

A Pacific Odyssey

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Caspar Henderson visits a remote atoll in the Pacific Ocean state of Palau to help protect coral reefs against the effects of global climate change. In the process he encounters a world of natural beauty, enriching humanity, and surprising history that makes him reflect on life's fundamentals.

I spent most of June 2004 on Helen, a tiny island on a coral atoll in the south-west Pacific Ocean, working with scientists and locals on a project that might help save the world. The aim was to build a “coral nursery” that could help protect what remains of their coral reefs in the face of potentially catastrophic climate change.



Transporting coral arc

Helen is one of two islands that make up Hatoheibi State in the Republic of Palau, a sovereign nation of 20,000 people. The other island is Tobi. Hatoheibi State has a population of about 300.

Tom Goreau and Wolf Hilbertz of the Global Coral Reef Alliance use mineral accretion to create coral nurseries or “arks”. Their technique enables healthy coral to grow at more than four times its normal rate, and resist the severe stresses that are becoming more prevalent and frequent across the globe. Some of the background to the project can be found [here](#). This article lays out some of the science and context in an easy-to-read way, and an account of an earlier expedition can be found [here](#).

Sand pattern



During the three weeks we were on Helen I spent many hours walking and observing on the shoreline, especially at sunrise and sunset when the patterns of light across sand and wave change endlessly. *Sand pattern*, taken on the western side of Helen at sunset, stays with me.

What Paul Klee said in 1923 of “the artist” may apply to many of us lesser mortals too:

“For the artist, communication with nature remains the most essential condition. The artist is human: himself nature; part of nature within natural space”.

Canoeist

The Pacific Ocean covers a larger area than all the land on the planet, plus Africa over again. (The Pacific is more than 69 million square miles, or 180 million square kilometres; the world’s land total landmass is 58m sq m, or 150m sq km, Africa covers 11m sq m, or 30 sq km). Brazil, Siberia and the Sahara would get lost in this ocean. Tobi island covers one-quarter of a square mile. Helen is about a hundredth the size of Tobi.

In the last three or four thousand years, people learnt to cross thousands of miles of open water between Pacific islands in canoes. Observing the flight of seabirds, watching for distant clouds that could be forming over tiny islands, or the shape of the waves and swells subtly altered by distant shores, they were able to navigate astounding spaces in tiny craft. The first long-distance travellers used large, double-hulled canoes. But people also crossed huge distances in canoes like the simple one in this picture.



Canoeist was taken on the island of Merir, about halfway on the 300 miles from Koror, the capital of the Palau archipelago, to Helen and Tobi. The canoeist, who lives on Merir with less than a dozen others, had no other means of transportation on the island. He had come out to greet our boat, the *Atoll Way*, see friends, get news.

It's only two or three hundred years since canoes like this were the only means of transport around here. Peter Black, an anthropologist, speculates as follows about the islanders' first view of European ships:

“The Tobian word for ship, *wafaruh*, means something like island canoe. When people saw the first sailing ship, they thought it must be an island which had been magically disconnected from its connection to the bottom of the ocean and was now traveling from place to place, with its trees (masts) still in place and its houses with people going in and out (the cabins on deck)”.

One of the Tobi elders told me that their ancestors used to say that the Europeans must come from the clouds (see *Ifiriingris*, “the time of the English”, on the website Friends of Tobi Island).

Maps of Helen

The detailed map on the left, partly superimposed with aerial photographs, is of our destination: Helen reef, or *Hotsharihi* which means Reef of the Giant Clam in the Tobi language. The reef, which is only exposed to the air at low tide, is about 15 miles (24 km) from north to south and 6 miles (10 km) from east to west. It forms almost a complete ring, enclosing a lagoon with a channel cutting to the open sea towards the southern end of the western side. Helen is thought to be the most biologically diverse reef in the Pacific, especially in the channel.



The atoll is a showpiece demonstration of Charles Darwin's theory of coral reef formation (see here, and

here) on how subsiding islands produce coral atolls.

Around 90% of the coral in Helen atoll died after the great bleaching which occurred in 1998. On some brief survey dives on parts of the reef, most of the coral was still dead – a vast, desolate boneyard. A few patches were springing back to life, astonishing in their diversity and colour, including the crazy puckered “lips” of the giant clams in fluorescent purple, blue and pink, some more than a metre long.

Helen island is about 445 metres long and 20 metres wide. On this map it is a scarcely visible dark dot on the finger-shaped yellow sandbar at the top of the atoll. The island, thickly vegetated and densely packed with nesting seabirds, rises about two metres above high tide.

Children



This photo was taken in the capital, shortly before we sailed for Helen and Tobi, the main island about 40 miles to the west of Helen to which it “belongs”. Around sixty people, including these four children and more than a dozen others, came with us on the small, ramshackle old ferryboat that is the *Atoll Way*. Particularly notable was the great tenderness and care toward to every child by both men and women. The great majority of adults, and all the children, went on to Tobi after they had dropped us off with the rangers on Helen. On Tobi, the children went to summer camp where the younger ones played and the older ones learnt some of the traditional skills of their ancestors.

A census by the German colonial authorities in the late 1800s counted some 5,000 people on Tobi island. The people of Tobi were subsisting on fishing and vegetables they grew on the island. Today there are fewer than 300 Tobians, of whom only a handful live on Tobi itself (the rest live hundreds of miles away in a hamlet outside the capital, Koror, where there are jobs and their children can go to school).

From 5,000 to 300 in about 100 years. Where did the people go? Some, perhaps, were abducted and forced into indentured labour in Australia. Some emigrated, and some were killed during the second world war. But the great majority probably died of disease inadvertently brought by the Europeans. Catastrophic mortality and decline – in excess of 90% – is fairly typical across the remoter islands of the Pacific, where populations were first exposed only in the 18th or 19th century to pathogens prevalent on the Eurasian landmass (China, India, Central Asia, the middle east and Europe): one of the first and most notable aspects of what today we would call globalisation.



I didn't talk to people about this great extinction, but a young man named Stalin whose dream is to become a sniper in the United States army (there are Palauns serving in Iraq on their path to citizenship), told me vivid stories of his grandparents' generation and the terrifying, weird ghosts that made life a misery on Tobi until they were driven out by Catholic priests and Jesus, seen here in his glow-in-the-dark green plastic manifestation.

Tobians say they suffered harshly under Japanese occupation during the Pacific war of 1941-45 when they were forced as slaves to grow food for the foreign soldiers. One old guy tells me that when, towards the very end of the war, US troops came close to taking the island, the Japanese – fearing an uprising – herded many of the remaining islanders into huts and threw in grenades. As one Tobian explained it to me, the Americans were so angry at what the Japanese had done to the Tobi people that they dropped nuclear bombs on them.

Sunset at Sea



On the way to Helen, aboard the *AtoII Way* I took this photograph of a sunset. Moments later Tom Goreau saw the green flash. I missed it completely. At sea, and on a small island, the sky plays a huge part in your life. For the contemporary traveller on a slow boat, clouds can be endless source of reflection. Not too far from where this picture was taken lies the Challenger Deep, one of the deepest spots in the world's oceans.

Evidence strongly suggests that the global climate will change rapidly during the 21st century. We cannot be sure what will be human influence and what will be natural, because we cannot run a simultaneous “control” version of the 21st century on planet earth minus the human impact. But the human input looks likely to be immense. As Myles Allen of climateprediction.net puts it “the last species to have this much influence on the climate was almost certainly green, slimy and inarticulate”.

There is a lot that needs to be better understood about the climate system, including what happens with cloud cover, the changing chemical balance of the seas and a possible “peat bog carbon time bomb”. (For reliable, easy-to-understand reports and analysis of the science, see this list of articles).

The situation looks particularly bad for coral. If sea levels rise slowly then coral can grow to keep up with the water levels. But coral is extremely sensitive to rising temperatures, and the corals that make up most reefs and atolls are already near the limits of their temperature tolerance.

“Bleaching”, which can lead to the death of whole reefs across large parts of the Indian and Pacific oceans, already appears to be occurring much more frequently than in the past. In some places coral is making a slow recovery. But if such bleaching events become more common – and rapidly rising ocean temperature makes it highly likely that they will – then reef-building corals as we know them could be in long-term trouble. In the unlikely event that rising temperatures do not destroy these massive, ancient and wonderful ecosystems, then the increasing acidity of the world’s oceans could do the job, perhaps by the year 2065.

The situation calls for hard thinking, honest discussion, leadership and a lot of work. As a notable drunkard and imperialist once put it: “You cannot tell from appearances how things will go. Sometimes imagination makes things out far worse than they are; yet without imagination not much can be done”.

Taking PV panels to shore



This was my first view of Helen, riding in on a dinghy with some of the photovoltaic (PV) cells to be used to power our project. Moments after this picture was taken, Flavian, the ranger sitting at the front of the boat, pointed to a large dark disc moving fast through the water. This was my first sight of a green turtle in the lagoon.

Our aim was to build a coral nursery or “ark” of the kind that the Global Coral Reef Alliance (GCRA) has constructed in dozens of places around the world, working closely with indigenous communities. In the event, the conditions proved unsuitable for a nursery and instead, we built a breakwater to help reduce erosion of the sandbar on which the island stands.

The project may only have demonstrative value at best: as coral dies, the underpinnings of the island will erode. The Tobi people could lose the atoll with all its economic and spiritual importance. But an important point here is that they were and are ready to experiment with possible counter-measures, no matter how extraordinary, for themselves. While Pacific island nations like Tuvalu receive some attention in the international press for their likely fate (caused, in truth, by a combination of sea-level rise and gradual sinking of the tectonic plate on which their islands sit), the Tobians are trying to do something practical and affordable to enhance and protect their heritage and future.

Sea shore



Here you can see erosion on the western shore of Helen island. We decided to build a breakwater on this side of the island to help reduce the rate at which the sand shifts and the island washes away.

The great tree trunk lying flat in the foreground of the picture is a Douglas Fir. It may have floated all the way from British Columbia. Charles Darwin, one of the most wide-awake people of his time, noted that stones caught in root mass of such driftwood could be of geological types found thousands of miles away. We found some large granite stones lodged in the roots of driftwood which probably reached Helen this way.

Green turtle



Green turtles, like the one in the picture, are frequent in the Helen lagoon. Snorkelling one day with Wolf Hilbertz when we were still searching for a suitable site for the coral nursery, we came across one quietly sleeping on the bottom. The turtle bodyplan has been essentially unchanged for about two hundred million years. Now most great turtle species are on the verge of dying out. It is only taking a few decades, as mankind destroys their breeding-grounds, pollutes their habitats and traps them in nets.

One of the most distressing experiences during my stay on Helen was to see the tiny newborns emerging at night making like troopers for our lights. We'd take them to the water, but knew that their chances of survival were slimmer than ever thanks to our own carelessness, and the increasingly hostile wider environment. Here is the death of birth.

In the heat of the day, or late at night when the sky was a "majestical roof, fretted with golden fire", I read a good deal, including Margaret Atwood's *Oryx and Crake*, a novel which imagines a catastrophic human future. Its young heroes play "Extinctathon, an interactive biofreak masterlore game on the web", where you have to name more bioforms that had become extinct in the past fifty years than your opponent. Precision is essential: not only do you have to identify the creature;

but also “what had snuffed it (pollution, habitat destruction, credulous morons who thought that eating its horn would give them a boner)”.

The heat in the Pacific can put in you in a bad mood, but there are moments of wonder too, when what exists almost knocks you over. The baby-eating reductionist Richard Dawkins puts this well in *Walking back to Genesis*:

“... my overwhelming reaction is one of amazement. Amazement at the extravaganza of detail that we have seen; amazement, too, at the very fact that there are any such details to be had at all, on any planet. The universe could so easily have remained lifeless and simple - just physics and chemistry, the scattered dust of the cosmic explosion that gave birth to time and space. The fact that life evolved out of nearly nothing, some 10 billion years after the universe evolved out of literally nothing, is a fact so staggering that I would be mad to attempt words to do it justice”.

Seed pod



There may be planets in this universe entirely covered in water. With no shores to break upon, storms would rage unchecked until they ultimately lost themselves in the sheer indifference of the larger ocean.

Could consciousness evolve in such places? Maybe. In the earth’s oceans, cetaceans (dolphins and whales) are surely conscious, but they have their origins on land.

To contemplate the seed in this picture, carried to Helen’s shores on the waves, takes a certain part of your brain, itself a population of hundreds of billions of cells that greatly exceeds the number of stars in the sky. The number of possible connections these cells can make exceeds the number of particles in the universe. The cortex has thirty billion neurons, and at least a million billion connections.

The seed in this picture, resembling a Japanese lantern, is picked out in the light of a specific moment, part of the indefinite passage of moments, but absolutely

particular. The uniqueness of the moment speaks against abstract human conceits like Heaven, as the late Czeslaw Milosz intuited in his 1986 poem *How it Should be in Heaven*:

“Where is time that both destroys and saves us?
This is too difficult for me. Peace eternal
Could have no mornings and no evenings.
Such a deficiency speaks against it.”

Crab on log



The log and the crab in this photograph have just travelled hundreds or thousands miles across open ocean. Within a few minutes of this picture being taken, the log was washed up on shore and this crab, together with others on the log, scuttled ashore to compete with thousands of these uncanny arthropods already on Helen.

For hundreds of millions of years, such means have transported plants, animals and other organisms all over the world, a factor in the creative-destructive processes in which “endless forms most beautiful and most wonderful have been, and are being evolved”.

Pile driving for the PV platform

Building the sea barrier was hard work, and took ten days as the weather conditions steadily deteriorated. Next to the barrier we installed two racks carrying the solar panels to power mineral accretion in the barrier so that it would be self-repairing and become stronger over time.

In the photo, Wolf Hilbertz is using compressed air from a diving tank to drive down a pile of one the racks down into the sand. We got as many



bodies as we could onto the frame of the rack in order to help drive it down into the sand and so secure it against coming storms.

High view



I took this picture from a precarious foothold at the top of the radar mast. From up here one could watch the surf breaking along the edge of the almost submerged reef for many miles.

This is one of the most beautiful and extraordinary sights I have ever seen: a white line gliding along the blue horizon, and extending the horizon itself ever further as it curls into the extreme distance.

It is a sight that cannot be caught on any still or moving camera (and it cannot be seen in the photo above). Part of the beauty is its silence and distance. From far away a camera sees nothing. And zooming in, the beauty is lost.

Our return from Helen was delayed by a super-typhoon, which kept us penned up on a tiny boat, a decrepit former Japanese ferry unsuitable for openwater sailing, as our food supply dwindled to nothing.

Caspar Henderson at Carricknath Point, Cornwall



This a photo of me, glad to be home again in England in late June 2004, in time for a friend's wedding. Because it was a joyful day, this is a picture I would like those who knew me to have when I'm dead, should they want to remember me for the vanishingly small fraction of the Long Now that they survive me.

It wouldn't meet most standards for a portrait shot – the face is partly in shade. But it is true to a moment and place – the light, the wind, the cloud, and the smile that says this is a place on the edge of the world where I feel at home.

The picture was taken next to the Carrick Roads on the coast of Cornwall in England. It's a place from which people have sailed all over the world, including to Palau, and where you feel some of the magic in this island, the land's sacred rights and dreams of ancestors since the last Ice Age.

A detail on the south door of the church at St Just in Roseland near the Carrick Roads. Another church nearby is dedicated to St Anthony, the saint popularly invoked by those in danger of shipwreck and renowned for his intercession in the recovery of lost things.



I know virtually nothing of my own direct ancestors – fishermen from Fife who braved the seas for many generations. In the 19th century, seven brothers upped and left to try make their fortunes in Glasgow, but that is another story. Did some of them look like I did, standing that day on the Cornish shore?

It's been almost twenty years since I set out on my own wanderings. Inspired by Chris Marker's *Sans Soleil* and Godfrey Reggio's *Koyaanisqatsi*, I wanted to make a map of human dreams. In New Mexico I tried to make a film on the impact of the atomic bomb on the human imagination (J. Robert Oppenheimer, speaking of the Trinity test of the first atomic bomb at Alamogordo, quoted the *Bhagavad Gita*: "I am become death, the destroyer of worlds"). Such things seem to make sense at 22. I am still confused, and I am still chasing after *virtute e canoscenza* (virtue and knowledge), which makes sense, I think.

Prince Lee Boo



From *LEE BOO* based on *of ARRA THULLE*

This is Prince Lee Boo, Palau's first global citizen. A monument in the Palaun capital Koror tells his story:

"With the consent of his Father, King Ibedul of Koror, Prince Lee Boo departed Palau with Captain Henry Wilson and the crew of the *Antelope* to London, England on November 12 in the year of our Lord 1783. While in London, Prince Lee Boo became Palau's first de facto ambassador of goodwill to England, and Palau's first true scholar. However, Prince Lee Boo's plan of returning to Palau to spread Universal Knowledge and Scientific Discoveries to his people came to an abrupt end when the young prince succumbed to small pox in the winter of

1784. The remains of Prince Lee Boo and his grand plans for Palau lay buried in the courtyard of St Mary's Church in Rotherhithe."

Lee Boo's grave at St Mary's Rotherhithe



To the memory of Prince Lee Boo, a Native of the Pelew or Palos Islands and Son to Abbe Thulle, Rupack or King of the Island Coo'roor'raa, who departed this Life on the 27 December 1784 aged 20 Years. This Stone is inscribed by the Honorable United East India Company as a Testimony of Esteem for the humane and kind Treatment afforded by his Father to the Crew of their Ship The Antelope [commanded by] Capt. Wilson which was wrecked off that Island on the Night of the 9th August 1783

They're very proud of Prince Lee Boo in Palau, and many Palauns were surprised I had never heard of him and had said I should visit his grave. So, on a sunny July day, shortly before leaving for the mountains of northern Pakistan, I cycled from openDemocracy's office in Clerkenwell to St Mary's Church.

Lee Boo's short time in England was full of excitement, a happy version of Kaspar Hauser: "By [July 1784] Lee Boo was already able to provide his own description [in English] of his ride by coach to London, saying that he had been put into 'a little house which was run away with by horses; that he slept, but still was going on; and whilst he went one way, the fields, houses, and trees, all went another'. Upon arrival in London, Lee Boo was taken to the home of Captain Wilson in Paradise Row in Rotherhithe. Here he was given his own bed-chamber and lived with the Wilsons as one of the family...."

During his visit to England, Lee Boo met the London poet George Keates and witnessed the first manned balloon flight in England by Vincenzo Lunardi. For me, two words on his tomb: "humane and kind". Setting aside for just a moment the nature of the East India Company and its enterprises, the short life of Lee Boo and his adventures with the English still speak of understanding, respect and affection across the 220 years.

About fifteen yards from Lee Boo's tomb is a monument to another group of travellers, the "Pilgrim Fathers" who left the quay just north of the church on the *Mayflower* in 1620.

The sight brings mixed feelings. The pilgrims' determination and idealism has borne many children, including (paradoxically, given the Puritan obsession with sin) the



myth of American innocence, of “original sinlessness”.

It troubles me that this world view, which I think is currently an important cause of many problems in the world, was so heavily shaped in my own country, albeit alongside what I regard as the progressive values of liberty and the enlightenment shaped by the likes of John Locke and much older beliefs in the law and the “rights of freeborn Englishmen” that are part of the hope of America. (This complex heritage is brilliantly anatomised by Anatol Lieven in his book *America Right or Wrong*).

Barracuda



We caught this barracuda with a long line on the way down to Helen, and ate it with garlic, soy sauce and rice. Less than two months later, Tom Goreau lost two fingers and part of his left hand in a very rare barracuda attack off the coast of Mexico.

Tom is OK now, and continues his work. Particularly encouraging is the potential of a new project on the Great Barrier Reef in Australia. Tom’s grandfather and father made pioneering contributions here, but for a long time the Australian authorities were in denial about the gravity of the threats now facing the world’s greatest reef. The Global Coral Reef Alliance may not have the answer, but at least they are alive to some of the possibilities, and may help the rest of us to wake up.

Log on water’s edge



“Beauty in things exists in the mind which contemplates them” (David Hume)