CA - Kelp forest ecosystem loss is not isolated to California

In cool coastal waters globally, tendrils of aquatic vegetation cascade from the surface of the ocean and extend to the seafloor creating an incredibly complex and irreplaceable ecosystem that is invisible to most. The aquatic vegetation, kelp, has the same sort of physical characteristics as a tree.

WEST COAST

By TRISTIN MCHUGH | Fort Bragg Advocate- News

The value of the kelp cannot be overstated as the forests they create are just as rich, dynamic, and important as their terrestrial counterparts such as the Amazon or Redwood forests. Unfortunately, starting in 2014, the kelp forests of the North Coast of California, primarily along the Sonoma and Mendocino County coastlines, have declined by as much as 96%. Poor oceanographic conditions, the complete absence of any apex predators, and a change in behavior of purple

urchins from passive to active grazers led to a large-scale shift from bull kelp forests to urchin barrens across most of Northern California. This combination of stressors, known to create a “perfect storm” of conditions each facilitating and exacerbating the other, led to considerable aquatic deforestation.

Kelp forest ecosystem loss is not isolated to California. These ecosystems are declining at an accelerated rate globally. Such extensive and rapid losses have had severe ecological, social, and economic impacts that touch every corner of human existence all around the world. At The

Nature Conservancy (TNC), we have launched an ambitious effort to protect and restore kelp forest ecosystems here in California and around the world. TNC has experience and expertise in restoring millions of acres of forest habitat all around the world, and we are now drawing our attention to our underwater forests. With a diverse set of partnerships, TNC is focused on advancing solutions for the protection and restoration of kelp forests by addressing three main components: Mapping and Monitoring, Reset and Restore.

In order to understand the extent of the problem, TNC and partners at UC Los Angeles, Woods Hole Oceanographic Institute, and Greater Farallones Association set out to conduct research on a suite of kelp mapping tools with differing capabilities and resolutions. Specifically, we wanted to know how much kelp forest loss there was, and where the strongholds of kelp were at higher spatial resolutions than had ever been obtained and mapped at scale. Recently, our team launched Kelpwatch.org, the world's largest map of kelp forest canopy in both time and space extending from Baja California, Mexico, to the Oregon-Washington State border seasonally from 1984 to 2021. A groundbreaking open-source web

tool, Kelpwatch.org harnesses the power of machine learning and cutting-edge remote sensing science to analyze nearly 40 years of Landsat satellite data and interactively display the kelp forest canopy. Kelpwatch.org users can select a region, time frame, and seasons of interest to animate the changes in the kelp canopy over time and freely download data.

The web tool has been launched amid historic and sustained declines in many kelp forest ecosystems, and we are using this tool to inform where and how we conduct kelp forest restoration, like identifying areas for restoration where kelp can be defended and expanded upon.

To reset the ecosystem, we are interested in exploring innovative ways to reduce the density of kelp-eating urchins on reefs to facilitate kelp growth. In partnership with Reef Check, California Ocean Protection Council, California Department of Fish and Wildlife, and local commercial urchin divers and processors, we are experimentally removing urchins at three targeted sites in Mendocino County. As for the urchin being harvested, to ensure none are wasted, we are exploring the development of a new market for food and non- food urchin. An urchin ranching industry could transform empty purple urchins into valuable seafood, and non-food grade urchins could be

used for soil amendments. In addition to human-led efforts to remove purple urchins, TNC and Friday Harbor Marine Labs are leading a captive breeding program for the endangered Sunflower seastar to safeguard this iconic and invaluable ocean predator.

To restore the ecosystem, we are working with the University of Milwaukee and UC Santa Cruz to develop a spore bank for bull kelp to capture genetic samples. This seed source could restore healthy and resilient kelp forests in the future. We are also exploring the potential of Green Gravel and regenerative experimental bull kelp farming to increase the amount of habitat-forming and carbon sequestering kelp.