



Anchialine pools are brackish, tidally influenced bodies of water with underground, variable connections to the ocean. © TNC

Hawai'i's anchialine pools are globally unique

The volcanic rock (porous basalt) that makes up the Hawaiian islands is filled with open spaces where water can flow unseen, creating pools near the ocean ranging in size from tiny puddles to acres wide. These anchialine pools appear landlocked, without a direct channel to the ocean. But fresh and ocean water flow underground and mix together in these unique ecosystems found in only a few places on Earth. Hawai'i Island is home to one of the largest concentrations of these pools in the world.

Each is unique but all—when healthy—are home to rare plants and animals, such as the tiny red native shrimp called 'ōpae 'ula, once occurring in such abundance they were used as fishing bait.

Many of Hawai'i's anchialine pools are overrun with former pets, from mosquito fish and guppies to bullfrogs and snapping turtles. They are also threatened by invasive plants, and pollution and sediment that prevent water flow, creating stagnant pools flush with algae. TNC is working

with community members and science partners to test restoration methods, such as removal of plants, detritus and mud to improve water flow, and natural innovative tools to remove invasive fish.



Tiny 'ōpae'ula (shrimp) thrive in healthy anchialine pools. © TNC

As sea levels rise, anchialine pools will change. Despite their unique and important role, they have rarely been included in sea level rise risk assessments until now.

In partnership with the National Oceanic and Atmospheric Administration (NOAA) and local community members, TNC developed an interactive tool called

Ecosystem Effects of Sea Level Change (maps.coastalresilience.org/hawaii) that visualizes inundation levels for 2015, 2040, 2050 and 2080.

The tool is described in a recently published scientific paper that outlines the methodology (Marrack et. al., 2021). It incorporates flood frequency, ocean and groundwater elevations, invasive fish, contamination from cesspools and septic systems and increasing development pressures.

This tool is also helping governments and communities plan for sea level rise impacts on coastal infrastructure, including houses, businesses, roadways, and more. As we prepare for stronger and more frequent storms in the islands, we need tools like this to ensure we are developing in a climate smart way and restoring natural climate solutions—like healthy reefs, intact fishponds and anchialine pools—to build climate resilience for our coastlines and communities.



Assessing carbon capture is a new way of valuing forests. © Rob Shallenberger/TNC

Restoring forests and capturing carbon at landscape scale

Trees offer great potential to remove carbon from the atmosphere by absorbing carbon dioxide as they grow. TNC is demonstrating Hawai'i's first project that would enable landowners to receive payments for maintaining and growing trees that capture carbon.

At our Kona Hema Preserve on Hawai'i Island, with experts from TerraCarbon, we have completed the initial evaluation. Local company Forest Solutions Inc. recently finished a comprehensive assessment of how much carbon is captured by the koa trees in Kona Hema. This work will next be verified by an accredited company and then reviewed and approved by the American Carbon Registry.

We estimate Kona Hema could generate up to 100,000 carbon credits in the first six years. One credit offsets one metric ton of carbon emissions. For example, three one-way tickets from Honolulu to Los Angeles emit one ton of carbon. Buying one carbon credit would offset the carbon emissions from those three flights.

Our demonstration project will show how landowners can sell carbon credits, adding an additional, complementary revenue stream to current ranching, farming or logging activities. Landowners can also participate by reforesting open areas with the fast-growing native koa.

We are working with landowners to gauge interest and share our results, with the goal of expanding the scale of healthy, connected forests across the landscape, increasing healthy forest habitat for native birds and plants, as well as fresh water capture, and reducing the amount of carbon in the atmosphere.

Learn more and support our work at nature.org/hawaii • nature.org/palmyra.

NATURE HAWAII & PALMYRA

Valuing TNC for the long term

Long-time champions of TNC, Melissa and Chris Benjamin are Legacy Club members who provided seed money for the Kona Hema carbon offset project.

Chris is a former TNC Hawai'i Board chair and current Ihupani Council member, and Melissa is a past Conservation Committee Chair for the Garden Club of Honolulu, so they both understand the challenge and importance of funding conservation work. In the carbon offset project, they see a pathway to long term funding of forestry work that not only conserves carbon but protects the watershed.



© Melissa and Chris Benjamin

"It's relatively easy to fund conservation work that donors can witness and benefit from directly," said Chris. "Much of TNC's most important work, however, is in remote forests that are inaccessible to donors. We hope the Kona Hema carbon project will help create an economic model for sustained funding of forest and watershed protection."

Melissa observes, "What sets TNC apart is its ability to execute environmental conservation at scale. I admire the TNC model of skilled collaboration with the private and public sectors to accomplish big goals. Given the current and projected rates of climate impacts and environmental degradation, we need that now more than ever."