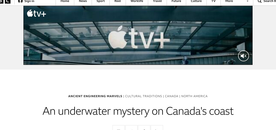


ANCIENT ENGINEERING MARVELS | CULTURAL TRADITIONS | CANADA | NORTH AMERICA

An underwater mystery on Canada's Coast

(Image credit: Diane Sellars)

By Diane Selkirk | 6th October 2021

Tens of thousands of wooden stakes poking up from British Columbia's shoreline have smashed a long-held stereotype of Canada's First Nation people

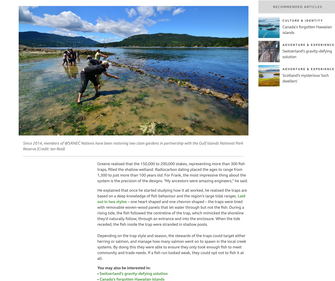
A visitor, the lowest tides, Canada's Cortes estuary ensures a nearly forgotten story: the ruins of more than 150,000 wooden stakes spread out across the intertidal zone, forming the remnants of hundreds of ancient fish traps. At peak ebb, it's believed the industrial-level installation would have stretched for nearly two miles. The stakes are all that's left of traditional infrastructure of the bountiful, mountain-fringed Cortes Valley, located on the east side of Vancouver Island on the edge of the Salish Sea.

Until recently, the sophisticated technology had been considered by Western science. Even though the stakes, which are thumb-sized in diameter in the shallows and increase to the size of small tree trunks in deeper water, are visible from many miles-wide roads, no one thought much about them. For Cory Frank, manager of the Homalco Nation's Lands and Resources, who oversees all aspects of environmental stewardship for the coastal Nation, the stakes were just something he grew up with, playing and fishing among them at low tide.

When he asked elders about them, they didn't have much information.

Frank says this began to change almost two decades ago. Cortes Bay Greene, then an undergraduate anthropology student, began researching the stakes for her senior thesis. Greene's research included interviewing elders and spending time on the bay, working with a team of volunteers, she began heading out on her own, at night, months recording the locations of 13,632 exposed tops of Douglas fir and western red cedar stakes. At the same time, she began asking the Homalco elders what she was looking at.

When she plotted them out, taking into account the oral history, the results were astounding. The stakes formed a constellation outlining one of the most extensive and sophisticated Indigenous fishing operations ever found.



Since 2014, members of WSÁNEĆ Nations have been restoring two clam gardens in partnership with the Gulf Islands National Park Reserve (Credit: Ian Boyd)

Greene realized that the 150,000 to 200,000 stakes, representing more than 500 traps, fitted the shallow wetland. Radiocarbon dating placed the ages to range from 1,300 to just more than 100 years old. For Frank, the most impressive thing about the system is the precision of the designs. "My ancestors were amazing engineers," he said.

He explained that once he started studying how it all worked, he realized the traps are based on a deep knowledge of fish behaviour and the region's large tidal ranges. Laid out in a series of V-shaped, funnel-like formations, the stakes guided fish into traps with immovable seven-sided panels that let water through but not the fish. During a rising tide, the fish followed the centreline of the trap, which mimicked the shoreline they'd naturally follow, through an entrance and into the chamber. When the tide receded, the fish inside the trap were stranded in shallow pools.

Depending on the trap style and season, the stewards of the traps could target either herring or salmon, and manage how many salmon went on to spawn in the local creek systems. By doing this they were able to ensure they only took enough for the meet community and trade needs. If a fish run looked weak, they could opt not to fish at all.

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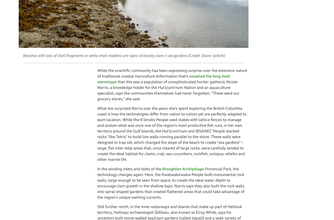
Answering the question about how such an elegant and sustainable fishing technology fell into obscurity requires a deep understanding of the impact of colonialism on Canadian history. In what's now known as British Columbia, dozens of coastal nations thrived for thousands of years. But with the arrival of explorers, traders and settlers, disease and law were used to forcibly separate Indigenous people from their culture and land.

"When 80 to 90% of the population died, they lost their knowledge holders and the intricate skills and protocols that made these technologies work," said Anne Salomon, an applied marine ecologist who has been working alongside coastal Indigenous communities for 15 years.

> Over thousands of years, they'd developed complex food production systems requiring the understanding of ecology, oceanography and gemmorphology.

Salomon explained that the Indian Act of 1876 forcibly removed people to reserves and cultural practices were outlawed. People lost physical access to their fish traps and their knowledge was not passed on. Salomon's research into Indigenous food production systems requiring the understanding of ecology, oceanography and gemmorphology," she said. "When they lost agency over their land, they lost part of their identity."



Beaches with lots of shell fragments or white shell middens are signs of nearby clam / sea gardens (Credit: Diane Sellars)

While the scientific community has been expressing surprise over the extensive nature of traditional coastal mariculture (information that's smashed the long-held stereotype of Canada's First Nation people as hunter-gatherers), Michelle Morris, a knowledge holder for the Hul'qumi'num Nation and an aquaculture specialist, says the communities themselves had never forgotten. "These were our grandmothers," she said.

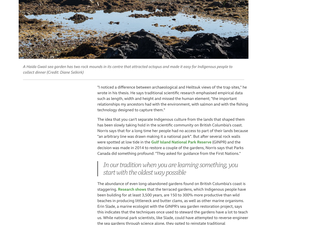
What has surprised Morris over the years she's spent exploring the British Columbia coast is how the technologies differ from nation to nation and are perfectly adapted to each location. While the K'ómoks People used stakes with lattice fences to manage and sustain what was once one of the region's most productive fish runs, in her own territory around the Gulf Islands, the Hul'qumi'num and WSÁNEĆ People stacked rocks to form the walls of their clam gardens. Unlike the K'ómoks, the stones were designed to trap silt, which changed the slope of the beach to create "sea gardens" – large, flat inter-tidal areas that, once cleared of large rocks, were carefully tended to create the ideal habitat for clams, crab, sea cucumbers, rockfish, octopus, whelks and other marine life.

In the sending islets and islets of the Broughton Archipelago Provincial Park, the technology changes again. Here, the Kwakwaka'wakw People built monumental rock walls, large enough to fit a tree from space, to create the ideal water depth to encourage clam growth in the shallow bays. Morris says they also built the rock walls to protect the shellfish from the powerful flattened areas that could take advantage of the region's unique swirling currents.

Still further north, in the inner waterways and islands that make up part of Haíłzaqv territory, Heiltsuk archaeologist Qálnasa, also known as Elroy White, says his ancestors built stone-walled seaclam gardens (called Ináyaá) and a wide variety of stone fish traps (called Ćx) that were specifically designed depending on if they were "on a tidal flat, or in a creek or at the mouth of a river".

"They were built so solidly that they wouldn't fall apart by actions of a river, or by the tide or if a canoe hit it," he said.

For his thesis, 'Heiltsuk Stone Fish Traps', White combined archaeology with oral history to gradually unravel the interconnection of rock-walled fish traps and his ancestors' relationship to salmon. He explained that while he began exploring the sites, he saw how the ancient fish trap technology and resource management system didn't just shape the tidal landscape, they shaped his culture and heritage.



A Haida Gaaw sea garden has two rock mounds in its centre that attracted octopus and made it easy for Indigenous people to collect dinner (Credit: Diane Sellars)

"I noticed a difference between archaeological and Heiltsuk views of the trap sites," he wrote in his thesis. He says traditional scientific research empirical data such as length, width and height and missed the human element. "The important relationship between Heiltsuk People and the environment, which started with the fishing technology, they can't capture that."

The idea of a shared, separate Indigenous culture from the lands that shaped them has been slowly taking hold in the scientific community on British Columbia's coast. Morris says that for a long time her people had no access to part of their lands because "an arbitrary line was drawn making it a national park". But after several rock walls were spotted at low tide in the Gulf Island National Park Reserve (GINPR) and the decision was made in 2014 to restore a couple of the sites, Morris says that Parks Canada did something profound. "They asked for guidance from the First Nations."

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The abundance of ever-long abandoned gardens found on British Columbia's coast is staggering. Research shows that the two Nations with which Indigenous people have been building for at least 3,500 years, are 10 to 30% more productive than wild beaches, producing more than double the amount of food per square metre. Salomon, Erin Szabo, a marine ecologist with the GINPR's sea garden restoration project, says this indicates that the techniques once used to steward the gardens have a lot to teach us. While national park scientists, like Szabo, could have attempted to reverse engineer the sea gardens through science alone, they opted to reinstate traditional Indigenous stewardship practices by inviting the WSÁNEĆ and Hul'qumi'num Nations back to their lands.

"In our tradition when you are learning something, you start with the oldest way possible," said Morris. So on the first gathering at a clam garden just off of Salt Spring Island, the Sidd everyone to just their science away, asked for guidance from the ancestors and started at the beginning. "This is how far you put your rake. This is how wind or salinity or time of year affects the clams."

The newest Indigenous people returned to their sea gardens and fish traps was the moment the technology stopped being about the past and became about the future. In Heiltsuk territory, the fish traps are starting to support tourism as a step on virtual and in-person cultural tours and there are plans to integrate more traditional fishing techniques into modern life. Frank, who's now a father, sees it as a reminder of their grandparents and great-grandparents' strong connection to the land and sea and all it has to teach them.

In the GINPR, Szabo says other communities have begun using their research to reestablish their sea gardens – an ecological boost not just for the beaches being managed, but for the overall abundance of sea life on the coast that the biomass in the gardens can support. Szabo says the expected increase in marine life is important, but the relationship between people and the ocean that the sea gardens represent is a teaching relationship between elders and youth. "This knowledge has been generated over millennia of stewarding these places, it's something that was always meant to be passed on generation through generation."

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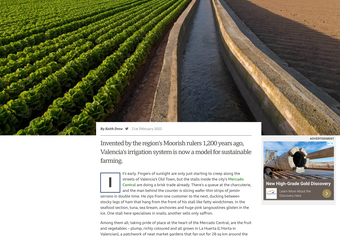

(Image credit: FAO GIAHS)

By Keith Drew | 21st February 2022

Invented by the region's Moorish rulers 1,200 years ago, Valencia's irrigation system is now a model for sustainable farming.

It's early. Fingers of sunlight are only just starting to creep along the streets of Valencia's Old Town, but the static inside the city's Mercado Central are doing a brisk trade already. There's a queue at the charcuterie, and the man behind the counter is doing wafer-thin slices of prime serrano in double time. He eyes from one customer to the next ducking between stacks of cheese, olives and cured meats, and he's ready to take their order. In the seafood section, tuna, sea bream, anchovies and huge pink langoustines glisten in the ice. One stall here specialises in snails, another sells only saffron.

Among them all, taking pride of place at the heart of the Mercado Central, are the fruit and vegetables – plump, richly coloured and all grown in La Huerta (L'Horta in Valencian), a patchwork of market gardens that has run for 28 days a week around the city. Encarna Folgado, owner of Frutas y Verduras Folgado, has been running a stall here for 40 years. She's one of the top commercial wholesale clients of the farmers who work in La Huerta. Really, if you need to buy the beans used in a traditional paella Valenciana, you come to Folgado.

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