructure ensures habitats can migrate with sea level rise and continue to act as buffers, providing protection to coastal communities, infrastructure, and ecosystems.

In the absence of widespread adaptation practices that prioritize natural coastal buffers, fear of rising sea levels and storms may trigger governments to build more sea walls and other armaments. This trend poses an existential threat to the planet's already dwindling coastal wetlands and beaches, as hardening facilitates their transition to open water,<sup>5,6,7</sup> and eliminates natural buffering capacity. In the U.S., even with environmental protection laws, more than 100,000 acres of coastal wetland transitioned to open water between 2004-2009, and wetlands disappeared at an average of 60,000 acres per year—a more rapid decline than in the years prior.<sup>8</sup> The global extent of wetlands is estimated to have declined between 64-71% in the 20th century, and degradation continues worldwide.<sup>9</sup> The further loss of coastal habitats will be devastating, especially to communities that depend on the coast for tourism, and the many other ecosystem services provided.

In short, if natural infrastructure and coastal restoration strategies are adopted more broadly and supported through substantial DoD investment, it could significantly increase the buffering capacity of the nation's coastal lands, help secure long-term protection for billions of dollars of military assets, reduce the likelihood of unplanned training and operational disruptions and the need for extremely costly repairs, and set an example for the world.



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## II Background

### DOD'S COMMITMENT TO RESILIENCE TO ASSURE THE MILITARY MISSION

The United States operates thousands of military installations in the US and worldwide, worth about \$1.2 trillion.<sup>10</sup> These facilities are where personnel train, test weaponry, and work to deter foreign adversaries, with the specific aim of ensuring the nation's security.

In recent decades, an unconventional antagonist to military readiness emerged in the form of climate change. Base operations are now persistently disrupted by recurrent drought, heat waves, catastrophic wildfires, and flooding. Additionally, coastal installations are being impacted by rising sea levels, erosion and increasingly powerful storms. In 2018, Hurricane Michael damaged 95 percent of the infrastructure at Tyndall Air Force Base in Florida, with experts projecting a cost of over \$3 billion to repair the base.<sup>11</sup>

These threats are likely to increase in severity, duration and frequency in the years to come, and the seriousness of these disruptions prompted the Congress and the Department of Defense (DoD) to declare climate change a major threat to America's national security.<sup>12</sup> The Congress and DoD leadership mandated that the military services incorporate climate considerations into infrastructure and operations planning, and to comprehensively "assess and manage risks associated with the impacts of a changing climate."<sup>13</sup>

The DoD also recently began to emphasize the importance of pursuing climate-adaptive actions that increase base resilience. Resilience has historically been an ecological term, defined as "the amount of disturbance that an ecosystem could withstand without changing self-organized processes and structures."<sup>14</sup> DoD defines resilience similarly, as the "ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions."<sup>15</sup> This definition is associated explicitly with the impacts of climate change and applies to all aspects of DoD, including installations, operations, transportation and more.<sup>16</sup> In 2020, an amendment to U.S. law now requires major bases to, over three years, develop military resilience components in installation master plans to address climate impacts.<sup>17</sup> Other DoD programs, such as the Readiness and Environmental Protection Integration (REPI) statute, were also expanded by Congress to encourage climate resilience.<sup>18</sup>

*"The effects of a changing climate are a national security issue with potential impacts to Department of Defense missions, operational plans, and installations."*

– US DEPARTMENT OF DEFENSE, 2019



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*"Sea level rise, extreme weather, drought, floods, you name it—there is a growing recognition that those are real impacts on national security and the ability of the DoD to operate."*

– BOB BARNES, RETIRED BRIGADIER GENERAL, US ARMY

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17 10 U.S.C. § 2801

18 10 U.S.C. § 2684

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