

= Caroline Island =

Caroline Island or Caroline Atoll ( also known as Millennium Island and Beccisa Island ) , is the easternmost of the uninhabited coral atolls which comprise the southern Line Islands in the central Pacific Ocean .

First sighted by Europeans in 1606 , claimed by the United Kingdom in 1868 , and part of the Republic of Kiribati since the island nation 's independence in 1979 , Caroline Island has remained relatively untouched and is considered one of the world 's most pristine tropical islands , despite guano mining , copra harvesting , and human habitation in the 19th and 20th centuries . It is home to one of the world 's largest populations of the coconut crab and is an important breeding site for seabirds , most notably the sooty tern .

The atoll is currently designated as a wildlife sanctuary . In 2014 the Kiribati government established a 12 @-@ nautical @-@ mile fishing exclusion zone around each of the southern Line Islands ( Caroline ( commonly called Millennium ) , Flint , Vostok , Malden , and Starbuck ) .

The atoll is best known for its role in the millennium celebrations . A 1995 realignment of the International Date Line made Caroline Island one of the first points of land on Earth to reach January 1 , 2000 on the calendar .

= = Geography and climate = =

Caroline Atoll lies near the southeastern end of the Line Islands , a string of atolls extending across the equator some 1 @, @ 500 km ( 930 mi ) south of the Hawaiian Islands in the central Pacific . The slightly crescent @-@ shaped atoll ( 3 @. @ 76 km<sup>2</sup> or 1 @. @ 45 mi<sup>2</sup> in land area ) consists of 39 separate islets surrounding a narrow lagoon , 8 @. @ 7 by 1 @. @ 2 km<sup>2</sup> in size , or with an area of 6 @. @ 3 km<sup>2</sup> . The total atoll area , including dry land , lagoon and reef flat , measures 13 by 2 @. @ 5 km , or 24 km<sup>2</sup> . The islets rise to a height of only 6 meters ( 20 feet ) above sea level . The islets , like those of all atolls , share a common geologic origin and consist of sand deposits and limestone rock set atop a coral reef . According to the path of the International Date Line , Caroline Island is the easternmost point on land on Earth .

Three large islets make up the bulk of Caroline 's land area : Nike Islet ( 1 @. @ 04 km<sup>2</sup> or 0 @. @ 40 mi<sup>2</sup> ) at the north ; Long Islet ( 0 @. @ 76 km<sup>2</sup> or 0 @. @ 29 mi<sup>2</sup> ) at the northeast of the lagoon and South Islet ( 1 @. @ 07 km<sup>2</sup> or 0 @. @ 41 mi<sup>2</sup> ) . The remaining assembly of small islets , most of which were named during the 1988 ecological survey , conducted by Angela and Cameron Kepler , fall into four major groupings : the South Nike Islets , the Central Leeward Islets , the Southern Leeward Islets , and the Windward Islets ( see map at the Wayback Machine ( archived December 23 , 2010 ) ) . Caroline 's islets are particularly ephemeral ? over the course of a century of observation , several of the smallest islets have been documented to appear or disappear entirely following major storms , while the shapes of larger ones have significantly changed .

The central lagoon , roughly 6 by 0 @. @ 5 km ( 3 @. @ 73 by 0 @. @ 31 mi ) , is shallow ? at most 5 ? 7 m ( 16 ? 23 ft ) in depth ? and is crossed repeatedly by narrow coral heads and patch reefs . Reef flats generally extend about 500 m ( 1 @, @ 600 ft ) from shore ? although some sources report them to extend more than a kilometer from land ? and make boat landings perilous except at high tide . There are no natural landings , anchorages , or deep water openings into the central lagoon ; water which spills into the lagoon over shallow channels at high tide is contained within the surrounding reef and remains stable despite ocean tides . Most landings are generally made at a small break in the reef at the northwest corner of the South Islet ( visible on the satellite photo above ) .

Densities of giant clams reach up to four per square foot in parts of the lagoon . The most common species is the ? small giant clam ? *Tridacna maxima* and largest clam species , *Tridacna gigas* is also found in the lagoon .

There is no standing fresh water on Caroline Island , although the Nike and South Islets harbor underground freshwater aquifers ( or Ghyben @-@ Herzberg lenses ) , and wells have been built to tap drinking water for temporary settlements . Soils on Caroline are similarly poor , dominated by

coral gravel and sand , with significant organic content present only within stable , forested island centers . Guano deposits make island soil , where it does exist , nitrogen @-@ rich ; but even in the oldest and most vegetated regions of the atoll , soils are only a few centimeters ( one or two inches ) thick .

Like the rest of Kiribati , Caroline Island enjoys a tropical maritime climate which is consistently hot and humid . Meteorological records are sparse , but temperatures generally range between 28 and 32 degrees Celsius ( 82 and 90 degrees Fahrenheit ) year round . Caroline lies within a region of highly variable precipitation , but is estimated to receive an average of 1 @,@ 500 mm ( 59 in ) of rain annually . Tides are on the order of 0 @.@ 5 m ( 1 @.@ 6 ft ) and trade winds , generally from the northeast , mean that corner of the island experiences the roughest seas .

Caroline Island is among the most remote islands on earth ? 230 km ( 140 mi ) from the closest land at Flint Island , 1 @,@ 500 km ( 930 mi ) from the nearest permanent settlement on Kiritimati , 4 @,@ 200 km ( 2 @,@ 600 mi ) from the Kiribati capital of Tarawa , and 5 @,@ 100 km ( 3 @,@ 200 mi ) from the nearest continental land in North America .

= = Flora and fauna = =

Despite more than three centuries of occasional human impact on Caroline , it is considered to be one of very few remaining " near @-@ pristine tropical islands . " and has been rated as one of the most unspoiled Pacific atolls . Its relatively undisturbed state has led to Caroline being considered for designation as a World Heritage Site and as a Biosphere Reserve . Ecological surveys documenting the island 's flora and fauna have been made intermittently through the later 20th century : Caroline was visited in 1965 by the Pacific Ocean Biological Survey Program , in 1974 by the Line Island Expedition , and in 1988 and 1991 by the United Nations Environment Programme Wildlife Conservation Unit .

Caroline Island is heavily vegetated , and most islets possess three ringed zones of vegetation : an outermost herb mat , typically composed mainly of *Heliotropium anomalum* ; an inward zone of shrub , primarily *Heliotropium foertherianum* ; and a central forested region , typically dominated by groves of *Pisonia grandis* trees . Coconut palms have also been introduced and exist in substantial quantities on the larger islets . This pattern of vegetation is consistent across the larger islets , with smaller islets lacking the central forest and the smallest vegetated solely by low herbs . Other common plants include *Suriana maritima* and *Morinda citrifolia* .

Caroline Island is an important breeding site for a number of species of seabirds , most notably the sooty tern ( *Onychoprion fuscata* ) , numbering around 500 @,@ 000 ? a colony of sooty terns dominates the eastern islets ? and the great frigatebird ( *Fregata minor* ) , numbering over 10 @,@ 000 . Caroline Island and its neighbor , Flint Island , also host some of the world 's largest populations of the coconut crab . ( *Birgus latro* ) . Other native animals include the *Tridacna* clam , which is abundant in the central lagoon , hermit crabs , and multiple species of lizards .

The endangered green turtle ( *Chelonia mydas* ) nests on the beaches of Caroline Island , but there have been reports of poaching by recent homesteaders . The bristle @-@ thighed curlew ( *Numenius tahitiensis* ) , a migrant visitor from Alaska , is also classified as vulnerable .

Around twenty non @-@ native species of flora have been introduced to Caroline Island via human contact . Among these are the vine *Ipomoea violacea* , which has begun to proliferate . Domestic cats and dogs introduced alongside a small homestead have driven the seabird population away from the islet of Monu Ata @-@ Ata .

= = History = =

= = = Prehistory = = =

Caroline Island is believed to have originated from a volcanic hotspot which eroded and then become home to a coral reef which grew above the ocean surface . Although these geological

processes are poorly understood , the orientation of the Line Islands ( roughly north @-@ south ) suggests that they were formed more than 40 million years ago , before the Pacific Plate changed its direction of travel . The same hotspot more recently gave rise to the Tuamotu Archipelago .

There is evidence of settlement by Polynesian peoples on the largest islets from before European contact . Graves and temple platforms were uncovered by early expeditions to the island , and a large marae exists on the west side of Nike Islet . To date , these artifacts have not been surveyed by archaeologists .

= = = 17th to 19th century = = =

The first recorded sighting of Caroline Island by Europeans was on February 21 , 1606 , by Pedro Fernández de Quirós , a Portuguese explorer sailing on behalf of Spain ; his account names the island " San Bernardo . " The atoll was " rediscovered " on December 16 , 1795 by Captain William Robert Broughton of HMS Providence , who gave the atoll the name Carolina ( which later became Caroline ) " in compliment to the daughter of Sir P. Stephens of the Admiralty . " Caroline was again sighted in 1821 by the English whaling ship Supply and was then named " Thornton Island " for the ship 's captain . Other early names for the atoll include Hirst Island , Clark Island , and Independence Island . Among other early visits which left behind accounts of the island are that of the USS Dolphin in 1825 ( recorded by Lieutenant Hiram Paulding ) , and of a whaling ship in 1835 ( recorded by Frederick Debell Bennett in his Narrative of a Whaling Voyage Round the Globe From the Year 1833 ? 1836 ) .

In 1846 , the Tahitian firm of Collie and Lucett attempted to establish a small stock @-@ raising and copra ( coconut meat ) community on the island , an operation which met with limited financial success . In 1868 , Caroline was claimed by the British vessel HMS Reindeer , which noted 27 residents in a settlement on South Islet . This settlement lasted until 1904 , when the six remaining Polynesians were relocated to Niue .

In 1872 , the island was leased by the British government to Houlder Brothers , who conducted minimal guano mining on the island . In 1881 , the lease was later taken over by the mining operation 's manager , John T. Arundel ( for whom one of the islets is named ) . Guano mining , which began in 1874 , supplied a total of about 10 @,@ 000 tons of phosphate until supplies were exhausted around 1895 .

In 1883 , an expedition of American astronomers traveled from Peru to Caroline Island aboard the USS Hartford to observe a total solar eclipse on May 6 . A French expedition also observed the eclipse from Caroline , and the United States Navy mapped the atoll . Johann Palisa , a member of the expedition , discovered an asteroid later that year which he named Carolina " in remembrance of his visit to [ the ] island . "

= = = 20th century = = =

Leased to S.R. Maxwell and Company , a new settlement was established in 1916 , this time built entirely upon copra export . Much of the South islet was deforested to make way for coconut palms , a non @-@ indigenous plant . The business venture , however , went into debt , and the island 's settlement slowly decreased in population . By 1926 , it was down to only ten residents and by 1936 , the settlement consisted of only two Tahitian families before abandonment sometime in the late 1930s .

Caroline Island remained uninhabited and undisturbed through World War II and afterwards . It remained under British jurisdiction , repossessed by the British Western Pacific High Commission in 1943 and governed as part of the Central and Southern Line Islands . In January 1972 , the Central and Southern Line Islands , including Caroline , were joined with the British colony of the Gilbert and Ellice Islands , which had become autonomous in 1971 as part of British decolonization efforts .

In 1979 , the Gilbert Islands became the independent nation of Kiribati ; Caroline Island is Kiribati 's easternmost point . The entire island is owned by the government of the Republic of Kiribati , overseen by the Ministry of Line and Phoenix Groups , which is headquartered on Kiritimati .

Competing claims to sovereignty over the island by the United States ( under the Guano Islands Act ) were relinquished in the 1979 Treaty of Tarawa , ratified by the U.S. Senate in 1983 .

The island was briefly inhabited again from 1987 to 1991 by Ron Falconer , his wife Anne , and their two children , who developed a largely self @-@ sufficient settlement on the atoll . Following a transfer of ownership , Falconer was evicted from the island by the Kiribati government . A book , Together Alone ( ISBN 1 @-@ 86325 @-@ 428 @-@ 5 ) , written by Falconer , documents the story of their residence on Caroline Island .

In the 1990s , the island was leased to Urima Felix , a French Polynesian entrepreneur ; he established a small homestead on one of the islets and reportedly had plans for development of the atoll . The island is also occasionally visited by Polynesian copra gatherers under agreements with the Kiribati government in Tarawa .

== Time zone realignment ==

On December 23 , 1994 , the Republic of Kiribati announced a change of time zone for the Line Islands , to take effect January 1 , 1995 . This adjustment effectively moved the International Date Line over 1 @, @ 000 kilometers ( 620 mi ) to the east within Kiribati , placing all of Kiribati on the Asian or western side of the date line , despite the fact that Caroline 's longitude of 150 degrees west corresponds to UTC ? 10 rather than its official time zone of UTC + 14 . Caroline Island now is at the same time as the Hawaiian Islands ( Hawaii @-@ Aleutian Standard Time Zone ) , but one day ahead . This move made Caroline Island both the easternmost land in the earliest time zone ( by some definitions , the easternmost point on Earth ) , and one of the first points of land which would see sunrise on January 1 , 2000 ? at 5 : 43 a.m. , as measured by local time .

The stated reason for the move was a campaign promise of Kiribati President Teburoro Tito to eliminate the confusion of Kiribati straddling the Date Line and therefore being constantly in two different days . However , Kiribati officials were not reluctant to attempt to capitalize on the nation 's new status as owners of the first land to see sunrise in 2000 . Other Pacific nations , including Tonga and New Zealand 's Chatham Islands , protested the move , objecting that it infringed on their claims to be the first land to see dawn in the year 2000 .

In 1999 , in order to further capitalize upon the massive public interest in celebrations marking the arrival of the year 2000 , Caroline Island was officially renamed Millennium Island . Although uninhabited , a special celebration was held on the island , featuring performances by Kiribati native entertainers and attended by Kiribati president Tito . Over 70 Kiribati singers and dancers traveled to Caroline from the capital Tarawa , accompanied by approximately 25 journalists . The celebration , broadcast by satellite worldwide , had an estimated audience of up to one billion viewers .

Despite many media and government claims to the contrary , Caroline Island was not the first point of land to see sunrise on January 1 , 2000 ( local time ) ; that distinction belongs to a point of land between Dibble Glacier and Victor Bay on the coast of East Antarctica , at 66 ° 03 ? S 135 ° 53 ? E , where the sun rose 35 minutes earlier . As this point is close to the Antarctic Circle , and the area beyond the Antarctic Circle is affected by the continuous sunlight in December , the definition of the exact point becomes a question of distinguishing between a sunset and an immediate sunrise in view of atmospheric refraction effects .

== 21st century and future ==

As Caroline Island only extends six meters above sea level , it would be in danger if sea levels rise . The Kiribati government estimates that the island may be reclaimed by the sea as soon as 2025 , and the United Nations has rated Caroline Island as among those most in danger from sea level rise .

== Image gallery ==

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