

Architecture on 'Isolated Islands' in the Pacific

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Abstract— *'Isolated islands' in the Pacific are specific natural and social environments. They can be considered 'banks of life' on Earth due to their rich biodiversity and abundance of endemic plants and animals. Due to their isolation, they were sparsely populated, so the social environment on them remained modestly developed. The indigenous population belongs to the Pacific region, and their main feature is a specific language. The architectural cultural and historical heritage is modest, since the society (clans) was oriented towards survival. The exception is Easter Island (Rapa Nui) where the remains of traditional buildings (actually, foundations made of eruptive stone) and monumental stone sculptures ('moai') have been preserved to this day. Vernacular architecture (photodocumented in the late 19th and early 20th centuries) testifies to its design and materialization in accordance with the natural environment and the modest needs of the social environment. This paper will cover: Easter Island (Rapa Nui), Pitcairn Islands, Pukapuka, Caroline Island (Millennium Island), Galápagos Islands, Tuvalu and Christmas Island.*

Keywords— *'Isolated Island', Synergy of natural environment, social environment and man.*

I. INTRODUCTION

The Pacific Ocean covers a third of the Earth's surface, covering an area larger than all of Earth's landmass combined (Figure 1). The thousands of islands of the Pacific Ocean have a total area of less than 1,300,000 km², of which about 85% are found on the mainland islands of New Guinea, New Zealand, and the much smaller but still relatively large Hawaiian Islands. The environments of the Pacific islands are diverse in their geology, topography, ecology, and rainfall. As one travels eastward from the islands of Southeast Asia, the islands generally become smaller and the distances between them greater, and the island biota becomes increasingly poorer, that is, the diversity of plant and animal species decreases significantly with distance eastward. Although before human colonization, the pristine islands of Oceania were covered in vegetation, often home to large populations of birds and, in some cases, reptiles, and were nesting grounds for turtles, all of which provided a rich food supply for the initial colonizers, the biodiversity of the islands, especially the small islands of remote Oceania, was extremely low. The diversity of the cultural landscapes of the Pacific islands is closely linked to the geology of the region and the resulting landforms of the ocean world. Cultural landscapes have the ability to read as living records of how societies have interacted with their environment over time [1,2,3,4]. The fundamental element of Pacific Island societies, which enabled their ancestors to successfully colonize the entire Pacific region, is their horticultural subsistence base [5]. The region is usually divided into three geocultural subregions:

Melanesia, Micronesia, and Polynesia. Early European explorers made these distinctions not only based on geography, but also on cultural, anatomical, and linguistic differences they observed among the peoples of the Pacific Islands. Polynesia, the Polynesian Triangle with the peaks of Hawaii to the north, Easter Island to the southeast, and New Zealand to the southwest, encompasses most of the islands where Polynesian languages were spoken at the time of sustained early European contact from the late 18th century. Over 1,000 different languages are spoken in Melanesia, of which about 700 are non-Austronesian (Papuan) languages, and about 400 are Austronesian languages. This extraordinary diversity of languages is accompanied by a similar diversity of cultural practices, in contrast to the relative homogeneity of Polynesian languages and cultures. This linguistic pattern contributes to and reflects the unique character of the Pacific region. On the one hand, Polynesia and parts of Micronesia are inhabited by Polynesian-speaking communities whose language can be understood by communities living thousands of kilometres away in other island groups. On the other hand, Melanesia is the most linguistically diverse region in the world, with people living in adjacent valleys speaking completely different languages. The human colonization of the Pacific islands is a unique episode and a remarkable story in human history. Oceania – the 'continent of the sea' – was the last major region of the world to be settled by humans, made possible only by the extraordinary maritime and navigational skills of the ancestors of the Pacific island peoples. The story of the colonization of the Pacific islands is crucial to understanding the cultural landscapes of the region. Sophisticated knowledge of the sea and navigation, combined with a highly adaptive resource strategy, enabled humans to colonize the region, and the legacy of this is evident in the patterns of relationships between different island and sea features across the region. Current evidence suggests that the colonization of Melanesia and Polynesia occurred in three distinct phases, the earliest of which was the Late Pleistocene. At least 40,000 years ago, human groups traveled to Australia and New Guinea, which then formed the larger continent of Sahul, from the islands of Southeast Asia and within a few thousand years systematically colonized almost every type of environment from Tasmania to the Solomon Islands. The earliest archaeological evidence in the Bismarck Archipelago, from the islands of New Britain and New Ireland east of New Guinea, dates to about 35,000 years ago. Evidence for this great temporal depth for human settlement of the islands comes from several open and cave sites in New Britain and New Ireland in the Bismarck Archipelago that contain remarkable archaeological sequences reflecting human

settlement interwoven with evidence of major volcanic eruptions on New Britain. In the sediments of New Ireland, there is evidence that people were returning from a journey of over 100 km across the open sea from New Britain to New Ireland as early as 20,000 years ago. This evidence comes in the form of obsidian or volcanic glass, originating from the volcanoes of the Talasea Peninsula on New Britain. These people were most likely hunter-gatherers and began to modify the island landscapes from the initial colonization ^[6]. The second phase in this eastward movement is known as the 'Lapita colonization' of Far Oceania. Colonization of islands outside the main southern chain of the Solomon Islands, now known as the Santa Cruz Reef Islands, Vanuatu, New Caledonia, Fiji, Tonga and Samoa by producers of distinctive decorated pottery known as 'Lapita' after the site in New Caledonia where the pottery was first identified. Archaeological sites containing 'Lapita' pottery form an archaeological trail from the Bismarck Archipelago across the Near/Remote Oceania border to Samoa. The third phase of colonization, that of Eastern Polynesia, including New Zealand and many remote islands in the Pacific Ocean, began more than 1,000 years after the Lapita colonization. No navigational or maritime skills beyond those required for the colonization of Near Oceania were required for people to continue exploring and colonizing east of Samoa, the eastern extent of Lapita colonization, and yet Eastern Polynesia appears to have remained unknown until perhaps as recently as 1200 years ago. There is now sufficient evidence to suggest that during the period of colonization, and perhaps continuing until the early period of sustained European contact in the 18th century, Polynesian peoples continued to travel between islands and island groups, certainly maintaining some interaction within the core of Eastern Polynesia and possibly Western Polynesia ^[5]. European contact with Pacific island societies was a process that began about 400 years ago with the Spanish in Micronesia in the early to mid-17th century and continued until the mid-20th century when Europeans first ventured into the remote areas of the New Guinea highlands. In some parts of the region, such as the Solomon Islands and Vanuatu, this contact was sporadic over a very long period of time, while in other areas, notably the Society Islands and Hawaii, trading and then whaling ships regularly visited the area within a decade or two of initial European contact. In the late 18th and early 19th centuries, Europeans and Americans exploited the region's natural resources-pearl shells, sandalwood, beche-de-mer, whale oil-establishing small trading ports such as Levuka in Fiji, Kororareke (Russell) in New Zealand, and Noumea in New Caledonia. The impacts of European and American colonization on traditional society, governance, and land tenure systems varied considerably across the region. On some islands, such as the atolls of Kiribati, much of the Solomon Islands, Papua New Guinea, and Vanuatu, traditional land tenure and use practices continued throughout the colonial era and continue today, alongside colonial plantation economies and extractive industries, including mining and logging. In New Zealand, Hawaii, and New Caledonia, the arrival of large numbers of settlers disrupted traditional land tenure, and issues of

traditional land rights are still being resolved. In the early 19th century, European and American voyages to the Pacific were driven by the special resources the region offered-sandalwood, especially from the forests of the islands of Melanesia and Fiji, pearl shells from the atolls of Eastern Polynesia, and whale oil. By 1825, there were 25 British ships in the South Pacific, along with American and French ships hunting whales ^[7]. In this early phase of contact with Pacific Island communities, the nature of the resources and their extraction did not necessitate large-scale permanent settlement on the islands, but rather a series of small trading ports were established throughout the region during this period, servicing ships and their crews, usually in conjunction with and in a negotiated arrangement with the indigenous village. The opening up of the Pacific islands, which in many areas rapidly embraced Christianity. The building of churches, mission schools and Pacific trade routes also brought Christian missionaries to the region, as early as 1796, thirty years after Wallis discovered Tahiti, the first cultural landscapes of Polynesia and much of Melanesia ^[5]. It was not until the late 19th century, in conjunction with the widespread and rapid annexation of Pacific island territories by European and American powers, that plantations were established in the Pacific islands. Cotton, sugar, and copra plantations were usually established with non-local labor, either from other parts of the Pacific, southern China, or India. Before World War II, the Japanese had strongly established their trusteeships in Micronesia, former German colonies that had been granted to the Japanese by the League of Nations at the end of World War I. At the end of World War II, the United States military occupied these territories and the Marshall Islands, increasing its military presence and infrastructure with the advent of the Cold War. Thanks to this presence in Micronesia, the United States was able to conduct nuclear weapons tests on small, remote atolls in the northern Marshall Islands, the most famous of which is Bikini Atoll. Between 1986 and 1993, the Micronesian territories of the United States of America - Palau, the Federated States of Micronesia, and the Marshall Islands - gained political independence, although the region remains highly militarized. Guam and the Northern Mariana Islands remain territories of the United States of America. Numerous other atolls, islands, and island groups remain colonies, states, or external territories of foreign nations, notably the French territories of French Polynesia, including the Society Islands, the Tuamotu Archipelago, and the Marquesas Islands; New Caledonia; and Futuna/Uvea; American Samoa and the British territory of the Pitcairn Group. Norfolk Island remains an Australian territory, but with some political autonomy ^[5]. In his published books and scientific papers, the Author has covered architecture in almost all areas (natural environments) on planet Earth, thereby testing his theory of „Architecturally Defined Space“ ^[8,9,10,11, 12,13,14,15,16,17,18,19,20]. With the same goal, the author visited many cities: in the Balkans ^[21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44], in Europe ^[45,46,47,48,49,50,51,52,53], in the Mediterranean ^[54,55,56,57,58,59] and in Asia ^[60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78].

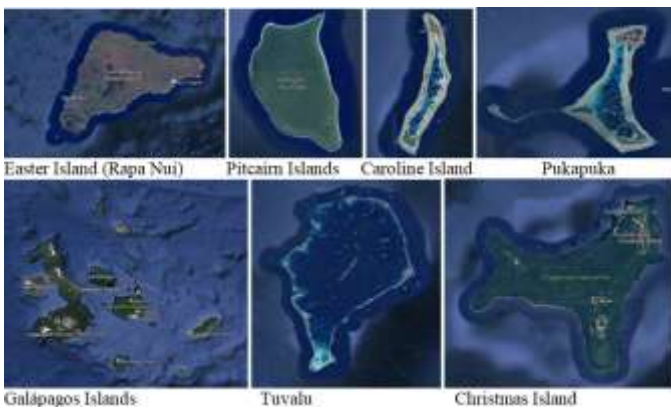
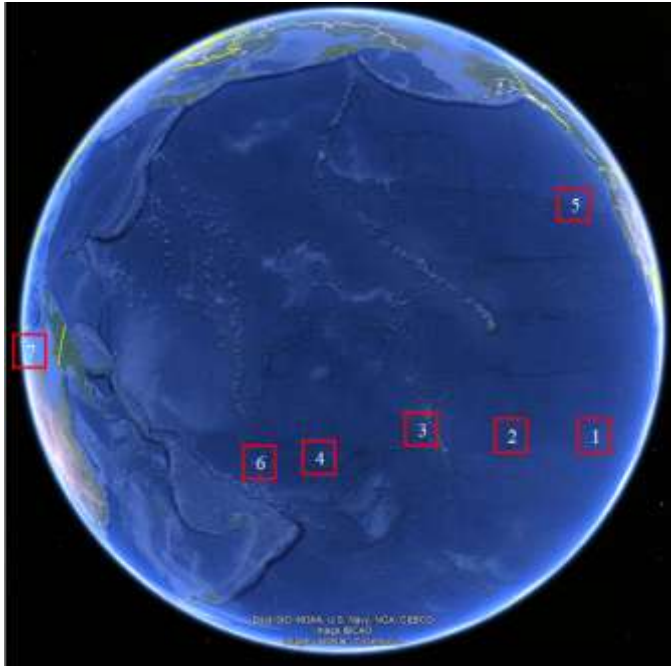


Figure 1. Oceania: 1. Easter Island (Rapa Nui), 2. Pitcairn Islands, 3. Caroline Island (Millennium Island), 4. Pukapuka, 5. Galápagos Islands, 6. Tuvalu, 7. Christmas Island

Source: Google Earth. Accessed: April 30, 2026.

II. EASTER ISLAND (RAPA NUI)

Easter Island (Rapa Nui) is located more than 3700 km from the Chilean mainland, this volcanic island is known for its extreme isolation (Geographic coordinates: 27°07'19.00"S, 109°21'00.59"W, Elevation: 140 m). Easter Island is a special territory of Chile in the southeastern Pacific Ocean, at the southeasternmost point of the Polynesian Triangle in Oceania. The island is known for its nearly 1000 preserved monumental statues, called 'moai', created by the early inhabitants of Rapa Nui. In 1995, UNESCO declared Easter Island (Rapa Nui) a World Heritage Site, and most of the island is protected within the Rapa Nui National Park ^[79]. Easter Island is the only territory in Polynesia where Spanish is the official language (Figure 2).

There is no consensus on when the Polynesian islanders first arrived on the island. While many researchers have cited evidence that they arrived around 800 AD, a 2007 study provided compelling evidence suggesting that their arrival was

closer to 1200 AD ^[80]. The islanders created an advanced culture, as evidenced by the numerous huge stone 'moai' and other artifacts on the island.



Figure 2. Easter Island (Rapa Nui)

Source: <https://www.nationalgeographic.com/travel/article/polynesia-things-to-see-natural-wonders>, Accessed: May 1, 2026.

Clearing land for cultivation and the introduction of the Polynesian rat led to gradual deforestation. By the time Europeans arrived in 1722, the island's population was estimated at 2,000 to 3,000 people. European diseases, Peruvian slave expeditions in the 1860s, and emigration to other islands such as Tahiti further reduced the population, reducing it to just 111 native inhabitants by 1877 ^[81]. Chile annexed Easter Island (Rapa Nui) from 1888 to 1966. In 2007, the island was granted constitutional status as a 'special territory' (Spanish: territorio especial). Administratively, it belongs to the Valparaíso Region, which forms one municipality (Isla de Pascua) of the Isla de Pascua province. The 2017 Chilean census recorded 7,750 people on the island, of whom 3,512 (45%) identified as Rapa Nui. The island was first explored after Haumaka dreamed of such a distant land; Hotu considered it a valuable place to escape from a neighboring chief, to whom he had already lost three battles. At the time of their arrival, the island had one lone settler, Nga Tavake 'a Te Rona. After a brief stay in Anakena, the colonists settled in various parts of the island. Hotu's successor, Tu'u ma Heke, was born on the island. Tu'u ko Iho is considered the leader who brought the statues and made them walk ^[82]. By the 15th century, there were two confederations, the hanau, of social groups, mata, based on descent. The western and northern parts of the island belonged to the Tu'u, which included the royal Miru, with a royal centre at Anakena, although Tahai and Te Peu had served as earlier capitals. The eastern part of the island belonged to the 'Otu 'Itui. Shortly after the Dutch visit, from 1724 to 1750, the 'Otu 'Itui fought the Tu'u for control of the island. This continued until the 1860s. Famine followed the burning of huts and the destruction of fields. Social control disappeared as the orderly way of life gave way to lawlessness and predatory gangs as the warrior class took power. Homelessness was prevalent, with many living underground. After the Spanish visit, from 1770 onwards, a period of demolition of statues, the huri mo'ai, began. This was an attempt by rival groups to destroy

the socio-spiritual power, or mana, represented by the statues, taking care to break them as they fell to ensure they were dead and de-energized. None remained standing until the arrival of French missionaries in the 1860s [82]. Between 1862 and 1888, about 94% of the population perished or emigrated. The island was the victim of a black bear hunt from 1862 to 1863, resulting in the kidnapping or killing of about 1,500 people, 1,408 of whom worked as indentured servants in Peru. Only about a dozen of them eventually returned to Easter Island, but they brought smallpox, which decimated the remaining population of 1,500. Among those who perished were the island's tumu ivi 'atua, the bearers of the island's culture, history, and genealogy, as well as the rongorongo experts [82].

A. Natural resources and sights

Easter Island (Rapa Nui) is an isolated, triangular volcanic island in the Southeast Pacific, with a mild, subtropical climate, dramatic crater landscapes, and limited native biodiversity. It is dominated by three major volcanoes—Terevaka, Poike, and Rano Kau—and its ecosystem has changed from a forested landscape to a mostly grassland landscape due to historical deforestation. The island was formed by three extinct volcanoes: Terevaka (the highest elevation), Poike, and Rano Kau. The terrain consists of rolling hills and steep volcanic craters (Rano Raraku, Rano Kau, and Rano Aroi), which contain natural crater lakes. The volcanic soil is generally porous, meaning that there are very few permanent streams or surface water bodies; water is found primarily in these crater lakes and through groundwater seepage along the coast. According to the Köppen climate classification, Easter Island's climate is classified as a tropical rainforest climate (Af) bordering on humid subtropical climate (Cfa) [83]. The lowest temperatures are recorded in July and August (minimum 15 °C), and the highest in February (maximum temperature 28 °C), the summer season in the Southern Hemisphere. Winters are relatively mild. The rainiest month is May, although the island experiences rain throughout the year. Easter Island's isolated location exposes it to winds that help keep temperatures fairly low. The average annual rainfall is 1118 mm. The island is occasionally hit by heavy rains and rainstorms. This occurs mainly in the winter months (June–August). There is significant temperature moderation due to its isolated position in the middle of the ocean. Biodiversity is extremely low, with approximately 48 known native species. Historically, the island was covered in forest that included the endemic Easter Island palm. It is now primarily characterized by sparse vegetation and grasslands. The surrounding waters, declared the Rapa Nui Marine Protected Area (2018), have a high biodiversity, harboring endemic species such as the Easter Island butterfly and significant populations of coral (6 species). Much of the island is protected within Rapa Nui National Park, which has been a UNESCO World Heritage Site since 1995 [84] (Figure 3).

B. Architectural cultural and historical heritage

Easter Island (Rapa Nui) is a unique cultural phenomenon. Nature has already created fascinating architecture through the geomorphology of Easter Island

(Figure 3). A Polynesian-origin society that settled there around 300 AD established a strong, imaginative and original tradition of monumental sculpture and architecture, free from any external influence.



Figure 3. Rapa Nui National Park
Source: <https://whc.unesco.org/en/list/715/>, Accessed: April 30, 2026.

From the 10th to the 16th centuries, this society built shrines and erected huge stone figures known as 'moai', creating an unparalleled cultural landscape. Key environmental challenges include soil erosion, invasive species and the effects of climate change such as rising sea levels, storm surges and drought. The island remains one of the most geographically remote inhabited places in the world, with its nearest inhabited neighbour (Pitcairn Island) more than 2000 km away [84]. The architecture of Easter Island (Rapa Nui) is defined by monumental megalithic stone engineering, primarily focused on ceremonial platforms ('ahu') and massive human-carved statues ('moai') created between the 13th and 16th centuries. The architecture highlights a unique, isolated Polynesian culture that uses volcanic rocks for both symbolic ancestral figures and unique elliptical 'boat houses' ('hare paenga'). Approximately 900 monolithic statues ('moai'), carved from volcanic tuff at the Rano Raraku quarry, represent revered ancestors. Ceremonial platforms ('ahu') located primarily along the coast serve as pedestals for the 'moai'. Ahu Tongariki is the largest example (Figure 4).



Figure 4. Ahu Tongariki
Source: <https://www.easterisland.travel/places-to-visit/ahu-tongariki/>, Accessed: May 1, 2026.

Cylindrical red stone 'tops' or 'hats' ('pukao') are placed on some moai heads. Boathouses ('Hare Paenga') have elliptical foundations built of long black basalt slabs with holes for supporting posts, with thatched roofs in the shape of inverted canoes. The village of Orongo is a specialized ceremonial center on the summit of the Rano Kao volcano, known for its

stone houses with cantilevered arches. Estimated dates for the initial settlement of Easter Island (Rapa Nui) range from 400 to 1300 AD^[85], although the current best estimate is the 12th century AD^[86]. The colonization of Easter Island (Rapa Nui) probably coincided with the arrival of the first settlers in Hawaii. Significant ecological impacts and major cultural investments in monumental architecture and sculpture therefore began soon after the initial settlement^[87]. According to oral tradition, the first settlement was at Anakena. Researchers have noted that the landing site of Caleta Anakena provides the island's best shelter from the prevailing waves, as well as a sandy beach for landing and launching canoes, making it a likely early settlement site. However, radiocarbon dating suggests that other sites predate Anakena by many years, particularly Tahai by several centuries. A 'pukao' is a red bun or headdress worn on some of the moai statues on Easter Island (Rapa Nui), and often symbolizes high status or represents hair (Figure 5).



Figure 5. Cylindrical 'tops' or 'hats' of red stone ('pukao')

Source: <https://kids.britannica.com/students/assembly/view/163192>, Accessed: April 30, 2026.

'Hare paenga' are traditional elite canoe-shaped houses on Easter Island (Rapa Nui), characterized by elliptical stone foundations with incised basalt ridges to support thatched roofs. They served as high-status residences, often located near platforms, functioning as residential, social, and ceremonial spaces (Figures 6,7). These houses have been nicknamed 'boat houses' because of their unique inverted canoe shape. Their streamlined shape helps to withstand the strong winds of Rapa Nui^[88]. There are hundreds of boathouses throughout Easter Island (Rapa Nui). Their average length is about 15 m, but the largest (in the Tepeua area) is as long as 45 m. The entrances of the early 'hare paenga' faced the raised 'ahu' platforms and were therefore also oriented towards the sea. Approaching the entrance to a

'hare paenga' would involve walking across a paved 'poro' area. It should be remembered that 'poro' are small rounded rocks, and their shape and condition are the result of the rolling in the water of the shore by the impact of waves (Rapa Nui has no surrounding reef). In this sense, they are a material that is found at the junction of land and sea, in effect marking a transitional zone. This is precisely the role they play within the architecture of 'hare paenga', where elements of the island world are used as a resource to create related but different effects in the built architecture^[89].

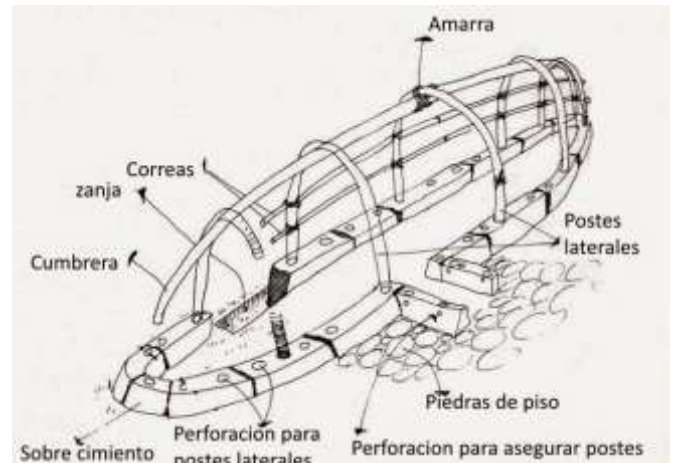


Figure 6. Boathouse ('hare paenga') with timber frame, paenga foundation blocks and tiled terrace

Source: <https://constru-chile.blogspot.com/2015/04/la-vivienda-rapa-nui-hare-paenga.html>, Accessed: May 1, 2026.

Source: <https://the-past.com/feature/hare-paenga-the-canoe-shaped-houses-and-monumental-archaeology-of-rapa-nui-easter-island/> Accessed: April 30, 2026.

Source: <https://www.gettyimages.ca/videos/easter-island-landscape>,
Accessed: May 1, 2026.



Figure 7. The remains of the 'Hara Paeng' as they appear today
Source: <https://the-past.com/feature/hare-paenga-the-canoe-shaped-houses-and-monumental-archaeology-of-rapa-nui-easter-island/>
Accessed: April 30, 2026.



Figure 8. Ahu Akahanga
<https://the-past.com/feature/hare-paenga-the-canoe-shaped-houses-and-monumental-archaeology-of-rapa-nui-easter-island/>
Accessed: May 1, 2026.

The spectacular ruined 'ahu' complex at Akahanga, with its collapsed 'moai and tufts ('pukao'), is located on the southern coast of Rapa Nui (Figure 8). With the roar of the Pacific Ocean in our ears, if we walked inland, within a hundred meters we would see the foundations of numerous houses ('hare paenga') poking through the low grass. They take the form of a series of shaped black basalt blocks ('paenga') placed side by side to form the foundation of the house in the shape of a boat. The blocks were firmly anchored in the ground and each had a series of circular holes cut into the upper surface. During the construction of the house, thin wooden planks about 2 m long were inserted into each hole and were joined at the top and secured to a ridge pole to form a keel-like roof. This would create the unusual shape of the house, reminiscent of the hull of an overturned canoe. In front of the house, a semicircle of water-worn stones ('poro') served as a platform. Ahu Akahanga lies along a small bay on the southern coast of

Rapa Nui. It consists of a series of separate platforms and linked collapsed 'moai', showing a long and continuous construction process. Uphill are clustered houses known as 'hare paenga' [89].

III. PITCAIRN ISLANDS

The Pitcairn Islands are a British overseas territory in the South Pacific with less than 50 inhabitants on the main island (Geographic coordinates: 24°22'38.84"S, 128°19'26.90"W, Elevation: 27 m). The Pitcairn Islands are known as the place where the mutineers of the HMS Bounty settled. Officially known as Pitcairn, Henderson, Ducie and Oeno Islands [90], they are a group of four volcanic islands that form the only British overseas territory in the Pacific. The four islands - Pitcairn, Henderson, Ducie and Oeno - are scattered over several hundred kilometres of ocean and have a total area of about 47 km². Henderson Island makes up 86% of the land area, but only Pitcairn Island is inhabited. The inhabitants of Pitcairn are descended primarily from nine British mutineers from the HMS Bounty and twelve Tahitian women. In 2023, the territory had a permanent population of 35, making it the smallest territory in the world by number of permanent inhabitants [91]. Portuguese navigator Pedro Fernandes de Queirós (1563–1614) encountered Ducie and Henderson Islands while sailing for the Spanish Crown, arriving on 26 January 1606. He named them La Encarnación and San Juan Bautista. Some sources express doubt as to which of the islands Queirós visited and named, suggesting that La Encarnación may actually have been Henderson Island and San Juan Bautista Pitcairn Island [92]. Pitcairn Island was sighted on 3 July 1767 by the crew of the British sailing ship HMS Swallow, commanded by Captain Philip Carteret (1733–1796). The island was named after Midshipman Robert Pitcairn (1752–1770), the 15-year-old crew member who first sighted the island. Robert Pitcairn was the son of British Marine Major John Pitcairn (1722–1775), who later died at the Battle of Bunker Hill in 1775 during the American Revolutionary War

A. Natural resources and sights

The Pitcairn Islands formed from a center of rising magma called the Pitcairn Hot Spot. Pitcairn Island is a volcanic remnant formed primarily of tuff, where the north side of the cone has been eroded [93] (Figure 9). Pitcairn is the only permanently inhabited island. Adamstown, the main settlement on the island, is located within a volcanic basin [93]. Henderson Island, which covers about 86% of the territory's total land area and supports a rich diversity of animals in its almost inaccessible interior, can also support a small human population despite its scarce freshwater, but access is difficult because its outer shores are steep limestone cliffs covered in sharp coral. In 1988, the island was declared a UNESCO World Heritage Site [94]. The other islands are more than 100 km away and are not inhabited. Pitcairn Island has no permanent source of water; however, the island has three seasonal semi-permanent springs [93]. Pitcairn Island has a coastal tropical rainforest climate (Af in the Köppen climate classification). The island is warm and humid throughout the

year, characterized by constant temperatures, high humidity (60–90%), and no defined dry season. The average annual rainfall is about 1543 to 1800 mm. About 16 plant species are considered endemic to Pitcairn (Figure 10). These include the tapau, once an important timber resource, and the giant nehe fern. Some, such as the red berry (*Coprosma benefica*), are dangerously close to extinction ^[95]. The plant species *Glochidion pitcairnense* is endemic to Pitcairn and Henderson islands ^[95]. The birds of Pitcairn fall into several groups. These include seabirds, wading birds and a small number of landbird species that inhabit the island. Of the 20 breeding species, Henderson Island has 16, including the unique flightless Henderson's warbler; Oeno hosts 12; Ducie 13, and Pitcairn six species. Birds that breed on Pitcairn include the fairy tern, the common kangaroo and the red-tailed tropicbird.



Figure 9. Pitcairn is one of the remotest inhabited islands in the world
Source: <https://www.ultimatecruising.co.nz/our-packages/pitcairn-gambier-islands-2027>, Accessed: May 1, 2026.



Figure 10. Flora and fauna of the Pitcairn Islands

Source: <https://travel2unlimited.com/pitcairn-island-flora/>, Accessed: May 1, 2026.

Source: <https://animalia.bio/ocean-sunfish?environment=526>, Accessed: May 1, 2026.



The Pitcairn reed warbler, known among Pitcairners as the 'sparrow', is endemic to Pitcairn Island; formerly common, it was added to the endangered species list in 2008 ^[95]. A small population of humpback whales migrate to the islands every year to winter and breed ^[96,97].

Manganese, iron, copper, gold, silver and zinc have been discovered within the exclusive economic zone ^[98], which extends 370 km from the coast and covers 880,000 km². In 1998, the UK's foreign aid agency, the Department for International Development, funded a beekeeping program for Pitcairn that involved training Pitcairn beekeepers and detailed analysis of bees and honey with particular reference to the presence or absence of disease. Pitcairn has one of the best examples of disease-free bee populations anywhere in the world, and the honey produced was and remains of extremely high quality. As a result, Pitcairn exports honey to New Zealand and the United Kingdom. It is sold in London by Fortnum & Mason and is said to be the favorite fruit of King Charles and former Queen Elizabeth. The Pitcairners, under

the brands "Bounty Products" and "Delectable Bounty", also export dried fruit, including bananas, papayas, pineapples and mangoes, to New Zealand. Honey production and all honey-related products are a protected monopoly [99].

B. Architectural cultural and historical heritage

Various forms of evidence indicate that the earliest settlers of the Pitcairn Islands were Polynesians who inhabited Pitcairn and Henderson for several centuries until the islands were abandoned: Henderson most likely before the 16th century, and Pitcairn in the 17th or early 18th century (Figures 11,12). The islands were uninhabited when discovered by Europeans [100]. In 1790, nine mutineers from the British warship HMS Bounty, along with the native Tahitian men and women who accompanied them (six men, 11 women, and one girl), settled on Pitcairn Island and set the Bounty on fire. Later islanders remained unaware of the location of the Bounty, which is still visible underwater in Bounty Bay, but the wreckage gained significant attention in 1957 when it was documented by National Geographic explorer Louis Marden (1913-2003). Although the settlers subsisted by farming and fishing, the early period of settlement was marked by serious tensions among them. Alcoholism, murder, disease, and other troubles claimed the lives of most of the mutineers and Tahitian men. John Adams and Ned Young turned to the scriptures, using the ship's Bible as a guide to a new and peaceful society. Young eventually died of an asthmatic infection. Ducie Island was rediscovered (1791) by Royal Navy Captain Edward Edwards (1742–1815) aboard HMS Pandora, while searching for the Bounty mutineers. He named it after Francis Reynolds-Moreton, 3rd Baron Ducie, also a Royal Navy captain.

Source: <https://www.worthpoint.com/worthopedia/original-photo-1935-people-pitcairn-116218694>, Accessed: May 1, 2026.

Source: <https://www.ebay.com.sg/itm/363646636187>, Accessed: May 1, 2026.

Source: <https://whalesite.org/pitcairn/Guide%20to%20Pitcairn%20Island.htm>, Accessed: May 1, 2026.

The American sealing ship Topaz, under the command of Mayhew Folger (1774-1828), became the first to visit the island when the crew spent ten hours on Pitcairn in February 1808 [101]. Whalers then became regular visitors to the island. Henderson Island was rediscovered by British Captain James Henderson (1766-1834) of the British East India Company's Hercules on 17 January 1819. Captain Henry King (1783-1874), sailing on the Elizabeth, landed on 2 March to find the royal ensigns already flying. His crew carved the name of their ship into a tree. Oeno Island was discovered on 26 January 1824 by American Captain George Worth (1794-1842) on the whaler Oeno. In 1832, after trying and failing to petition the British government and the London Missionary Society, Joshua Hill, an American adventurer, arrived [102].



Figure 12. Left: 'Port' at Pitcairn Island houses. Right: Swimming area at Pitcairn Island houses

Source: https://www.delcampe.net/en_US/collectibles/postcards/pitcairn-islands/?srsltid=AfmBOooVr6VQ_h6JQt--5XK3uiPRyYifByQ_fJBWbT5y3bpB4WjI2pf, Accessed: May 1, 2026.

Source: <https://whalesite.org/pitcairn/Guide%20to%20Pitcairn%20Island.htm>, Accessed: May 1, 2026.



Figure 11. Pitcairn Island houses (1900s, 1935, 1963)

Source: <https://stage.encyclopedia.adventist.org/article?id=782T>, Accessed: May 1, 2026.



Figure 13. Newer settlement on Pitcairn Island

Source: <https://triplook.me/en/countries/pitcairn-islands>, Accessed: May 1, 2026.

It seems that one of the empty prison buildings on Pitcairn Island could be given a new lease of life if a current proposal to build a community cultural center is realized. The prison is a large building near the main center of Adamstown. It is currently located behind a high fence that is ignored by everyone (Figure 14).



Figure 14. Newer architecture on Pitcairn Island. Left: Pitcairn Island Health Centre. Right: Prison complex

Source: <https://paulandruthontherock.blogspot.com/2012/08/>, Accessed: May 1, 2026.

Source: <https://www.tema.ru/eng/travel/pitcairn/>, Accessed: May 1, 2026.

In the late 19th century, a missionary came here and converted everyone to Seventh-day Adventism. The church organizes Bible discussions followed by karaoke songs about Jesus. The system administrator who came here to configure something plays the electric organ (Figure 15).



Figure 15. Church on Pitcairn Island

Source: <https://www.tema.ru/eng/travel/pitcairn/>, Accessed: May 1, 2026.

There is a serious shortage of fresh water on the island. The stream has dried up, so everyone relies solely on collected rainwater (Figure 16).



Figure 16. Rainwater harvesting (as drinking water)

Source: <https://www.tema.ru/eng/travel/pitcairn/>, Accessed: May 1, 2026.

IV. CAROLINE ISLAND (MILLENNIUM ISLAND)

Caroline Island (Millennium Island) is a pristine coral atoll in Kiribati, in the central Pacific Ocean, the country of Kiribati (Geographic coordinates: 9°54'53.10"S, 150°12'18.10"W, Elevation: 12 m), (Figure 17). The atoll was first sighted by Europeans in 1606, and the United Kingdom of Great Britain and Ireland claimed it in 1868. It has been part of the Republic of Kiribati since the island nation's independence in 1979. Caroline Island has remained one of the most pristine tropical islands in the world, despite guano mining, copra harvesting (coconut meat), and human habitation in the 19th and 20th centuries. It is home to one of the world's largest populations of coconut crabs and is an important breeding ground for seabirds, the most famous of which is the sooty tern. The atolls (ringed coral reefs) of the Pacific Ocean are the most marginal environment in the world for human habitation ^[103]. They have generally not been inhabited for over 1,500 years ^[103] but humans began to settle them after permanent islets formed around the lagoons ^[103]. There is evidence that early Polynesians arrived on the island before Europeans, as several 'marae' (communal or sacred sites) and graves have been discovered, but no evidence of long-term settlement has been found. Evidence of the largest 'marae', located on the western side of the islet of Nake, was documented in 1883. The first recorded sighting of Caroline Island by a European was on 21 February 1606, by Portuguese explorer Pedro Fernández de Quirós (1563–1614), who named the island San Bernardo and wrote an account of his voyage ^[104]. The island was next sighted by Europeans on 16 December 1795, when British naval officer William Robert Broughton (1762–1821) of HMS Providence named it Carolina, after the daughter of Philip Stephens, First Secretary of the Admiralty. The island was sighted in 1821 by the English whaler Supply and was subsequently named 'Thornton Island' after the ship's captain ^[105]. Caroline Island (Millennium Island) has a tropical rainforest climate (type Af, according to the Köppen-Geiger climate classification), characterized by consistently high temperatures and significant humidity. High temperatures (typically 28–32°C) are recorded throughout the year, and are influenced by the northeast trade winds. Precipitation is high, estimated at about 1500 mm per year. As a low-lying atoll, the island is very vulnerable to sea level rise.



Figure 17. Caroline Island (Millennium Island)

Source: <https://www.britannica.com/place/Caroline-Islands>, Accessed: May 2, 2026.

Source: <https://science.nasa.gov/earth/earth-observatory/millennium-island-kiribati-39286/m>, Accessed: May 2, 2026.

A. Natural resources and sights

Caroline Island (Millennium Island)'s most important natural resource is its biodiversity (Figure 18). The island is a

haven for seabirds; it is a key breeding ground, with one of the world's largest colonies of sooty terns (approximately 500,000) and over 10,000 great frigatebirds. The shallow, crystalline lagoon is a 'nursery' for blacktip reef sharks, Napoleon wrasses and huge populations of giant clams (*Tridacna maxima*). The island is covered in scrub, particularly *Pisonia grandis* trees, and serves as a nesting site for the endangered green sea turtle. The atoll consists of over 20 small islets, such as Nike and South Islets, which surround a shallow central lagoon, with an area of about 3.76 km². The coral reefs are considered some of the most intact in the world. Some of the islets contain ancient Polynesian stone structures ('marae') from the Tuamotu, indicating early human presence. Designated a wildlife sanctuary and part of the Line Islands, the island is strictly protected to ensure that it remains a 'natural laboratory'. Ecological surveys documenting the island's flora and fauna were occasionally conducted during the later 20th century: Caroline was visited in 1965 by the Pacific Biological Research Programme, in 1974 by the Line Island Expedition, and in 1988 and 1991 by the Wildlife Conservation Unit of the United Nations Environment Programme. Caroline Island is densely vegetated, and most of the islets have three ring-shaped vegetation zones: an outermost vegetation cover, usually consisting mainly of *Heliotropium anomalum*; an inner shrub zone, primarily *Tournefortia argentea*; and a central forested area, usually dominated by stands of *Pisonia grandis* trees. Coconut palms have also been introduced and are present in significant numbers on the larger islets. This vegetation pattern is consistent across the larger islets, with smaller islets lacking a central forest and the smallest being covered exclusively with low plants. Other common plants include *Messerschmidia argentea*, *Suriana* and *Morinda citrifolia* ^[106]. The endangered green sea turtle (*Chelonia mydas*) nests on the beaches of Caroline Island, but there have been reports of poaching by recent settlers. The bristle-tailed snipe (*Numenius tahitiensis*), a migratory bird from Alaska, is also classified as vulnerable. About twenty non-native species of flora have been introduced to Caroline Island through human contact. Among these is the morning glory, which has begun to spread. Domestic cats and dogs introduced with a small farm have driven the seabird population from the islet of Monu Ata-Ata ^[107]. Such sites are recognized by the UNESCO World Heritage Centre and the UNESCO World Heritage Centre. It is a high priority area for biodiversity, and visitors are required to follow strict conservation guidelines. Context and importance of the environment ^[108].



Figure 18. Flora and fauna on Caroline Island (Millennium Island)

Source: <https://www.alluringworld.com/caroline-island/>, Accessed: May 2, 2026.

Source: <https://traveltourismblog.com/caroline-islands.php>, Accessed: May 2, 2026.

Source: <https://news.mongabay.com/2022/11/meet-the-millennium-forest-a-unique-tropical-island-reforestation-project/> Accessed: May 2, 2026.

Source: <https://www.visit-kiribati.com/exploring-kiribati/endemic-species-kiribati/>, Accessed: May 2, 2026.

B. Architectural cultural and historical heritage

Caroline Island (Millennium Island) is a largely uninhabited, pristine coral atoll in the southern Line Islands of Kiribati, known for its nearly pristine ecosystem. Although largely natural, there is archaeological evidence of early Polynesian visits, including reported temple platforms and tombs, indicating its past use (Figure 19). Even after European sightings in 1606, the island was sparsely populated, particularly due to guano mining (1873–1895) and copra production in the early 20th century. The atoll is known for its 'grass beds', cedar scrub, and pisonia forests.



Figure 19. Left: Temple platforms ('marae', communal or sacred places) on Caroline Island (Millennium Island). Right: Rai stones on Yap (Caroline Islands/Millennium Islands)

Source: <https://upload.wikimedia.org/wikipedia/commons/a/ab/CarolinePic-Kepler-Nake.JPG>, Accessed: May 2, 2026.

Source:

https://en.wikipedia.org/wiki/Caroline_Islands#/media/File:Malal_of_Yorlap_Kanifay_Yap_islands.jpg, Accessed: May 2, 2026.

V. PUKAPUKA

Pukapuka is a remote coral atoll in the Cook Islands, known for its unique language and the preservation of traditional culture despite having only about 400 inhabitants (Geographic coordinates: 10°51'06.65"S, 165°50'20.25"W, Elevation: 6 m), (Figure 20). The atoll's traditional name is Te Ulu-o-Te-Watu ('Head of the Rock')^[109]. Pedro Fernandes de Queirós (1563-1614) sighted an island in 1595, probably Pukapuka, and named it San Bernardo^[110]. Pukapuka is an atoll 6.3 km long and 3.7 km wide at its widest point, with an area of approximately 5 km². Its small lagoon covers 2 km² and has no real channel connecting it to the ocean. Geologically, the atoll is a coral outcrop (265 m high) of the summit of a small, underwater volcanic mountain of the same name, which rises 3,380 m from the ocean floor and was formed between 41.5 and 41.9 million years ago. In 2012, the population was 166, mostly living in the village of Pukapuka, located on the western side of the atoll. Isolated, this atoll is unique in the Tuamotu archipelago in that its inhabitants speak Marquesan (the Marquesas Islands are located approximately 500 km to the north) instead of Paumotu. In 1996, a major cyclone devastated the atoll. The atoll's economy is based on the production of coconuts and copra, which cover much of Pukapuka. Since 1979, the atoll has had an airport with a 950-

metre runway. All the islands lie in the tropics, although the southernmost is just barely so. Pukapuka has a tropical climate (type Af according to the Köppen-Geiger climate classification). Average annual temperatures on the southern island of Rarotonga are around 24 °C, but on the northernmost island of Penrhyn they are around 28 °C. The seasons are not clearly defined. The English terms summer, winter, spring and autumn are used, but Cook Islanders also recognise traditional local patterns of prevailing winds, rainfall and temperature. Rainfall, although unpredictable throughout the year, is usually uniform across the islands. It averages around 2000 mm on Rarotonga, although with considerable variation between the windward and leeward sides of the central mountains; rainfall is slightly lower on Aitutaki and slightly higher on Penrhyn. A spectacular climatic hazard is the occurrence of tropical cyclones (locally called typhoons), which strike with devastating force between December and March about once or twice every 10 years. Less spectacular, but sometimes equally destructive to agriculture, are droughts, to which the northern group of islands is more susceptible than the southern.



Figure 20. Pukapuka

Source: <http://gaia.merveille.free.fr/nature/oceanie/tuamotu/pukapuka.html>, Accessed: May 2, 2026.

A. Natural resources and sights

In the Teonemahina village, several Pritchardia palms (Pritchardia thurstonii) can be seen in roadside gardens. The genus Pritchardia, which includes the Makatea palm (Pritchardia mitiaroana), also found on Niau, Anaa and Mitiaru, is endemic to the Pacific with about thirty species, most of which are found in the Hawaiian Islands. In the north, only a limited range of plant life thrives, with coconuts and pandanus trees dominating (Figure 21). In the fertile areas of the southern islands, a wide range of tropical fruits and vegetables thrive. Native species include taro, yams, bananas, breadfruit and sweet potatoes. Introduced species - in many cases grown for export - include citrus fruits, tomatoes, pineapples, papayas, beans and squashes^[111]. The original Polynesian settlers brought with them pigs, dogs, chickens and a species of small rat. These remain the main fauna, although a few goats, horses and other animals have also been introduced.

Some native birds became extinct in the 19th century after Europeans introduced cats. The kakerori, or Rarotongan flycatcher, an attractive tiny bird unique to Rarotonga, had declined to around 30 breeding pairs by the early 1990s. However, by the early 21st century, efforts by a small group of conservationists and landowners had managed to restore the kakerori population to sustainable levels. In 2012, the government announced plans to create a protected marine park covering the area around the southern islands, covering more than 1,000,000 sq km ^[111].



Figure 21. Natural resources and sights

Source: <http://gaia.merveille.free.fr/nature/oceanie/tuamotu/pukapuka.html>,
Accessed: May 2, 2026.



Figure 22. The Teonemahina village, with the town hall, school and the church of Joan of Arc

Source: <http://gaia.merveille.free.fr/nature/oceanie/tuamotu/pukapuka.html>,
Accessed: May 2, 2026.

B. Architectural cultural and historical heritage

With the exception of the isolated Pukapuka Islanders, who are predominantly of Samoan and Tongan descent, almost all of the Cook Islanders are of mixed Polynesian descent. Inter-marriage with European, Chinese and African

settlers was common in the early 19th century. There are two main indigenous Polynesian languages, one for Pukapuka Island and the other (with dialectal variations) for all other islands. The latter, known as Cook Islands Māori, is an official language, along with English. Christian denominations account for almost all religious affiliations. Just over half the population belong to the Christian (Congregational) Church of the Cook Islands. Roman Catholicism, Anglicanism, Seventh-day Adventism and Bahá'ism have smaller followings ^[111]. Most Cook Islanders live in villages, although some people (particularly on Rarotonga) live on their farms. The largest settlement is Avarua. The former indigenous houses of straw and wood have been almost completely replaced by houses of cement and wood with iron roofs ^[111]. The village of Teonemahina has a town hall, a school, and a church dedicated to Joan of Arc (Figure 22).

VI. GALÁPAGOS ISLANDS

The Galápagos Islands are located about 1000 km off the coast of Ecuador (it is a province of Ecuador) (Geographic coordinates: 0°22'02.59"S, 91°09'29.58"W, Elevation: 485 m), (Figure 23). This archipelago has an area of 8010 km². The Galápagos Islands are a volcanic archipelago known for their exceptional, fearless wildlife and unique biodiversity. These 21 islands inspired Charles Darwin (1809–1882), who developed the theory of evolution in 1835. As a leading UNESCO World Heritage Site, they offer unparalleled opportunities for observing endemic species such as giant tortoises and marine iguanas ^[112]. The Galápagos Islands are named for their giant tortoises, which were abundant at the time of their discovery.



Figure 23. Galápagos Islands

Source: <https://www.forbes.com/sites/startswithabang/2017/04/25/science-discovers-how-complex-life-came-to-the-galapagos-islands/>
Accessed: May 2, 2026.

The Spanish word 'galápagos' comes from a pre-Roman Iberian word meaning 'tortoise'. The Galápagos Islands primarily have a semi-arid or hot-summer Mediterranean climate (type BSk/Csa, according to the Köppen-Geiger

climate classification). It is surprisingly cool for its equatorial location due to the Humboldt Current. The climate is characterized by a warm/wet season (December–June) and a cool/dry garúa season (July–November), with significant microclimates based on altitude. Air temperatures are 23°C–31°C (tropical, sunny), with short, intense, infrequent showers. The cool/dry season (July–November) has air temperatures of 18°C–26°C; it is windy, with fog (garúa) and clouds. The climate is strongly influenced by the Humboldt Current (cold, nutrient-rich water), the Panama Current (warm), and the Cromwell Current. The lowlands are desert, while the highlands are humid with forests.

A. Natural resources and sights

Volcanism in the Galápagos Islands has been continuous for at least 20 million years. The mantle beneath the eastward-moving Nazca Plate (51 km/Myr) has created a 3-kilometer-thick platform beneath the island chain and seamounts. In addition to the Galápagos archipelago, other key tectonic features in the region include the North Galápagos volcanic province between the archipelago and the Galápagos Spreading Center (GSC) 200 km to the north at the boundary of the Nazca Plate and the Cocos Plate. This spreading center tapers to the west into the East Pacific Rise and is bounded to the east by the Cocos Ridge and Carnegie Ridge. The Galápagos Hot Spot is located at the northern boundary of the Pacific Province of Large Low-Shear Velocity, while the Easter Hot Spot is located at the southern boundary. The Galápagos Islands are known for their marine iguanas, giant tortoises, blue-footed boobies, and penguins. Because the animals did not evolve with major terrestrial predators, they show little fear of humans (Figure 24). The islands are young, with constant volcanic activity, especially on Fernandina and Isabela. Many species are found nowhere else, which supports evolutionary studies [113]. The flora of the Galápagos Islands is extremely diverse, forming the basis of all life within this unique ecosystem (Figure 24). The islands are home to approximately 560 native species of 'higher' plants, which have arrived naturally.





Figure 24. Flora and fauna of the Galápagos Islands

Sorce: <https://www.forbes.com/sites/startswithabang/2017/04/25/science-discovers-how-complex-life-came-to-the-galapagos-islands/>

Accessed: May 2, 2026.

Sorce: <https://galapagoscruise.agency/galapagos-islands-flora/>, Accessed: May 2, 2026.

Sorce: <https://www.animalspot.net/galapagos-islands-animals>, Accessed: May 2, 2026.

Sorce: <https://whc.unesco.org/en/list/1/gallery/>, Accessed: May 2, 2026.

Impressively, about a third of these species are endemic and found nowhere else in the world, making the Galapagos flora as remarkable as its wildlife. Notable among these endemic plants is *Scalesia*, known as the 'daisy tree'. *Scalesia* has evolved into numerous species, reflecting the adaptive radiation observed in Darwin's finches. These unique plants, along with 200 species of introduced plants and 500 species of mosses, lichens and liverworts, create a rich and complex ecosystem.

A. Architectural cultural and historical heritage

The capital of the Galápagos Islands is Puerto Baquerizo Moreno. Baquerizo Moreno is a charming coastal town located on the west coast of Santa Cruz Island in the Galápagos archipelago. It is known for its natural beauty: pristine beaches, crystal-clear waters, and lush, endemic vegetation in the background (Figure 25). General José de Villamil (1789-1866) founded the city in the 1830s or 1840s, but it was named after Alfredo Baquerizo (1859-1951), the first president to visit the city during his presidency, in 1916. Puerto Baquerizo Moreno is the oldest settlement in the Galápagos Islands. The agricultural center of El Progreso, located about 8 km from the city, was founded in 1879 as Hacienda Progreso. It had a large sugar refinery that operated

under difficult conditions. According to the 2010 census, the city had a population of 6,672, second only to Puerto Ayora [114]. Kicker Rock (León Dormido) is a dramatic, fissured volcanic rock formation popular for snorkeling, offering opportunities to see sharks and turtles. Cerro Tijeretas and Interpretive Center is a popular hiking spot with a statue of Charles Darwin. Popular sites include Playa Mann (near the city), Punta Carola, and La Loberia. Guided boat tours (360° tours) circle San Cristóbal, offering a variety of diving and beach visits. Sea Lion Colony: The local beach is a vibrant habitat for large populations of Galápagos sea lions.



Figure 25. Puerto Baquerizo Moreno (on the San Cristóbal island)

Sorce: <https://www.exoticca.com/us/america/south-america/ecuador/baquerizo-moreno>, Accessed: May 2, 2026.

Puerto Ayora is the most populous city in the Galapagos, with a population of 12,696. Located on the southern coast of Santa Cruz Island, it is the capital of the Santa Cruz canton. The city was named in honor of Isidro Ayora (1879-1978), President of Ecuador (Figure 26).



Figure 26. Puerto Ayora

Sorce: <https://www.dronestagr.am/puerto-ayora-santa-cruz-galapagos-islands-ecuador/>, Accessed: May 2, 2026.

VII. TUVALU

Tuvalu is an independent country consisting of nine coral atolls and is known for being extremely remote and rarely visited, offering a secluded haven (Geographic coordinates: 7°58'18.84"N, 178°26'02.13"E, Elevation: 14 m), (Figure 27). Tuvalu consists of three reef islands and six atolls spread between 5° and 10° south latitude and between 176° and 180° longitude. Tuvalu has a total area of 25.14 km² and a population of 10,643 (2022 census). The first inhabitants of Tuvalu were Polynesians who arrived as part of the Polynesian migration to the Pacific that began about three thousand years

ago ^[115]. Long before European contact with the Pacific islands, Polynesians often traveled between islands by canoe. Polynesian navigational skills enabled them to undertake meticulously planned voyages in double-hulled sailing vessels or outrigger canoes. Scholars believe that Polynesians spread from Samoa and Tonga to the Tuvaluan atolls, which then served as a springboard for further migration to the Polynesian islands of Melanesia and Micronesia ^[116]. Tuvalu has a tropical monsoon climate (type Af according to the Köppen-Geiger climate classification). It is hot all year round, with an average daily temperature of around 28°C to 30°C. The climate is very humid; due to its location in the central Pacific Ocean, the climate is moderated by the trade winds. Tuvalu has two distinct seasons, a wet season from November to April and a dry season from May to October ^[117]. Westerly winds and heavy rains prevail from November to April, a period known as Tau-o-lalo, with tropical temperatures moderated by easterly winds from May to October. Tuvalu experiences the effects of El Niño and La Niña, which cause changes in ocean temperatures in the equatorial and central Pacific. El Niño effects increase the likelihood of tropical storms and cyclones, while La Niña effects increase the likelihood of drought. The islands of Tuvalu typically receive between 200 and 400 mm of rainfall per month. The central Pacific Ocean experiences changes from La Niña to El Niña periods ^[117].



Figure 27. Tuvalu

Source: <https://www.theguardian.com/global-development/2019/may/16/one-day-disappear-tuvalu-sinking-islands-rising-seas-climate-change>
Accessed: May 2, 2026.

A. Natural resources and sights

Tuvalu's rich biodiversity reflects its diverse marine and terrestrial ecosystems. Flora includes tropical plants such as coconut palms, pandanus and breadfruit trees, which provide food and materials for local communities. Coastal vegetation, including mangroves and sea anemones, plays a key role in stabilizing coastlines and preventing erosion (Figures 28,29). Fauna is predominantly marine, with coral reefs home to a variety of fish such as parrotfish, surgeonfish and butterflyfish (Figure 30). Sea turtles, including green and hawksbill turtles, are frequently seen in Tuvalu's waters. The islands serve as important nesting grounds for seabirds such as the black noddy and the white tern. Terrestrial wildlife is limited but includes lizards, crustaceans and insects adapted to the island

environment ^[118]. In Tuvalu, all plants are vascular or 'higher' plants – plants that have true roots and a vascular system of tissue that conducts water, dissolved nutrients and the products of photosynthesis throughout the plant. The main groups of vascular plants are ferns and fern relatives, gymnosperms and flowering plants or angiosperms. Non-vascular plants, such as mosses and lichens and a wide range of seaweeds, of which Tuvalu has a good number, are not included. Ferns and fern relatives (Pteridophytes) are the most primitive vascular plants. They have no true flowers or seeds and spread and reproduce by very small spores contained in small bundles on the underside of their leaves. In Tuvalu, they are represented by plants such as laukatafa (*Asplenium nidus*), sulufe (*Nephrolepis acutifolia*) and maile (*Microsorium grossum*). Gymnosperms (*Gymnospermae*) are ancient vascular plants that have true but 'naked' seeds that are not formed inside fruits and are usually formed in cone-like structures. They do not have true flowers. They include cycads (*laupama*) and trees with cones, such as the tall *Araucaria* pines at the Vaiaku Lagi Hotel ^[119].



Figure 28. Aerial views looking west across the southern islet of Fogafale, Funafuti Atoll, showing the oceanfront reef covered in red coral algae, the intertidal reef flat, the beach and raised coral reef, the inhabited and vegetated zone, and the central lagoon

Source: <https://tuvalu-data.sprep.org/system/files/Thaman%202016.pdf>,
Accessed: May 2, 2026.



Figure 29. Taro pits dug on Fogafale Island with taller giant swamp taro, pulak (*Cyrtosperma chamissonis*), behind and true taro, tala (*Colocasia esculenta*), in front of a woman

Source: <https://tuvalu-data.sprep.org/system/files/Thaman%202016.pdf>,
Accessed: May 2, 2026.

Source: <https://biodb.com/region/tuvalu/>, Accessed: May 2, 2026.



Figure 30. Tuvalu. Fauna

Source: Accessed: May 2, 2026.

Source: <https://biodb.com/region/tuvalu/>, Accessed: May 2, 2026.

B. Architectural cultural and historical heritage

Before European influence, the Tuvaluan islands did not have villages, but rather small hamlets based on family clans. They consisted of communal houses, a raised kitchen hut or 'pa'ape', storehouses, and canoe houses. These structures were organized around an open space, the 'malae'. During the day, people moved between the structures for various activities: from sleeping shelters, to kitchen huts, to eating platforms, to the bush, to the storehouses (Figure 31). Not only were these hamlets loose aggregations that encouraged movement, but the settlements themselves were mobile. Sometimes, to allow the

coconuts to grow and the fishing grounds to rest, the permanent village would be temporarily abandoned and the entire tribe would move to another location. Several duplicate villages were built around the lagoon, sometimes complete with a chapel and courthouse, where each family owned a residence and moved to it periodically to enjoy a change of air and scenery. This flexible settlement pattern was facilitated by collective ownership models, which allowed for the sharing of buildings and landscape resources among clan members. It also provided an opportunity to limit the overuse of scarce resources through deliberate mobility. The original hamlets were surrounded by 'bush', where coconuts, pandanus, and bananas were grown and collected. The hamlets were connected by informal footpaths. Beyond them, the ocean and lagoon served as an extension of the living space, used for swimming, recreation, and fishing. Settlements were located based on access to fishing grounds in areas sheltered from the reef waves and wind. This was usually the western side of the island, sheltered from the easterly winds. Although this meant that the location was not optimally adapted to cooling breezes, the open building structure and the shading of breadfruit trees prevented some of the ecological problems faced by modern Western-style buildings in Tuvalu. Traditional Tuvaluan architecture and settlements are characterised by adaptability and mobility, which allow their inhabitants to adapt physically and socially to the fragile atoll ecosystems they inhabit. The traditional Tuvaluan house is a post and beam structure with a thatched roof and coral stone foundation, measuring from 2.5 m x 5 m to 5 m x 10 m. The supporting posts are made from coconut or pandanus trunks, and secondary ribs are made using pandanus branches. Thatch is usually made from pandanus leaves folded over the spine of a coconut leaf, stitched with the central ribs of the coconut leaf, and tied to the battens (placed vertically) with strings made from dried coconut husk fibers ('kolokol'). Thicker strings of coconut fiber ('gafa') are used to tie the posts and beams. The steep slopes of the roof allow rain to run off easily, which helps prevent the thatch from rotting or mold. All vernacular buildings, except for chicken coops, are built without walls to allow maximum ventilation. In older styles of houses, the eaves reached close to the ground to keep out the rain. In newer styles of houses with higher eaves, coconut palm fronds ('pola') are used to keep out wind and rain. These controllable façade systems, like modern louvered windows, allow buildings to adapt to changing weather conditions. Variations in this general system also occur depending on the purpose and island. The roofs of traditional houses are also removable; historically, when a storm came, the roof could be removed and placed on the leeward side of the house for the duration of the event. The removal of roofs during storms is a function of the traditional social structure, where the extended family and the entire village are obliged to help out due to the social mechanism of reciprocity. In contrast, the now ubiquitous corrugated iron roofs are easily blown away during cyclones, making them dangerous projectiles. Furniture inside the buildings was minimal. Sleeping houses ('fale moe') were usually equipped with mats ('pakau' or 'papa') for sitting and sleeping, and baskets hung from the rafters were used to store

food. In this way, each structure was also transformable: the arrangement of different objects on the floor surface allowed for the programmatic transformation of the space. Master builders ('tufuga fai fale') created special and even new typologies of buildings. The 'fale poutasi', a house structure unique to Niutao Atoll, was supported by a single pillar in the center, which allowed the structure to rotate. Built for important people such as the eldest son or daughter, they were rotated by two men to allow maximum cross-ventilation during hot days, adapting the structure to the temperature and wind direction ^[120].



Figure 31. Houses in Tuvalu

Source: <https://maison-monde.com/maisons-traditionnelles-aux-tuvalu/>, Accessed: May 3, 2026.



Figure 32. Newer house in Tuvalu

Source: <https://www.thesitemagazine.com/read/fluid-vernacular>, Accessed: May 3, 2026.

VIII. CHRISTMAS ISLAND

Christmas Island is an Australian external territory in the Indian Ocean, comprising the island of the same name (Geographic coordinates: 10°26'50.63"N, 105°41'36.60"E, Elevation: 259 m), (Figure 33). It is located about 350 kilometres south of Java and Sumatra and about 1550 km northwest of the nearest point on the Australian mainland. It has an area of 135 km². Christmas Island's geographical isolation and history of minimal human influence have led to a high level of endemism among its flora and fauna, which is of interest to scientists and naturalists. The territory was named after its discovery by Captain William Mynors (1593–1667) on Christmas Day 1643. The first European to sight Christmas Island was Richard Rowe () of the Thomas in 1615. Mynors gave it his name. It was first settled in the late 19th century, after abundant deposits of phosphate (originally deposited as

guano) were found, prompting Britain to annex the island in 1888 and begin commercial mining in 1899 ^[121]. The Japanese invaded the island in 1942 to secure its phosphate deposits. After the end of the Japanese occupation, the administration of the island was returned to Singapore, but in 1958 it was transferred to Australia, where it has remained since. Christmas Island had a population of 1,692 in 2021 ^[122] most of whom lived in settlements on its northern edge. The main settlement is Flying Fish Cove, known simply as The Settlement. Other settlements include Poon Saan, Drumsite and Silver City. Historically, Asian Australians of Chinese, Malay and Indian descent have made up the majority of the population. Today, it is estimated that about two-thirds of the island's population is of Straits Chinese descent (although only 22.2% of the population claimed Chinese ancestry in 2021) ^[122], with significant numbers of Malays and European Australians, and smaller numbers of Straits Indians and Eurasians. Several languages are spoken, including English, Malay, and various Chinese dialects. Religious beliefs vary geographically. Anglo-Celtic influence in the capital is closely associated with Catholicism, while Buddhism is common in Poon Saan, and Sunni Islam is generally observed in the coastal countryside where the Malays live ^[123].



Figure 33. Christmas Island

Source: <https://science.nasa.gov/earth/earth-observatory/kiritimati-kiribati-christmas-island-2301/>, Accessed: May 3, 2026.

A. Natural resources and sights

The majority (63%) of the island is occupied by Christmas Island National Park, which contains several areas of primary monsoon forest ^[124]. Christmas Island National Park provides fantastic opportunities for observing unique plants and animals in their natural habitats (Figure 34). The park covers 85 square kilometres – about two-thirds of the island. As an isolated oceanic island, remote from other land masses, Christmas Island is home to a high proportion of endemic species – found nowhere else in the world. Several of these are threatened. The park protects significant ecosystems, including much of the island's uniquely structured rainforest and two internationally important wetlands, the Dales and

Hosnies Heads. A variety of native sea and forest birds, unique fish and land crustaceans – including tens of millions of red crabs, known worldwide for their spectacular annual breeding migration – can be found in and around the national park. Christmas Island is one of the truly spectacular tropical seabird habitats in the world. It is not just the number and variety of seabirds or their magnificent splendor that makes the island so remarkable, but also their sheer visibility. Around 80,000 seabirds nest here annually, of which 23 species are breeding or resident.

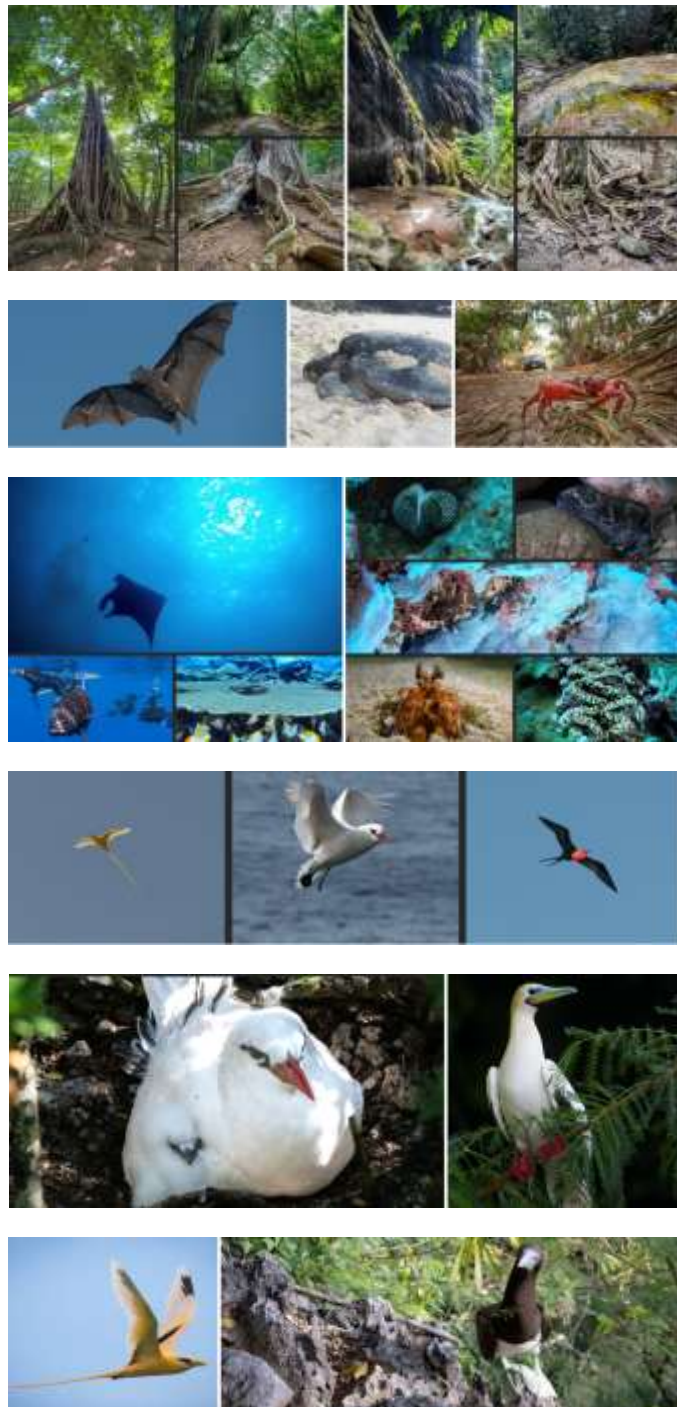


Figure 34. Flora and fauna on Christmas Island

Source: <https://www.christmas.net.au/nature-wildlife>, Accessed: May 3, 2026.

Source: <https://www.wildlifetourism.org.au/christmas-island-australias-gem-in-the-indian-ocean/>, Accessed: May 3, 2026.

B. Architectural cultural and historical heritage

Traditional houses on Christmas Island are called coolies. The new coolie lines consist of several planks and atapa sheds. They are well built and raised on piles almost a meter and a half above the ground (Figures 35, 36). Three of these sheds have been completed, with beds raised about 60 centimeters from the floor. They are extremely comfortable in them. Five more sheds have been completed, besides raised beds, and are now occupied by coolies sleeping on the floor. One shed is half finished and uninhabited, and two others have just been started. It is proposed to build a double row of these sheds. There is enough room for as many as needed. Currently, the coolies living in the new lines get their food from the old kitchens. There is no latrine here, the coolies use the jungle between the sheds and the edge of the cliff. The manager proposes the installation of wooden latrines that protrude over the face of the cliff. The cliff is about 9 meters high, and at its base there is 90 meters of water ^[125].



Figure 35. Left: Part of c1903 map showing coolie lines in Settlement. The "Eating Shed" for the coolies was located in what is now the parking lot across the road from the supermarket. Right: "New" coolie lines in 1905 (Extending from supermarket to Tai Pak Kong Temple, Gaze Rd)
Source: <https://christmasislandarchives.com/coolie-houses/>, Accessed: May 3, 2026.

The capital and largest settlement of Christmas Island is Flying Fish Cove, founded in 1888 (Figure 37). It has a population of 1,355 (2021 census). The buildings that make up the residential area are of architectural interest, are relatively

intact and show a considerable unity of style derived from the British experience in Singapore/Malaya. This unity combines with the consistent planting and ornamentation of the gardens and the linear connection of Gaza Road to create a strong streetscape. The presence of semi-detached servants' quarters is also of historical importance and indicates the social and economic stratification that prevailed on the island during the colonial period.



Figure 36. Photograph of most recent type of Coolie House as erected at Christmas Island. This may be taken as almost a model for this type of building (1911)

Source: <https://christmasislandarchives.com/coolie-houses/>, Accessed: May 3, 2026

The residential area is also historically significant as a reminder of the phase of Christmas Island's history when the island came under the control of the British Phosphate Commission and the mining industry and supporting community experienced significant expansion. The service area is of social and historical importance. It includes a series of early Chinese terraced houses, as well as a range of buildings representing each of the different phases of phosphate mining, including one of the oldest buildings on the island. It was also the main meeting place on the island where Asian workers and European staff came together through mutual reliance on retail, healthcare, recreation and other services. The area contains a number of buildings of particular significance to the community and, together with three cemeteries, strongly reflects the mixed racial background of the island^[126].



Figure 37. Flying Fish Cove

Source: <https://www.christmas.net.au/flying-fish-cafe>, Accessed: May 3, 2026

Source: https://stock.adobe.com/search?k=%22flying+fish+cove%22&asset_id=254742871, Accessed: May 3, 2026

IX.CONCLUSION

'Isolated islands' in the Pacific are specific natural environments on Earth. Looking at a map of the Pacific, they appear as mere 'dots' and at first glance seem completely insignificant. However, this is not the case. It is precisely their isolation that has made these islands extremely valuable oases of life, with rich biodiversity, with a multitude of endemic plants and animals. As such, these islands can be considered a 'world bank of life', which is why they must be the focus of conservation. The traditional (vernacular) architecture on these islands is unobtrusive and completely in harmony with the natural environment and the needs of the indigenous people. Built from natural materials taken on site, this architecture, even when destroyed by natural disasters, can be quickly rebuilt and used by people. There are few larger settlements on these islands, built by European and American colonizers. These are mainly bases from which tourist cruises to the islands depart. With the role of 'tourist destinations', these islands are not threatened in the future. A greater threat comes from climate change – a general threat to planet Earth as a whole. Rising sea levels, one of the manifestations of climate change, seem to be a major threat to these islands, even in the near future.

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