

An aerial photograph of a coastal landscape. On the left, a dense forest of tall evergreen trees covers a steep slope. The forest meets a rocky shoreline. A wide, flat area of greenish-brown, likely a clam garden, stretches along the coast. The water is calm and reflects the sky. In the distance, more land and mountains are visible under a cloudy sky.

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Sea Gardens Across the Pacific

Showcasing an Indigenous mariculture renaissance

Sea Gardens Across the Pacific is a new ‘story map’ that gathers information about Indigenous mariculture practices across the world and emphasises the importance of revitalising these practices for food sovereignty and resilience, writes **Samantha Larson**.

An aerial view shows an ancient clam garden found in British Columbia, Canada. Image courtesy Keith Holmes, Hakai Institute

An Indigenous mariculture renaissance is making waves as groups across the Pacific seek to revitalise these ancient techniques and traditions

From left: Larry Raigetal, Keli'i Kotubetey and Ann Singeo draw in the sand, demonstrating how the *beng* of Palau would have looked and functioned. Image Momi Afeli

INDIGENOUS PEOPLES have been stewarding the ocean for thousands of years. This stewardship has appeared in many different forms around the world, all of which represent a reciprocal relationship between humans and the sea rooted in deep place-based knowledge. From eel ponds in Budj Bim, Australia, to octopus houses in Haida Gwaii, Canada, an Indigenous mariculture renaissance is making waves as groups across the Pacific seek to revitalise these ancient techniques and traditions.

For the first time, information about a multitude of Indigenous cultivation practices has been collected into a cohesive online repository. Sea Gardens Across the Pacific: Reawakening Ancestral Mariculture Innovations is a new, interactive, 'living' story map that synthesises knowledge about Indigenous aquaculture throughout the Pacific region, including the west coasts of North, Central and South America; the east coasts of Asia, Australia and Aotearoa New Zealand; Oceania; and coastlines in between. The project shows these local initiatives are not one-off projects, but rather pieces of a global story. It's a story that is being told by Indigenous knowledge holders, and further amplified by diverse collaborators who created the story map.

Many ancestral mariculture practices were subverted over time by colonialist attitudes and policies that targeted the erasure of Indigenous cultures and the separation of people from wilderness. As ocean change caused by industrialisation continues to imperil marine resources, reviving ancient practices could help to protect these ecosystems and the people who rely on them today.

For example, clam gardens – which are typically created by constructing a rock wall in an intertidal zone, thus expanding habitat for clams and other species – can locally reduce the impacts of warming ocean temperatures. Skye Augustine is an Indigenous scholar at Simon Fraser University, Canada, and a collaborator on the new story map. Augustine spearheaded the restoration of clam gardens at two sites in the Gulf Islands of British Columbia. 'One of the most important aspects of restoring these places is restoring people's relationships with them,' she says:

It forces us to re-examine the idea that humans only have negative impacts on our ecosystems, and remember that for millennia we have had positive and reciprocal relationships with the places we belong to, and that we can have those kinds of relationships once again.

Kii'iljuus Barbara Wilson, a Haida matriarch and Indigenous scholar from the Cumshewa Eagle Clan, collaborated with the team to highlight the octopus houses of Haida Gwaii, an archipelago off the coast of British Columbia. She states:

In this time of climate change, it's really important to acknowledge Indigenous mariculture as conservation and recognise First Nations governance over our land and resources. It's time to put the library back together and learn about all the things our ancestors did to ensure that there was enough fish and octopus – looking after and respecting the environment. We managed to live in the world for thousands of years without the massive ecological destruction that's happening now. It's very much about not taking more than you need.



The Gunditjmara people (also known as the Dhauwurd Wurrung) built channels and pools over an area of about 10,000 hectares

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An eel pond at Mount Eccles (Budj Bim). Image Mertie, licensed under CC BY 2.0
- 02
Remains of Aboriginal stone eel traps at Budj Bim. Image denisbin, licensed under CC BY-ND 2.0

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The movement to revive Indigenous aquaculture practices is occurring in modern-day Australia as well. As described in the story map, the Gunditjmara people (also known as the Dhauwurd Wurrung) built channels and pools over an area of about 10,000 hectares in what is now Victoria, including Budj Bim National Park. This aquaculture system is estimated to have supported gatherings of up to 1,000 people.

After the arrival of European settlers in 1834, however, Lake Condah was drained to increase the land available for livestock grazing, which reduced wetland habitat and rendered the eel traps inoperable. As part of the Lake Condah Sustainable Development Project, the Gunditjmara have put forward a vision for restoring the practice of eel ponds. Their vision is that ‘Gunditjmara people will experience the landscape, engage in eel and fish harvesting using the stone trap systems, and apply traditional knowledge practices in land and water management.’ As the water returns to the landscape, they hope to learn more about the ways in which previous generations cared for and used the land: ‘We will pass what we learn on to the next generation so that traditions and knowledge are never lost again.’ As of now, 24 out of the 82 identified traditional eel traps have been reactivated.

The story map creates a broader frame of reference for these initiatives. ‘It’s so lovely to have a visual representation of these practices, and to be able to see the spatial extent of Indigenous aquaculture and caretaking of coastal environments,’ says Brenda Asuncion, a collaborator on the story map, who co-ordinates a network of Native Hawaiian fishponds with Kua’aina Ulu ‘Auamo, an organisation that supports traditional practices. ‘They aren’t isolated phenomena.’

Asuncion says that the story map is a way to share knowledge about Indigenous aquaculture, with the potential for an even greater reach to showcase similar community-led efforts around the Pacific.

The story map is one of many collaborations fostered and co-ordinated by the Indigenous Aquaculture Collaborative Network, which is a community of practice consisting of Pacific-region Sea Grant offices; Northwest Tribes and First Nations; Native Hawaiian and Indigenous communities; and organisations and universities working to advance Indigenous aquaculture. In addition to projects and gatherings that take place in virtual settings, the group prioritises opportunities for the community to meet and learn from one another in the real world. In February 2020, the collaborative’s first gathering was held on O’ahu in Hawai’i, during which more than 125 participants representing dozens of Indigenous groups from across the Pacific helped to rebuild a seawall to support a *loko i’a* (Hawaiian fishpond).

In July 2022, a smaller group of Indigenous aquaculture practitioners gathered for a knowledge exchange in Palau. Local mariculture systems known as *beng*, in which an obstruction is placed in tidal waters to direct or trap fish (also known as fish weirs), were once commonly used in Palau but now the technique has fallen from use. Participants in the knowledge exchange visited the remnants of a *beng* in Ngkeklau, and many of the participants shared their own experiences with wall-building from elsewhere in the Pacific Basin. Weaving rocks to enhance habitats for customary foods is one of the many common practices that link unique place-based cultures across the Pacific – from the tidelands of the Swinomish Indian Tribal Community, who are building the first known modern-day clam garden in the USA, to the *loko i’a* in Hawai’i. ‘The fellowship of the group was incredible,’ says Larry Raigetel, who is a Pwo master navigator and boatbuilder as well as the co-founder of Waa’gey, an organisation that applies traditional skills and knowledge to addressing the social, economic and environmental challenges faced by the people of Micronesia’s remote islands:

Reviving ancient practices could help to protect these ecosystems and the people who rely on them today



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Cross-Pacific knowledge exchange participants join Ann Singeo, executive director of the Ebiil Society, to learn more about *beng*, a traditional mariculture system of Palau. Image Kimeona Kane

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Palau's *beng* had an arrow-like shape. At high tide, fish are directed inside the trap. As the tide recedes, they are trapped inside. The shape of this *beng* is similar to the *aech* of Yap, Federated States of Micronesia; *Shi hu* in Taiwan; and the tidal fish traps of the Salish Sea. Image Reid Endress

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It was a great experience, one that sends us off to the different places we are now. I think the momentum that took us from Palau is ongoing. When there is no wind and we need to get somewhere, we paddle while chanting – and the current will take us home. Whether sailing or drifting, we need to be continuing to share this knowledge.

With this momentum, the Ebiil Society is reviving the Ngkeklau *beng* for community food-fishing rooted in Palauan cultural heritage. 'We're hoping we will be able to add our *beng* to the growing sea garden map,' says Ann Singeo, the Ebiil Society's executive, who hosted the knowledge exchange.

The idea for the story map began when Anne Salomon, a marine ecologist at Simon Fraser University, was told by renowned fisheries scientist Daniel Pauly that she could elevate the recognition of the importance of clam gardens by placing them within a global context. 'These innovations have been present for thousands of years, but much of the world doesn't know about them,' Salomon says. She introduced a synthesis and analysis of Indigenous mariculture into her graduate class on social-ecological resilience, and her students came up with the idea of an interactive story map.

As part of the class, students attended the Indigenous Aquaculture Collaborative Network's gathering in Hawai'i and took part in the restoration of the fishpond. 'What was so powerful there was the energy, momentum, and the sense of community that flowed from taking part in the revitalisation of that practice,' says Heather Earle, who co-led, designed and created the story map. 'As we've worked with practitioners, knowledge-holders and researchers across the Pacific to compile this map, we've seen that same energy and momentum again and again.'

Salomon reached out to Melissa Poe, who co-ordinates the Indigenous Aquaculture Collaborative Network. Poe immediately saw the potential: 'These features exist worldwide. If people better understood their diversity, functionality and extent, I'm convinced that more communities would be empowered to restore them.'

While both Salomon and Poe say the current story map only 'scratches the surface,' they believe that publishing this current edition will help bring other practices into the public light. As the conversation around Indigenous mariculture continues to gain traction, and as recognition of the innovation and resilience of these biocultural seascapes grows, the contributors see them as time-tested solutions to some of our most pressing coastal challenges.

In other words, this global perspective can help affirm and push forward the local ones. 'The power is to first understand that almost the same idea exists across cultures, and that many of the same things are important to these seascapes across the world. For example, the wisdom of the elders is very important,' explains story map collaborator Jaime Ojeda, who contributed to the story map's piece on *corrales de pescas* – a practice that Ojeda's grandmother, a Mestizo-Chiloté elder, grew up with in Patagonia. 'In terms of the past, but also in terms of right now. Sometimes people think this is history – it has happened. Part of the power is for people to see, oh, this is happening. In many places, this is happening.'

To explore the story map, see seagardens.net

Samantha Larson is the science writer at Washington Sea Grant.