The School of Ocean and Earth Science and Technology at the University of Hawai'i at Mānoa is located on the traditional 'āina of the Kanaka 'Ōiwi, who never ceded their sovereignty to the United States. We recognize that her majesty Queen Lili'uokalani yielded the Hawaiian Kingdom under violent duress and protest to the US to avoid the bloodshed of her people. We further recognize that Hawai'i remains an illegally occupied state of the US.

Generations of Indigenous Hawaiians and their knowledge systems have sustainably cared for Hawai'i and still continue to do so. We are grateful to occupy this space and learn the ways in which we can contribute. As a school, we seek to support the varied strategies that the Indigenous peoples of Hawai'i are using to protect their land and their communities, and commit to dedicating time and resources to working in solidarity.
Aloha kākou! Welcome to SOEST, the School of Ocean and Earth Science and Technology at the University of Hawai‘i at Mānoa. SOEST has a tradition of innovation and excellence as an international leader in many diverse fields that are important in Hawai‘i and throughout the world. SOEST scientists are global experts in environmental science, marine and terrestrial biology, planetary exploration, geophysics, geology and hydrology, oceanography, climate science and meteorology, alternative energy and natural resource sustainability, and many more. These disciplines overlap with Hawaiian culture and Indigenous ways of knowing and doing. Through a variety of research, education, and community-oriented activities, we are exploring and embracing the synergy between Indigenous and western science.

SOEST celebrates its 35th anniversary in 2023. We are proud of our past and we are excited about the future. Over the past decade, SOEST has brought in over $976 million in extramural funds and private revenue. We are an excellent investment for the State of Hawaii. In FY2022 SOEST received $36 million in state general funds and generated $103 million in extramural funds for research and training.

SOEST is home to a vibrant community of students, staff, faculty, and volunteers. We are a diverse, student-centered, research and education institution focused on advancing solutions to living on Planet Earth in ways that conserve natural ecosystems; promote just, healthy communities; and foster a high-tech economy in which future generations will thrive.

SOEST is widely recognized as a world-class research and academic institution. We are ranked in the top 1% globally for Marine Sciences, and top 3% for Earth Sciences. Closer to home, we are responsive to the needs of Hawai‘i and engaged in finding solutions to our most pressing socio-environmental problems. Climate change, biodiversity loss, pandemics, pollution, and injustice are overlapping global crises that demand our full and immediate attention.

As UH Mānoa strives to become a Native Hawaiian Place of Learning, SOEST continuously works to infuse our research, teaching, and service with the Indigenous concept of aloha ‘āina. We value diverse voices, and we are dedicated to the idea that future generations have a right to a world that is just, sustainable, and resilient.

We are excited to share with you who we are, what we’ve done, and where we are headed!

Chip Fletcher
Interim Dean of SOEST

www.soest.hawaii.edu
# Academics and Student Services

## Opportunities and Experiences

In 2014, 2016, 2018, 2020, and 2022, there were 150, 100, 150, 200, and 250 total SOEST enrollment respectively. This shows an overall trend of increase in enrollment from 2013 to 2022.

### Enrollment by degree-granting program: 2013–2022

- **ATMO**
- **ERTH**
- **MBio**
- **OCN**
- **ORE**

## Services and Activities

- **SOEST Student Academic Services (SAS)**

## Student Support

### SOEST Male Mentoring Bridge

This program connects Native Hawaiian undergraduate students with a mentor who is an underrepresented SOEST graduate student, postdoctoral research associate, or recent graduate. The goal is to inspire Native Hawaiians, kamaʻāina, and individuals of other underrepresented ethnicities into ocean, Earth, and environmental science professions.

### Enrollments by semester and degree-granting program:

#### Fall (F) and Spring (S) Semesters:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Program</th>
<th>2014</th>
<th>2016</th>
<th>2018</th>
<th>2020</th>
<th>2022</th>
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<td>100</td>
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<td>OCN</td>
<td>150</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>250</td>
</tr>
</tbody>
</table>

## www.soest.hawaii.edu/soestwp/education

- Proud and happy SOEST graduates!

- SOEST courses engage students in a variety of collaborative learning opportunities.

- **S** = Spring semester
- **F** = Fall semester
Community Outreach and Student Recruitment

Community Outreach

7KURXJXRUFRRPXQLWRXWUHDFFDFWLYLWLHVZKVDUHКОHĐQDUHVWWVSRQGFWQGLVFRYULHVQDQGLJKLJKQJOJKWKLHQYDOXDEOHLQIRUPDLRLQDGQVHULYLVFZHSLQRYLGHWRDGGHVVFRRPSOHLVQHVFDHGELSEHRSHOQL+DZDLQDGDURQWKZLRQDG

• **SOEST faculty, staff, and students** visit with Hawai‘i high school students in person and virtually to share the latest scientific discoveries and academic opportunities available at SOEST.

• We attend college and career fairs at high schools across the State and participate in transfer fairs at University of Hawai‘i Community Colleges to share the path to becoming an undergraduate student.

• We offer tours of SOEST facilities and laboratories for high school students to experience camp life, view working spaces, and meet current students, staff, and faculty.

• During the **Mānoa Experience**, prospective students from Hawai‘i and beyond learn about all that SOEST and UH Mānoa have to offer.

• Day-long to multi-week experiential programs for high school students immerse participants in field and lab activities and data analysis.

Community Outreach

**Through our community outreach activities we share the latest scientific discoveries and highlight the invaluable information and services we provide to address complex issues faced by people in Hawai‘i and around the world.**

• The **biennial SOEST Open House** is a two-day event wherein we open our doors to host approximately 6,000 people — 4,000 students and 2,000 community members. During this exciting event, SOEST students, faculty, and staff share their research and passion for science through hands-on activities, demonstrations, and displays.

• **Public presentations** at the Hanauma Bay Education Program and the HIMB Coral Resilience Laboratory's partnership with Kahala Hotel allow our students and researchers to share their latest findings; and we co-host renowned international speakers with the UH Better Tomorrow Speakers Series.

• **Citizen science initiatives**, such as the University of Hawai‘i Sea Grant College Program’s Hawai‘i and Pacific Islands King Tides Project, engage the community in collecting critical data to help understand and adapt to rising seas.

• **Participate in community events**, including at the Waikīkī Aquarium and local fairs, and family STEM events at schools.

• **Sci-Art collaborations**, such as Hawai‘i Sea Grant’s ResilienSEA: a Celebration of Science, Education and Art, showcased artwork by local artists inspired by ongoing research and education activities.

www.soest.hawaii.edu
Ship Operations and Facilities

**Vessels and Underwater Vehicles**

7KH8+0UDLQH&HQWHUDPLQWDVQDQGSHUHWDWHVDSDQHJKHVLQSDQGRWHQVULQJ\nVRKHU\n
- **R/V Kilo Moana** — 186-ft Small Waterplane Area Twin Hull (SWATH) vessel transits the deep waters near Hawai'i and across the Pacific Ocean.
- **R/V Kaunānā** — 40-ft aluminum hulled catamaran workboat, used for coastal research in the main Hawaiian Islands.
- **R/V Imua** — 68-ft aluminum catamaran supports the management and conservation of Hawai'i's marine resources.
- At the Hawai'i Institute of Marine Biology, 17' and 22' Boston Whalers and the Kilo Kai are used for nearshore field work.
- **R/V Lu'ukai** — 6000 meter-rated remotely-operated vehicle performs science operations at the seabed or throughout the water column.
- **Towed sonar systems** — three sidescan sonar systems provide mapping and ocean sensing capabilities.
- **Ocean Gliders** — buoyancy driven autonomous underwater vehicles fly through water with extremely modest energy requirements.
- **REMUS AUV** — Remote Environmental Monitoring Units are equipped with sensors to assess nearshore waters.

**Ocean Observatories**

5HPWHRDQGWOFDEOHGRHFDQREVHUYDWRULHVKHQWGLQYHQW\n\n\n5\n\n3DFL\n\n6WDLRQR\n\n3\n
**Specialized Facilities**

- **Advanced Electron Microscopy Center**
- **Biogeochemical Stable Isotope Facility**
- **Biological Electron Microscope Facility**
- **Confocal Microscope Facility**
- **Electron Microprobe Facility**
- **Evolutionary Genetics Core Facility**
- **Flow Cytometry Facility**
- **Geological Sample Facility**
- **Glider Facility**
- **Hawai'i Sustainable Energy Research Facility**
- **Hawai'i Tree Snail Conservation Laboratory**
- **Hawaiian Drosophila Research Stock Center**
- **Lapidary Facility**
- **MC-ICP-MS Laboratory**
- **Olinda Rare Plant Facility**
- **SOEST Laboratory for Analytical Biogeochemistry**
- **Volcano Rare Plant Facility**

**SOEST faculty and staff are recognized as international research leaders on topics as varied as renewable energy, oceanography, coral reef ecology, volcanology, remote sensing, cosmochemistry, tropical meteorology, and climate modeling. Enabling this work are the world-class vessels and facilities housed within the School.**

**A:** SOEST's Research Vessel Kilo Moana.

**B:** HIGP undergraduate research assistant prepares comet-dust samples for further analysis.
The Marine Biology Graduate Program is an interdisciplinary program co-administered by the College of Natural Sciences and the School of Ocean and Earth Science and Technology, offering master’s and doctoral degrees in Marine Biology. The Marine Biology Graduate Program provides graduate students access to faculty in marine biology across disciplinary boundaries.

Academics

Faculty: 49
Affiliate faculty: 22
Graduate students: 85
Staff: 1

MBIO by the numbers

Students prepared for successful, productive postgraduate and professional careers where they can serve as technically trained scientists, managers, and policy makers.

Research findings contribute science-based knowledge for managing marine resources as stressors increase from human exploitation and global climate change.

Partner with state and federal agencies, such as NOAA’s Pacific Islands Fisheries Science Center, Hawai’i Department of Land and Natural Resources, and non-governmental organizations.

Nearly half of the 53 MBGP graduates currently work in positions that serve the State of Hawai’i.

mbiograd.manoa.hawaii.edu
Department of Atmospheric Science

Weather and changing climate have a significant influence on the well-being and future of our communities. ATMO faculty, students, and graduates make an impact through their award-winning research and teaching at the University and working at government agencies and private industry.

Academics

- PhD, MS, and BS programs in Atmospheric Sciences
- Combined Bachelors and Masters — five-year program saves students time and financial resources, and readies them for the workforce
- State-of-the-art weather lab prepares students for working in the National Weather Service
- Field work opportunities for undergraduates and graduates provide real-world experiences
- Practical computing and modeling courses

Community impact and contributions

- Vog Measurement and Prediction Program provides real-time vog conditions statewide that can impact community health and create a visibility hazard for general aviation
- Hawaii State Climatologist Office — modeling, predicting extreme events; empowering community preparation
- Nimbus AI Start-up — accurate cloud predictions improve solar energy production; in support of the Hawai'i Clean Energy Initiative of 100% renewable energy by 2045
- Expanding Your Horizons — Women in Science Outreach and Mentoring help pave the way for the next generation of atmospheric scientists

ATMO by the numbers

- Faculty: 11
- Researchers: 6
- Undergraduates: 18
- Graduate Students: 22
- Staff: 2
- Funding during past decade: $14M
Community impact and contributions

- Nutrient-rich groundwater discharge
- Sea level rise exposure area
- 3.2 ft scenario

Research highlights:
- Eruption history and dynamics of volcanoes in Hawai'i and beyond
- Monitor earthquakes and landslides in Hawai'i; evaluate risk of mega earthquakes and tsunamis
- Origin and evolution of the Moon, Mars, and Earth-like bodies
- Protecting Hawai'i's freshwater resources from human impacts, sea level rise, and climate change
- Climate change impacts on rainfall patterns and mega-droughts
- Modeling impacts of sea level rise — urban flooding and coastal erosion

Academics:
- The ERTH Program offers a BA in Environmental Earth Science, a BS in Earth Sciences, and MS and PhD degrees in Earth and Planetary Sciences
- Students gain professional training in monitoring Earth's surface and interior, tracking contaminants in freshwater, and assessing climate change impact on groundwater and shorelines
- Graduates become leaders in state and federal agencies addressing volcanic hazards, tsunamis, and water, land and natural resources
- Alumni lead local and national companies focused on land management, environmental and geotechnical consulting, public utilities, geophysical surveying, and mineral and energy resources
- They lead schools and universities as STEM educators and researchers

Community impact and contributions:
- Partner with USGS Hawaiian Volcano Observatory during 2018 Kīlauea eruption crisis
- Serve as Science Director at National Disaster Preparedness Training Center; Hawai'i State Volcanologist
- Serve on the Honolulu Climate Change Commission to guide city departments and state agencies to mitigate and adapt to climate change and sea level rise
- Support K–12 education in STEM and Earth Sciences; summer course for local high school students
- Partner with communities and small farmers to assess climate impacts on freshwater supply

ERTH by the numbers:
- Faculty: 18
- Researchers: 5
- Undergraduates: 115
- Graduate students: 58
- Staff: 5
- Funding during past decade: $29M

ERTH by the numbers:

A: Instructors and students on a field trip to lava flows at Kīlauea volcano, Hawai'i Island.
B: Remote sensing of groundwater affecting waters near Honokohau Harbor, Hawai'i Island.
C: Simulated flooding of Waikīkī, O'ahu, by 2100 with a sea level rise prediction of 3.2 feet.
Department of Ocean & Resources Engineering

In the Department of Ocean and Resources Engineering, we educate top quality ocean and resources engineers; conduct and disseminate research in the fields of coastal, offshore, ocean resources and oceanographic engineering; and serve the ocean engineering needs of the State of Hawai'i and the Pacific Basin.

Academics

- The ORE Program offers a PhD degree, and an MS in Ocean and Resources Engineering that is accredited by the Accreditation Board for Engineering and Technology (ABET)
- Kilo Nalu Nearshore Observatory off O'ahu's south shore: field testing site for state-of-the-art underwater robotics innovations
- Year-round access to sea-going activities involving undersea vehicles, marine observatories, and marine testing capability
- Student internship opportunities with local marine engineering companies

Community impact and contributions

- ORE research underpins the tsunami inundation/evacuation maps in Hawai'i and the Pacific Basin
- Provide to Hawai'i communities: wave forecasting, coastal hazard assessment and mitigation, environmental impact assessment and mitigation, and climate resiliency
- Collaborate on ocean energy initiatives: Wave Energy Test Site, Kāne'ohe Bay
- Furthering SMART Subsea Cables for disaster risk reduction and ocean observing
- Prepare needed marine technical workforce in Hawai'i

ORE by the numbers

- Faculty: 8
- Graduate students: 30
- Funding during past decade: $22M

Research highlights

- Hydrodynamics and fluid-structure interactions — applications wave energy, aquaculture, and more
- Tsunami modeling and wave forecasting
- Underwater acoustics: detect, classify, and localize marine life from sounds recorded on hydrophones (underwater microphones)
- Aloha Cabled Observatory, deepest observatory in the world: real-time observations of the deep ocean north of O'ahu
- Assessing risk for ships and offshore structures in the harsh and changing conditions of the Arctic
- Remote sensing and autonomous instruments: develop sensors to measure seawater CO₂ chemistry and advance glider technology
- Robotics and propulsion: improve stability, control dynamics, and propulsion of autonomous vehicles; bio-inspired improvements to performance
- Nature-based shoreline protection via an engineered coral reef ecosystem

In the Department of Ocean and Resources Engineering, we educate top quality ocean and resources engineers; conduct and disseminate research in the fields of coastal, offshore, ocean resources and oceanographic engineering; and serve the ocean engineering needs of the State of Hawai'i and the Pacific Basin.
OCN

Department of Oceanography

As a world leader in oceanographic research and education, we engage in diverse projects from the tropics to the poles and from above the sea surface to deep within the seafloor. We build on our unique location in the Pacific Ocean and serve our diverse communities and cultures with respect and aloha.

Community impact and contributions

- Investigating environmental impacts of prospective deep-sea mining industry
- Models of ocean dynamics inform search and rescue missions, preparations for sea level rise and coastal flooding
- Workshop for Hawaiʻi teachers: “Deep Sea Discovery: revealing Hawaii’s biggest ecosystem to its students”
- Partner with Paepae o Heʻeia to track influence of restoration, storms, and climate on fishpond health
- Serve on city, state, and federal government boards and commissions to adapt and mitigate climate change; and on the US National Committee for the UN Decade on Sustainable Ocean Development
- NSF-funded Hālau Ola Honua grant supported OCN201 Mauka to Makai summer course created pathways for Native Hawaiian Pacific Islander students from community colleges to four-year degrees in geosciences
- Home to the Uehiro Center for the Advancement of Oceanography

Academics

- The OCN Program offers MS and PhD degrees, and a BS in Global Environmental Science that is the world's first accredited environmental science degree (Accreditation Board for Engineering and Technology; ABET)
- Combined Bachelor’s and Master’s accelerated pathways, with focus on public health, finance, urban planning, and teaching (Grade 6–12 science)
- Faculty incorporate Native Hawaiian knowledge and cultural practices into course curricula in support of UH’s mission of becoming a Native Hawaiian Place of Learning
- Graduate program trains STEM educators that support higher education system in Hawai‘i

As a world leader in oceanographic research and education, we engage in diverse projects from the tropics to the poles and from above the sea surface to deep within the seafloor. We build on our unique location in the Pacific Ocean and serve our diverse communities and cultures with respect and aloha.
C-MORE by the numbers

- Faculty: 6
- Researchers: 2
- Graduate students: 8
- Staff (science and support): 14
- Funding during past decade: $50M

Research highlights

- Focus on investigating diverse assemblages of microorganisms in the sea
- Assessing the genetic basis of marine microbial biogeochemistry including the metabolic regulation and environmental controls of gene expression
- Applying advanced molecular techniques for an unprecedented view of the structure, diversity, and possible function of sea microbes
- Investigating processes that underpin the movement and storage of carbon, related bioelements, and energy in the marine environment
- Combining novel approaches with more well-established techniques in microbiology, oceanography, and ecology

The Center for Microbial Oceanography: Research and Education (C-MORE), established in 2006, aims to develop a more comprehensive understanding of the biological and ecological diversity of marine microorganisms — the most abundant life forms on Earth.

Academics

- Undergraduate and graduate students are trained on the latest genomic techniques and chemical, biological, and physical oceanography approaches
- Postdoctoral researchers are trained in all aspects of the discipline as well as in academic and community leadership for their future careers in science

Community impact and contributions

- C-MORE brings together teams of experts — scientists, educators, and community members — facilitating the creation and dissemination of a new understanding of the critically important role of marine microbes in global habitability
- K–12 teachers have access to hands-on science kits, microscopes, and small grants to foster awareness in microbial science at all level of education

C-MORE

A: Fluorescence microscopic image of *Trichodesmium*, an iconic nitrogen-fixing microorganism common in Hawaiian waters.
B: A conductivity-temperature-depth (CTD) rosette on the deck of the R/V *Kilo Moana* ready for deployment to the ocean.
C: Scientists preparing to deploy an array of sediment traps to collect sinking particles on an expedition to Station ALOHA.
CIMAR, a NOAA Cooperative Institute, was created to support innovative research for understanding and predicting environmental change in the tropical Pacific, for conserving and managing coastal and marine resources in island environments, and for supporting economic, social, and environmental needs of island communities.

**Research highlights**
- Improving ecological forecasting: fish recruitment and productivity, sustaining protected species, and human health (e.g., fish contaminants; harmful algal blooms)
- Ecosystem-based management: understanding interconnections and effects of land management practices, terrestrial inputs, and climate change
- Protection and restoration of resources including endangered species, habitats, and ecosystems
- CO₂ exchange between atmosphere and ocean; water column CO₂ distributions and transport, and the ocean’s role in sequestering anthropogenic CO₂
- Tsunamis and long-period ocean waves: improving predictability of tsunamis and wind wave-driven coastal flooding, hazard risk assessment, mitigation, and preparedness

**Academics**
- Support for undergraduate and graduate students, and postdoctoral investigators in the Life, Ocean, and Earth Sciences
- Co-sponsor (with NOAA) of the Pacific Islands Fisheries Science Center (PIFSC) Summer Intern Program for undergraduate students; immersive research experiences and training under PIFSC and CIMAR mentors

CIMAR, a NOAA Cooperative Institute, was created to support innovative research for understanding and predicting environmental change in the tropical Pacific, for conserving and managing coastal and marine resources in island environments, and for supporting economic, social, and environmental needs of island communities.

**Community impact and contributions**
- Promote the transition of research to operational products and services that benefit Pacific Islands communities
- Collaborate with Pacific Islands Ocean Observing System (PacIOOS), which also provides real-time wave, current, water quality data, and wave-driven flooding forecasts to communities in the US-Affiliated Pacific Islands
- CIMAR staff regularly share their knowledge and experiences with K–12 students and community members. Topics include marine mammal research; protection of Hawaiian monk seals; marine turtle biology and ecology; coral reef ecosystem health and vitality; fish and fisheries research; shark and other bycatch mortality; and marine debris impacts on the environment.
- Meet regularly with fishermen and fisheries observers in the Pacific Islands Region to discuss and promote conservation and bycatch mitigation efforts for protected species

**Academics**
- Support for undergraduate and graduate students, and postdoctoral investigators in the Life, Ocean, and Earth Sciences
- Co-sponsor (with NOAA) of the Pacific Islands Fisheries Science Center (PIFSC) Summer Intern Program for undergraduate students; immersive research experiences and training under PIFSC and CIMAR mentors

**CIMAR by the numbers**
- Employees within NOAA labs and at UH (scientists, economists, engineers, and more): 117
- Administrative staff: 10
- Funding during past decade: $166M

**Community impact and contributions**
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- Employees within NOAA labs and at UH (scientists, economists, engineers, and more): 117
- Administrative staff: 10
- Funding during past decade: $166M
HIGP by the numbers

- Faculty: 17
- Researchers/specialists: 9
- Postdoctoral researchers: 8
- Graduate students: 30
- Staff (science and support): 36
- Funding during past decade: $97M

Research highlights

- Discovered water on the Moon — essential for NASA’s plan to return humans to the lunar surface
- Part of NASA’s Mars 2020 Team as Perseverance Rover searches for ancient life
- Developed a novel biological sensing fluorescence imaging instrument which can detect life on other planets, as well as explosives and pollutants on Earth
- Discovered a vast store of freshwater in submarine rocks offshore of Hawai’i
- Developing high performance materials for applications including energy storage, environmental pollutant removal, abrasives, and semiconductors
- Launched a satellite into orbit in 2020 and plan to launch another in 2023, designed, built, and tested in Mānoa; Hawai’i Space Flight Laboratory is a catalyst for Hawai’i’s aerospace industry
- Analyzed priceless samples of 4.6 billion year-old asteroid Ryugu, unraveling mysteries surrounding the origin and evolution of our Solar System

HIGP explores the Earth and planets. As a team of scientists, engineers, and technologists — students alongside faculty — we invent and apply state-of-the-art instruments and data analysis techniques to discover more about our islands, our planet, and our neighbors in space.

HIGP by the numbers

- Faculty: 17
- Researchers/specialists: 9
- Postdoctoral researchers: 8
- Graduate students: 30
- Staff (science and support): 36
- Funding during past decade: $97M

Community impact and contributions

- Hawai‘i Space Grant Consortium shares space science with ~2000 teachers and 20,000 students in Hawai‘i each year through K–12 programs and events, and funding to Community Colleges
- NASA-funded Ka mālamalama o ka mahina project pairs Native Hawaiian undergraduate and high school students with scientists at UH Mānoa to conduct lunar science research
- HIGP faculty fund nine scientists to support the work of the Hawaiian Volcano Observatory
- Putting Cube Satellite kits into Hawai‘i’s middle and high school classrooms via Project POKE (Providing Opportunities for Keiki in Engineering), and training the teachers to help their students use them
- HIGP faculty serve on the Hawai‘i Earthquake and Tsunami Advisory Committee, the Research Advisory Committee of the Natural Energy Laboratory of Hawai‘i Authority, and the University of Hawai‘i Red Hill Task Force
Hawai‘i Institute of Marine Biology

Based on Moku o Lo‘e and surrounded by coral reef in Kāne‘ohe Bay, HIMB embraces a Native Hawaiian Sense of Place and a local-to-global focus with cutting-edge science, technology, and education aimed at understanding and conserving tropical marine and coastal ecosystems.

Academics

- Home to graduate students pursuing degrees in Marine Biology, Zoology, Botany, Oceanography
- Collaborate with College of Education to prepare early career science instructors
- KeaoaLo‘e REMS Lab and partners developed an early-college, dual-credit program to support Hawai‘i high school students’ pathways in marine STEM
- Applications of Kūlana Noi‘i and Indigenous methodologies in community-embedded research

HIMB embraces a Native Hawaiian Sense of Place and a local-to-global focus with cutting-edge science, technology, and education aimed at understanding and conserving tropical marine and coastal ecosystems.

Community impact and contributions

- Teach marine science and conservation to over 6,000 community members and K–12 students per year
- HIMB and He‘eia NERR programs engage Native Hawaiian communities in collaborative research, management, and education focused on Kāne‘ohe Bay
- Nā Kilo ‘Āina program empowers Native Hawaiian communities to strengthen reciprocal pilina (relationship) between people and place, and to better understand ‘āina momona (fertile land)
- Trained over 500 fisheries scientists, managers, and students from Hawai‘i, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands
- Restore with Resilience, the first community coral restoration project in Hawai‘i, partners with federal, state, non-profit and community groups
- Serve on state and federal governments boards, and commissions to address reef health, whale and dolphin population numbers, fisheries, and nearshore water quality

Research highlights

- Coral reefs: investigating threats to and sources of resilience, developing novel solutions for long-term health, including selective breeding and reef restoration
- Fisheries studies: ecology, oceanography, social science, and traditional knowledge to ensure sustainability in Hawai‘i and across the Pacific
- Sharks: researching sensory biology and movement patterns to promote their conservation
- Marine mammals: sperm whale foraging patterns, humpback whale songs and nursing behavior, and discovery of toxoplasmosis in Hawaiian spinner dolphins
- Learning from Indigenous resource management, promoting ahupua‘a resilience
- Advise local, national, and international conservation and regulatory organizations on fisheries, marine protected areas, and threatened species

HIMB by the numbers

- Faculty: 22
- Postdoctoral researchers: 26
- Undergraduate interns: 64
- Graduate students: 77
- Staff (science and support): 39
- Funding during past decade: $57M

Academics

- Home to graduate students pursuing degrees in Marine Biology, Zoology, Botany, Oceanography
- Collaborate with College of Education to prepare early career science instructors
- KeaoaLo‘e REMS Lab and partners developed an early-college, dual-credit program to support Hawai‘i high school students’ pathways in marine STEM
- Applications of Kūlana Noi‘i and Indigenous methodologies in community-embedded research

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Research highlights

- Advanced sustainable energy development in grid technology, energy storage, fuel cells, ocean energy, alternative fuels, and energy efficiency
- Received six patents for work in fuel cells, batteries, grid systems, and biocarbons
- Deployed an electric vehicle charging system that optimizes fleet usage
- Developed novel tools for diagnosis and prognosis of battery degradation, state of charge, and state of health tracking
- Developed novel printing processes for fabrication of solar cells and other electronic devices
- Discovered and developed efficient, low cost, and safer hydrogen storage materials; and methods to reduce fuel cell contamination
- Assessed feedstock availability for renewable bioenergy and biofuel products for Hawai‘i
- Commissioned a hydrogen station on the Big Island to support fuel cell electric buses for the County of Hawai‘i's public transit system
- Provided technical support to the Navy's Wave Energy Test Site to facilitate testing of wave energy prototypes

HNEI conducts research, development, and testing of advanced energy technologies; and provides technical and policy analyses to inform decision makers on cost-effective pathways to achieve Hawai‘i’s 100% clean energy goals. HNEI also works closely with international partners to support the development of resilient, sustainable energy systems in the Asia-Pacific region.

Academics

- Funding and training to over 80 undergraduate and graduate students; and more than 15 postdoctoral researchers (past five years)
- Provided training to engineers from the Provincial Electricity Authority of Thailand and to governments and utilities in the Asia-Pacific region on renewable energy technologies, integration and procurement, power system management, and energy policy and regulation
- Licensed battery modeling toolbox to more than 100 organizations (academic and private) worldwide

Community impact and contributions

- Supported the County of Hawai‘i's Mass Transit Agency proposal that resulted in a $23 million grant for hydrogen fuel cell electric buses and infrastructure
- Partnered with local utilities and commercial partners to help integrate renewable energy and promote resiliency for communities
- Advised State and HPUC during retirement of the AES coal plant
- Shared renewable energy technology and innovation with Hawai‘i schools, from elementary to high school

Community impact and contributions:

- School visits
- Educational workshops
- Policy briefs and reports

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- Provided training to engineers from the Provincial Electricity Authority of Thailand and to governments and utilities in the Asia-Pacific region on renewable energy technologies, integration and procurement, power system management, and energy policy and regulation
- Licensed battery modeling toolbox to more than 100 organizations (academic and private) worldwide

Community impact and contributions

- Supported the County of Hawai‘i's Mass Transit Agency proposal that resulted in a $23 million grant for hydrogen fuel cell electric buses and infrastructure
- Partnered with local utilities and commercial partners to help integrate renewable energy and promote resiliency for communities
- Advised State and HPUC during retirement of the AES coal plant
- Shared renewable energy technology and innovation with Hawai‘i schools, from elementary to high school

Community impact and contributions (

- School visits
- Educational workshops
- Policy briefs and reports
Research highlights

- Assessing local and global impact of climate variability empowers communities with data to prepare and possibly mitigate effects.
- IPRC’s data center makes atmospheric and oceanic data of relevance to the Asia-Pacific region readily available to its own researchers, the broader climate research community, policy makers, and the general public.
- Seasonal climate prediction and future climate projections over the Pacific Islands (collaboration with the Pacific RISA program).

IPRC by the numbers

- Faculty: 7
- Researchers: 2
- Postdoctoral researchers: 2
- Staff (administrative and technical): 4
- Funding during past decade: $33M

Research highlights

- With expertise in meteorology and oceanography of the Asia-Pacific region, IPRC’s scientific focus on the Asian-Pacific region is unique for a US institution.
- Investigate extreme rain events (e.g., April 2018) over the Hawaiian Islands and the role of warm ocean temperatures surrounding the islands.
- Employ high-resolution global and regional climate modeling to assess climate change over the region including the Hawaiian Islands.
- Reveal decadal variability in the North Pacific climate system.
- Determine the impact of small scale processes on the climate system.
- Develop marine debris transport models to identify sources, pathways, and sinks of natural and anthropogenic marine debris.
- Assess impacts of long-living plastic debris on large-scale ecological connectivity and biological invasions, and the establishment of the new, debris-associated open ocean ecosystems.
- Assess factors affecting the intensity and duration of droughts over Hawai‘i and the US-affiliated Pacific Islands, and develop seasonal predictions of rainfall, including floods and droughts.

Academics

- IPRC makes an important contribution to the international climate research enterprise through training of students and young scientists – both from UH and international institutions.
- IPRC hosts postdoctoral students and long-term visiting scientists to advance collaboration and state-of-the-art computational facilities and observational systems.

The International Pacific Research Center (IPRC), established in 1997, operates under a cooperative agreement between UH and the Japan Agency for Marine-Earth Science and Technology. The IPRC mission is to improve understanding of the nature and predictability of climate variability and change in the Asia-Pacific region and develop innovative ways to utilize knowledge gained for the benefit of society.

Academics

- Postdoctoral researchers: 2

PE by the numbers

- Postdoctoral researchers: 2
Research highlights

- Integrates molecular, cellular, and developmental biology, neurobiology, parasitology, ecology, evolution, conservation and sustainability, and the environment-microbiome interface
- Focus on local and global issues, including climate change, ecosystem collapse, nutritional challenges, invasive species, and zoonotic diseases
- Kewalo Marine Laboratory, a leading institution in exceptional marine biology, celebrated its 50th anniversary in 2022
- Home to two prestigious NIH-funded Centers of Biomedical Research Excellence (COBREs), focused on (i) integrative studies of the environment, microbiomes, and human health, and (ii) integrating basic science in nutrition with health and well-being in the Native Hawaiian-Pacific Islander community

PBRC's transdisciplinary research and training integrates the islands' unique living laboratories and emphasizes the Hawaiian concept of ahupua'a, the self-sustaining interrelationship between land and sea, adaptations to the changing environment, and the ethic of communal responsibility and respect for the culture and natural resources of Hawai'i.

Academics

- $60M funding during past decade
- Faculty: 14
- Researchers: 8
- Postdoctoral researchers: 6
- Undergraduates: 14
- Graduate students: 19
- Staff (science and support): 51
- $60M funding during past decade
- Pacific Biosciences Research Center

Community impact and contributions

- Engage K–12 students in scientific research and provide tours of laboratories. A network of 35 K–12 schools conduct research in the Ala Wai watershed addressing water quality
- Provide scientific support to the Office of Hawaiian Affairs, the Native Hawaiian Legal Corporation, traditional practitioners, and the Polynesian Voyaging Society, addressing health-related challenges — water quality, rat lungworm, mosquito-borne diseases, and box jelly toxins
- Graduate students form the leadership base of the 'Ilima Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) Chapter at the University of Hawai'i
- Diversity, Equity and Inclusion: over 60% of PBRC faculty are women and 48% are minorities

PBRC by the numbers

- Faculty: 14
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Hawai‘i Sea Grant

University of Hawai‘i Sea Grant College Program

The University of Hawai‘i Sea Grant College Program supports an innovative program of research, education, communication, and engagement services directed to increasing sustainability of coastal and marine resources, and resilience of coastal communities of the state, region, and nation.

Research highlights
• Healthy coastal ecosystems: protecting and restoring habitats
• Resilient communities and economies: preparing for and adapting to changing conditions
• Environmental literacy, workforce development, marine science education
• Sustainable fisheries and aquaculture: working to ensure food and economic and cultural benefits
• Smart building and community design
• Sustainable coastal tourism
• Coastal and climate science and resilience
• Ulana ‘Ike, weaving together knowledge systems

Academics
• Numerous fellowship programs support the training of undergraduate and graduate students pursuing careers in government, academia, non-profit organizations, and more, focusing on marine and coastal science and policy
• Graduate fellows gain experience in science communication via written articles, oral presentations, and community outreach

The University of Hawai‘i Sea Grant College Program supports an innovative program of research, education, communication, and engagement services directed to increasing sustainability of coastal and marine resources, and resilience of coastal communities of the state, region, and nation.

Community impact and contributions

B. Limu huluhuluwaena is part of integrated multi-trophic aquaculture at Waikalua Loko I‘a.
C. Learning about pua (juvenile fish) ponds at He‘eia Fishpond, O‘ahu.