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# Stanford Report

(<https://news.stanford.edu/report>)

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## Underwater Stanford scientists investigate the kelp forests

A five-week course tests the mental and physical limitations of six up-and-coming scientific divers as they learn about the ecology and conservation of kelp forest communities through subtidal techniques.

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BY MADDI LANGWEIL

Swaying through the currents of Monterey Bay are underwater trees enrooted to the ocean floor. With blades poking through the surface of the water, these captivating towers are the heart of the West Coast's marine life, and a life's work for many researchers.

"Giant kelp (*Macrocystis pyrifera*) provides the essential structure for an ecosystem that harbors an amazing diversity of organisms. From an ecological standpoint, giant kelp is comparable to framework-building corals on tropical reefs," said Robin Elahi (<https://profiles.stanford.edu/robin-elahi>), a lecturer at Stanford University's Hopkins Marine Station (<https://hopkinsmarinestation.stanford.edu/>). "There's an intrinsic value to the biodiversity of kelp forests, but there is also a social and economic importance associated with these striking ecosystems."

Home to various organisms like abalone, rockfish, and sea otters, kelp forests are made up of brown algae found in dense stemlike structures. A beautiful space for marine creatures to live in, they also provide commercial and recreational value.

The prolific influence associated with these underwater forests made them perfect for teaching students research techniques and ecosystem complexities. Since the 1970s, when the first marine scuba diving course was taught at Hopkins Marine Station, the *Ecology and Conservation of Kelp Forest Communities* course has had a few facelifts. However, the course remained anchored to three components: train the next generation of underwater scientists, teach the students species identification and natural history, and engage in the ecology of this ecosystem through hands-on long-term monitoring.

"While training students in accordance with American Academy of Underwater Sciences standards and preparing them to be competent divers, we teach how to conduct science underwater and participate in the stewardship of datasets extending back to the 1970s," said Elahi, who currently leads the course. "It can test a student's physical and mental strengths."

Before Elahi taught the course in 2019 and again this year, Jim Watanabe, lecturer emeritus at Hopkins Marine Station and local kelp ecology expert, taught the class for nearly three decades. Under both instructors, this summer education has allowed students to work in challenging conditions, build a strong sense of camaraderie in a short period of time, and explore their potential in the field of marine ecology.

Kersten Schnurle, BS '12 MS '12, who took the course from Watanabe as a student in 2017 and has returned as a teaching assistant three times, has found it to be a pivotal experience in her life.

“The invertebrate life along the California coast is incredible! This class showed me that sharing it with eager and inquisitive people is exceptionally fun and rewarding,” said Schnurle, who was able to take the course as a non-Stanford student through a Hopkins Marine Station endowment. “It was my favorite class that I took at Stanford, or anywhere. *Kelp Forest Ecology* made me want to study kelp forests and being an assistant for the course started my forays into the field of outdoor education.”



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Members of the 2022 session of Ecology and Conservation of Kelp Forest Communities (left to right): Aubrey Taradash, Robin Elahi, Kersten Schnurle, and Ben Hodder in the back row; Nicole Woosley, Sarah Donald, and Samantha Persad in the front row. (Image credit: Maya Green)

“How to succeed in kelp forest ecology.” (Produced by Sarah Donald)

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## A morning dive with the kelp

### Stanford Report

A typical rhythm of hauling heavy gear, fastening swimsuits, and the flopping of rubber fins hitting the boats as early as 8 a.m. signals the start of the day. Following a morning of daily briefing and diving practices is <https://news.stanford.edu/report/> which allows students to write down their morning observations and learn from their physical experiences. As Elahi and his fellow co-instructors intend to pack in as much training as possible throughout the day, special outings like night dives occur as well.



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Supplies set out in advance of a dive on the Hopkins Marine Station campus in 2019. (Image credit: Mike Burnett)

Generally, with no more than eight students in a class for safety reasons, the small group of students each year develop intense bonds with their natural community and with each other. A bond that Jennifer Yin, MS '20 PhD '23, describes as “amazing.”

“I never knew I’d form a bond with this class and the environment that has become integrated in my career. Today, I commonly collaborate with biologists and ecologists to work together to understand and conserve coastal sites that overlap with local ecosystems,” said Yin, who took the course in 2019. “I felt very equipped when I had to do a field experiment for my job this summer, which required a lot of the skills that I learned from the kelp ecology course with Dr. Elahi.”

Besides the physical intensity of the class, students tested their mental prowess by learning the Latin names of over

150 species – a task that is rewarded when they get to see many of those species inhabiting the kelp forests.

## Finding inspiration through fatigue

Students like Yin, who was a graduate student during the course, and Schnurle, who was five years out of Stanford at the time of her experience, exemplify the diverse makeup of the special course. Elahi recalls a graduate student in the department of Modern Thought & Literature who took the course because it pertained to his dissertation on the environmental anthropology of kelp forests.

“I enjoy having different majors, graduates, and undergraduates in the course. Everyone has something to offer where the young can learn from the older students and vice versa. This creates a greater diversity of perspectives,” Elahi said.

As various majors and ages participate in the class, they learn field techniques such as dive navigation and planning, species identification, underwater videography, and field surveys of kelp and associated invertebrates. Freya Sommer, the Dive Safety Officer at Hopkins Marine Station, plays an integral role in the course by leading the scientific diver training in accordance with the standards set by the American Academy of Underwater Scientists. Part of conserving these kelp forests involves counting and calculating their abundance, density, and making observations about the types and amounts of species that are found in the giant kelp.



These skills, Elahi says, are transferable to any field of ecology and science because of the critical thinking and meticulous awareness of oneself, the environment, and the overarching goals involved. Withal, students are expected to put themselves first and take care of what they need in order to be successful in and out of the field. (<https://news.stanford.edu/report>)

This year, Elahi has incorporated a project for students to use underwater video equipment provided by **Stanford's Transforming Learning Accelerator** (<https://transforminglearning.stanford.edu/>) to capture transects as well as snippets of field sites and organisms. The footage will be used to make **short movies of each explorer's life** (<https://purl.stanford.edu/km092my4610>) as an underwater ecologist and kelp forest scuba diver. The project's goal is to increase access to marine science and give students anywhere the ability to learn about the natural history and participate in the long-term monitoring of kelp forests in Monterey Bay.



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Robin Elahi conducts video surveys along a transect in the kelp forest adjacent to Stanford University's Hopkins Marine Station. (Image credit: Samantha Andrzejaczek)



Course participants in 2019 (from left to right): Kersten Schnurle, Jim Watanabe, David Stentiford, Taylor Hughes, Ann Marie Abraham, Freya Sommer, Angela Korabik, Mike Burnett, Hanna Payne, Jim Rymarczuk, Robin Elahi, and Jennifer Yin. (Image credit: Courtesy Robin Elahi)

Besides the new project, a summer Research Experiences Especially for Freshmen and Sophomores (REEFS) intern at Hopkins Marine Station joined the course with the goal of developing the methodology of the video monitoring surveys. This work will be part of a larger international effort – Diversify and Integrate Marine Education at Stations (DIMES (<https://dimes.stanford.edu>)) – to increase virtual access to rocky shore ecosystems along the west coast of North America. Eventually, these resources will be publicly available on the Stanford Digital Repository.

In addition to providing data for other researchers, the content these students create this summer quarter will be tender reminders of the adventure they embarked on – and will hopefully inspire prospective students to get out of their comfort zone and follow in alumni footsteps.

“If you are willing to withstand some cold and fatigue, and carry a lot of gear, this is the best class in the world. Nowhere else at Stanford can you get the immersive experience (literally and figuratively) that is *Kelp Forest Ecology*,” said Schnurle. “You experience physical challenges, learn to make biological observations, and build camaraderie, in an unsurpassable setting with phenomenal people.”

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