

Geographies of Opportunity, Geographies of Constraint

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The Caribbean region's diverse physical environments and landscapes have acted both as a constraint on and an opportunity for human endeavor. Some of its territories are rugged and mountainous while others have subdued landscapes, undulating lowland plains, and gentle hills. Mountain environments constrained the pace of conversion to plantation economies, but at the same time offered opportunities for refuge and resistance by oppressed peoples. Hurricanes and tropical storms, earthquakes and volcanoes also litter Caribbean history and have been as violent and unpredictable as the region's turbulent colonial history.

The region's strategic location was critical to its historical development. Opportunities for territorial expansion and mercantile profit beckoned Spain and later British, French, and Dutch colonial powers. In the days of sugar, slavery, and sailing ships, the North Atlantic trade routes connected the West Indian colonies to Europe and Africa. Later, trade connections were forged between the United States, Cuba, and other Caribbean territories. Following the

opening of the Panama Canal in 1914, the Caribbean Sea acquired greater strategic significance as an international transport conduit in an increasingly globalized and interconnected world.

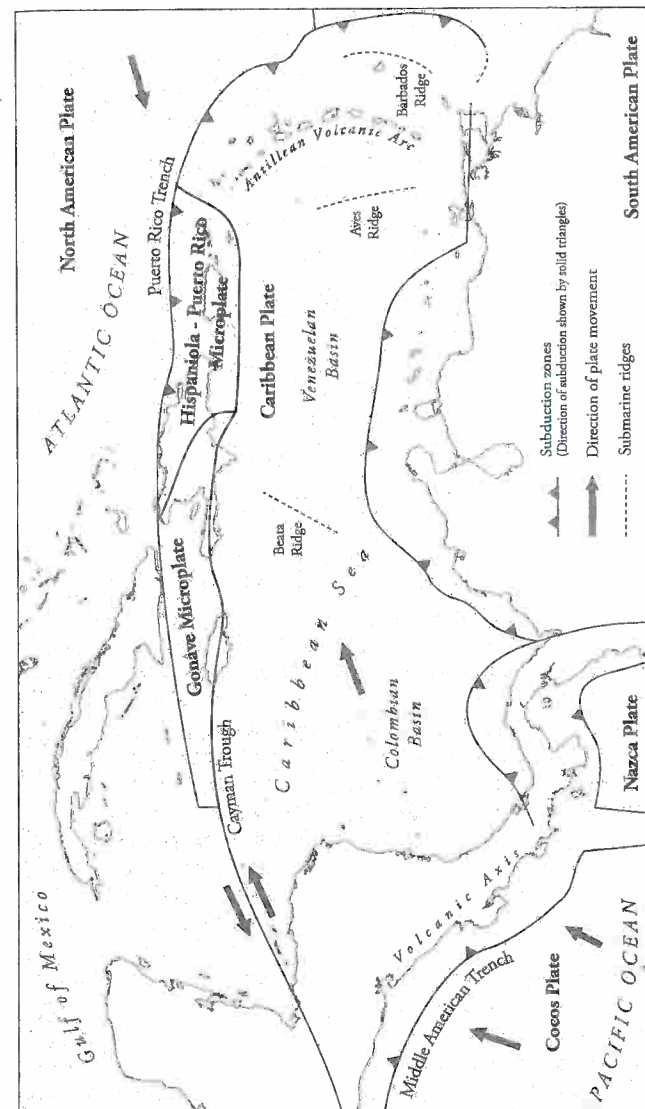
The Physical Setting

The Caribbean region, defined broadly, includes the islands within and adjacent to the Caribbean Sea, as well as the coastal areas of South and Central America that share a common cultural and economic history, notably Belize, Guyana, Suriname, and French Guiana. There are three main island groups: the Greater Antilles, the Lesser Antilles, and the Bahamas and Turks and Caicos archipelagos. Another line of islands fringes the north coast of South America and includes Aruba, Bonaire, and Curaçao, while Trinidad and Tobago lie to the south of the Lesser Antilles and the three Cayman Islands are located west of the Greater Antilles.

The total land area of the Caribbean islands is relatively small: some 91,000 square miles, roughly the size of the United Kingdom. Cuba is by far the largest island, and its 42,803 square miles represents nearly half the total (insular) land area. At the other end of the scale, Barbados covers 166 square miles and Aruba only 77. Most of the islands are sovereign states, but the Cayman Islands, Montserrat, and Anguilla are among the last colonies in the world. While its political status remains disputed, Puerto Rico is technically an internally self-governing territory of the United States, and Martinique and Guadeloupe are overseas *départements* of France. Several countries are territorially fragmented, like the twin-island Republic of Trinidad and Tobago, while the Bahamas' national territory comprises more than 700 islands, ranging in size from Andros to tiny uninhabited cays. The mainland countries of Guyana and Suriname (83,000 and 63,039 square miles, respectively) are much larger than any of the islands.

The geological evolution of the Caribbean Basin is the key to understanding the geographical distribution and relative sizes of the various island groupings. The theory of plate tectonics explains that the Earth's crust is composed of interlocking plates in constant motion relative to each other, and the Caribbean Plate is one small piece of this global jigsaw (fig. 1.1). The Caribbean Plate is moving eastward relative to the North and South American Plates, and is colliding with the North American Plate on its eastern margin. The plates' speed of movement is infinitesimal, only 0.3 to 0.6 inches per year, but inexorably the North American Plate is being forced under the Caribbean Plate. Geologists call this process subduction because crustal material is forced to descend into the Earth's mantle, where it mixes with magma. Inside the mantle, this super-

Figure 1.1 The Caribbean Plate and surrounding plates.



heated material eventually rises through vents in the Earth's crust and erupts onto the ocean floor, creating a submarine volcano. Over millions of years, such volcanoes grow in size and eventually appear above sea level as volcanic islands. Because subduction occurs along the entire plate boundary, a chain of volcanic islands is formed: a landform feature termed a *volcanic island arc*.

The islands of the Lesser Antilles consist of two volcanic arcs, an inner arc and an older outer arc. The inner arc, known as the Volcanic Caribbees, comprises the islands of Saba, St. Eustatius, St. Kitts, Nevis, Montserrat, western Guadeloupe, Dominica, Martinique, St. Lucia, St. Vincent and the Grenadines, and Grenada. These rugged, mountainous islands have 25 dormant and potentially active volcanoes, nine of which are on the island of Dominica, and they include the highest peaks in the eastern Caribbean, Soufriere (4,813 ft.) on Guadeloupe and Morne Diablotins (4,747 ft.) on Dominica. The scenically beautiful Pitons in St. Lucia are examples of extinct volcanic plugs. The process of volcanic island formation is being monitored carefully in the Grenadines, where a submarine volcano called Kick-em-Jenny will one day emerge above sea level to form a new Caribbean island.

There have been 17 volcanic eruptions in the islands' historical record. Unfortunately the andesitic volcanoes typical of the eastern Caribbean, formed when two plates rub against each other, are capable of extremely violent and explosive eruptions. The worst volcanic historical disaster occurred in 1902 on Martinique. At the climax of a series of eruptions by Mount Pelée, a *pyroclastic flow*, a cloud of superheated gases and ash, raced down the volcano's flanks and annihilated the town of St. Pierre in less than two minutes. Nearly 30,000 people were either incinerated or asphyxiated. There were only two survivors, one of whom was Auguste Ciparis, incarcerated in the town dungeon on a charge of murder.

The geologically older outer arc, the Limestone Caribbees, is the second chain of islands including Anguilla, St. Maarten, St. Bartholomew, Barbuda, Antigua, eastern Guadeloupe, La Desirade, and Marie Galante. The volcanoes that created these islands are long extinct. Their land surfaces were weathered and eroded long ago, then submerged under warm tropical seas, where limestone formed. Later they were raised above sea level again, so that today these islands are flat with low-lying hills.

The Lesser Antilles are more commonly subdivided into the Leeward and Windward Islands, a nomenclature that has nothing to do with their geology. It may be attributed to Columbus, who sailed westward through the Dominica passage—between Guadeloupe and Dominica—during his second voyage, to shelter from a hurricane in the lee of the northern Lesser Antilles. Two early English sugar colonies were established in the Leeward Islands group. Antigua is a relatively flat island—one of the Limestone Caribbees—whose forests were quickly cleared for sugar plantations. St. Kitts, geologically part of the Volcanic Caribbees, has fertile

volcanic soils on the coastal plains surrounding Mount Liamuiga, which provided opportunities for early planters to grow sugarcane.

Barbados is a relatively flat island like Antigua. Its forests, too, were quickly cleared for agriculture; its fertile, clayey soils were rich in lime and provided ideal conditions for the cultivation of sugarcane. The geological origin of Barbados, however, is different from that of other islands in the eastern Caribbean. Barbados lies on what geologists call an *accretionary prism* or *wedge*, created when part of the North Atlantic Plate buckled and crumpled as it slid under the Caribbean Plate over millions of years. Thick limestone and other sedimentary rocks formed in shallow seas over this deformation in the crust. Then further tectonic activity thrust the land above sea level, creating a mainly limestone coralline island with a series of parallel coral reef terraces that step downward toward the sea.

The Greater Antilles are larger, more mountainous, and more geologically complex than the Lesser Antilles. They are located along the northern boundary of the Caribbean Plate and include Cuba, Jamaica, Hispaniola, and Puerto Rico. The oldest rocks were once part of an ancient volcanic island arc, formed more than 100 million years ago, which disappeared under tropical seas and were overlain with sandstones and limestone. About 10 to 4 million years ago, the islands of the Greater Antilles were formed during a period of violent tectonic activity and mountain building that thrust the older rocks up above sea level again.

Jamaica, Hispaniola, and Puerto Rico are thus composed of various sedimentary, igneous, and metamorphic rocks that have been folded, faulted, and fractured. In places they have been sculpted into mountain blocks, plateaus, and steep escarpments. The islands are topographically similar, with central upland mountain ranges circumscribed by flatter coastal plains, the accessibility and good soils of which provided opportunities for human settlement and plantation agriculture. The highest peaks are Pico Duarte (10,417 ft.) in the Dominican Republic's Cordillera Central, and Jamaica's Blue Mountain (7,405 ft.). Many mountain ranges in Hispaniola, Puerto Rico, and eastern Jamaica are rugged, inaccessible, and deeply dissected by streams and rivers, producing spectacular, steep-sided, forested river valleys.

Only the southeastern portion of Cuba lies on the Caribbean Plate, so the geology of most of the island is different from that of the rest of the Greater Antilles and is reflected in a different topography. Cuba's mountain ranges are fairly isolated, such as the Sierra Guaniguanico in the west, famous for its tobacco, and the Sierra Maestra in the east. Most of Cuba is dominated by lowland limestone plains with fertile soils, ideal for the cultivation of sugarcane.

The location of the Greater Antilles along the northern boundary of the Caribbean Plate is significant. The Caribbean Plate is sliding very slowly past the North Atlantic Plate, and in an opposite direction. The movement is jerky and intermittent, and when slippage occurs, tremendous pressures released deep inside the

Earth's crust cause devastating shallow-zone earthquakes, so called because their point of origin, or focus, is less than 45 miles below the Earth's surface. Northern sections of the Caribbean Plate are fragmented into two small microplates, and it was slippage along the southern boundary of the Gonâve microplate that caused the January 2010 earthquake in Haiti. Measured at 7.0 on the Richter scale, with an epicenter only 15 miles from Port-au-Prince, it was not the largest-magnitude quake recorded in the region, but it caused loss of life and economic and social disruption on a scale unprecedented in Caribbean history.

The combined effects of these microplate movements along the northern plate boundary mean that the most devastating earthquakes in Caribbean history have occurred in the Greater Antilles. Puerto Rico suffered major earthquakes in 1670, 1787, 1867, and 1918. In Haiti, earthquakes destroyed Port-au-Prince twice in the 19th century and Cap-Haïtien in 1842. The famous 1692 earthquake in Jamaica killed more than 2,000 people and destroyed the pirate town of Port Royal, which had acquired a reputation as "the richest and wickedest city in Christendom" (Black 1988, 17). A large part of the town disappeared under the sea as a result of a submarine landslide. Aptly illustrating the theme of constraint and opportunity, most of the survivors abandoned Port Royal for the nearby Liguanea Plain, where they founded Kingston, one of the world's largest natural harbors and today a major transshipment center and container port.

Limestone regions are ubiquitous throughout the Greater Antilles. There are extensive limestone plateaus in northwest Haiti and Puerto Rico. And limestone uplands in central Jamaica are overlain with valuable bauxite deposits. These uplands have many common and distinctive landform features, including karst towers and cockpits and extensive underground cave systems created by the chemical weathering of limestone rocks. Large inland valleys in limestone areas are called *poljes*, and their alluvial soils are ideal for sugarcane. Impenetrable rugged limestone terrains once provided refuge for various groups who were in conflict with authorities. The spectacular Cockpit Country in Jamaica sheltered maroon communities that, from their remote and inaccessible villages, raided English plantations until the signing of a 1739 peace treaty. More recently, limestone caves in the Sierra Maestra provided refuge for Cuban rebels before the 1959 revolution. On Barbados and Puerto Rico, limestone caves are a major tourist attraction. The Bahamas and the Turks and Caicos Islands are archipelagos formed on stable and tectonically inactive low-lying limestone platforms where the combination of a shallow sea floor and warm tropical seas has created physical environments rich in exploitable marine resources and ideal for water sports.

Trinidad is geologically similar to the adjacent South American mainland. Its Northern Range was a separate island millions of years ago, but Trinidad was connected to mainland South America during the last Ice Age. Further south, Guyana,

Suriname, and French Guiana are low-lying littorals on the South American continent. Their coastal zones comprise mudflats and mangroves, with huge sluggish rivers draining from the continental interior. The coastal zones were the main areas of human settlement, and in colonial British Guiana, Dutch engineers constructed elaborate systems for water control. The large interiors of all three countries are still relatively uninhabited, and almost 80% of Guyana is still pristine tropical rain forest, its conditions very similar to those that existed at the time of Columbus's voyages.

Climate, Winds, and Ocean Currents

The Caribbean islands have a tropical maritime climate with humid, warm conditions throughout the year. The diurnal temperature range at sea level in summer, 34° C (93° F) in daytime to 20° C (68° F) at night, is greater than the seasonal temperature range—that is, the difference between the average daily temperatures of 28° C (82° F) in August and 25° C (77° F) in January. There are distinct wet and dry seasons, the timing of which varies slightly across the region. In Jamaica, for example, the wettest months are September and October and the driest are January and February, but there is a short rainy period around May and June. Climate and weather conditions are strongly influenced by the region's location in the path of the northeast trade winds. These winds originate in the Atlantic Ocean, blowing predominantly east to west—rather than from the northeast, as their name suggests—from a permanent high-pressure zone known as the Azores-Bermuda anticyclone. They blow all year, and their consistency and reliability were very important in the days of sailing ships (fig. 1.2).

This combination of rainfall, topography, and island size gives the Greater Antilles a mosaic of local climates. The rainfall is generally heaviest to the east and in mountain areas. In Jamaica, for example, the annual rainfall in the Blue Mountains is over 200 inches, whereas much of the central part of the island receives between 50 and 75 inches. There are also drier regions with low rainfall, known as rain shadow areas, in the lee of mountain ranges. In the Dominican Republic, for example, the Enriquillo depression is an east-west-trending valley with arid semi-desert conditions, places that lie below sea level, and a large salt lake.

There are also marked differences in rainfall patterns on the Windward Islands, where central mountains ensure that the eastern (windward) sides are wetter than the more sheltered western (leeward) sides. In the eastern Caribbean, the more tranquil weather conditions on leeward coasts provided opportunities to establish sheltered ports, and many of the region's capital towns, such as Kingstown (St. Vincent), Castries (St. Lucia), and Fort-de-France (Martinique), are notably located on the western sides of their islands.

The Caribbean islands are of course affected by the North Atlantic hurricane

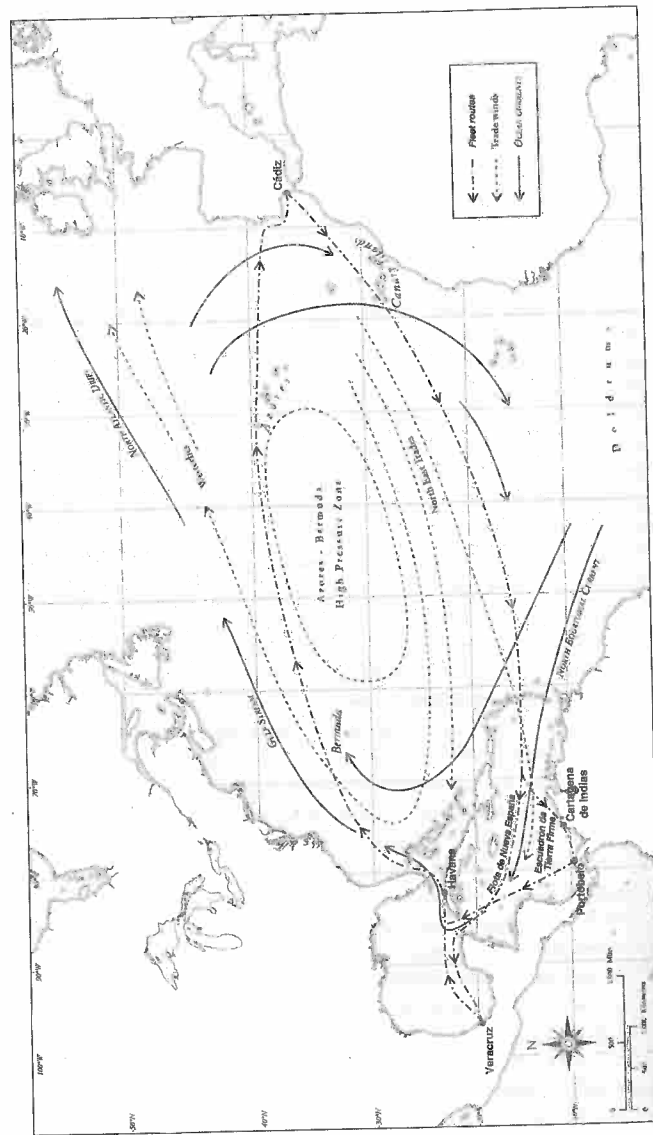


Figure 1.2 Trade winds and ocean currents in the northern Atlantic Ocean greatly aided navigation between Europe and the Caribbean, as in the routes of Spanish treasure fleets shown here.

season. The word "hurricane" is derived from the Taino word *hurakan* (devil wind). Hurricanes and tropical storms are intense, low-pressure weather systems that begin as tropical disturbances and intensify through various stages with awesome destructive power. Ferocious winds spiral outward from the eye of a storm in a counterclockwise direction, at wind speeds ranging from 74 to more than 155 miles per hour. Only the island of Trinidad and the continental lands of Guyana, Suriname, and French Guiana lie outside the paths of these weather systems. The storms generally move from east to west, though their movement is not entirely predictable and depends on many meteorological factors. The hurricane season runs from June through November, with a peak frequency in the first two weeks of September. Storm systems tend to form in the Atlantic and move into the Caribbean Basin, but early- and late-season storms can begin within the basin itself. Hurricanes can strike the islands and Central America, but many curve northward and move into the Gulf of Mexico or hit Florida and the Carolinas.

The first recorded hurricane in Caribbean history was logged during Columbus's second voyage, in June 1495. In those days, hurricanes were more a threat to shipping than to human populations—for example, scattering and capsizing the French fleet in 1565 and the Dutch fleet in 1640. When the Great Hurricane of 1831 slammed into Barbados on October 10 of that year, however, at least 27,500 deaths were reported, including 1,500 slaves—the highest number of fatalities ever recorded from a hurricane in the region. By comparison, Hurricane Mitch, the most catastrophic Atlantic hurricane in modern times in terms of loss of life, killed 18,000 people in Honduras and Nicaragua in 1998.

Ocean currents have also played an important part in the region's history. Gyres are wind-driven ocean currents that, on a global scale, proscribe huge circular patterns around subtropical high-pressure cells. In the Northern Hemisphere the rotation of ocean currents is clockwise; the circulation of the North Atlantic gyre is shown in fig. 1.2. Ocean currents move at different speeds, but the Gulf Stream has a velocity of 1.8 to 2.5 miles per hour and is one of the fastest in the world.

The directions of ocean currents and surface winds were important in the days of sail. From Columbus's epic voyages to the notorious triangular trade, the North Atlantic system of winds and ocean currents was used effectively by navigators of sailing ships. The routes of the Spanish treasure fleet's annual voyages aptly illustrate the opportune synchronization of wind, ocean currents, and human endeavor. The fleets sailed from Spain down the coast of Africa to the Canary Islands, then westward, catching the northeast trades. In the Caribbean the fleet divided into the *Escuadrón de Tierra Firme* and the *Flota de Nueva España*, following the routes de-

picted in fig. 1.2, to collect their booty. The ships later rendezvoused in Havana before making the perilous journey home, which took them through the Florida straits (making use of the Gulf Stream) before they set a course for the Azores and then back to Cádiz. The directions of the wind and ocean currents were critical at all segments of these annual voyages.

Population and Demography

The size of the region's indigenous population at the time of European contact is not known. Spanish chroniclers estimated the population at 1 million, but modern anthropologists argue that the numbers were much higher, between 6 and 12 million, with large populations on Hispaniola, Puerto Rico, and Jamaica. Tragically, these peoples and their societies were decimated within a few decades of contact, by Old World diseases, slave labor, emigration, and suicide. However, recent mitochondrial DNA studies of present populations have revealed a high Native American contribution, which suggests extensive sexual encounters between Spanish men and native women during the conquest period. Several thousand descendants of the Caribs still live on the island of Dominica, while "Black Caribs," people of mixed Carib, African, and Taino descent, live in northern St. Vincent. The mountainous volcanic island of St. Vincent was so successfully defended by the Caribs that it was one of the last of the Lesser Antilles to be colonized. After their defeat by the British, several thousand Black Caribs were deported in 1797 to an island off the coast of Honduras. Their descendants eventually settled on the Caribbean coast of Central America between Belize and Nicaragua, where they created a distinctive Garifuna culture.

The insular nature of the Caribbean region is significant because islands provided opportunities for colonial powers to establish defensible colonies during periods of intense European rivalry and warfare. Neighboring islands belonging to different colonial powers had little contact with each other, so despite their common histories, islands acquired some of the distinctive cultural traits of their colonists' mother countries, especially with respect to language and styles of governance—a legacy that has contributed to the cultural diversity of the region today.

Caribbean populations increased significantly under slavery, when more than four million people were brought from Africa, dramatically shaping the future ethnic composition of the population. A second important wave of immigration took place in the decades after emancipation, when large numbers of indentured laborers were brought from Asia to alleviate labor shortages on the plantations. Between 1835 and 1917, almost 700,000 workers arrived from British India and another 150,000 came from China, primarily into Trinidad and British Guiana, while approximately 50,000 from the Dutch East Indies (mainly Java) settled in Suriname.

After completing their indentured service, many laborers stayed on, encouraged by land grants and prospects for economic advancement, further enriching the cultural diversity of Caribbean societies. Today, people of East Indian descent form the largest ethnic group in Trinidad and Guyana (formerly British Guiana). Tens of thousands of Western Europeans (mostly Spaniards) also arrived in the Hispanophone Caribbean during the 19th and 20th centuries.

By 1960 the Caribbean population had reached 17 million, and it has since more than doubled to 40 million. Cuba, the largest island, has 11 million people, and the Greater Antilles together account for more than 90% of the region's total. In terms of language groupings, about 64% of the people live in the Spanish-speaking countries (Cuba, the Dominican Republic, and Puerto Rico) and 22% live in French-speaking territories (mainly Haiti). Only about 6 million people live in English-speaking countries, two-thirds of whom live in either Jamaica (2.7 million) or Trinidad and Tobago (1.4 million). Islands such as Antigua, St. Lucia, St. Vincent, and Grenada have populations between 100,000 and 200,000, while St. Kitts and Nevis has only 40,000.

Not surprisingly, population densities are high by international standards, with an average of 66 people per square mile. However, as with other demographic statistics, there is considerable variability from island to island. The highest population densities are in Barbados (1,663 per square mile), Aruba (1,479), and Puerto Rico (1,115), while the lowest are in the Bahamas (60) and the Turks and Caicos Islands (127). The population densities are even lower in continental French Guiana (3), Suriname (7), and Guyana (10) because their populations are geographically concentrated in the lowland coastal areas, while the interior rainforests and savannas are relatively unpopulated.

Recent improvements in health care have significantly reduced child morbidity and mortality, and birth rates and death rates now compare favorably with those in industrialized countries. As of 2007, the birth rate for the region was 19 per 1,000 residents, the death rate was a low 8 per 1,000 residents, the infant mortality rate was 32 (deaths of children under age one per 1,000 live births), and life expectancy was 71 years. These averages are distorted by atypical data from Haiti, where the birth rate was 29, the death rate 11, infant mortality 57, and life expectancy only 58. For most islands the proportion of people under age 15 ranged between 25% and 30%, which is more typical of Asian than African countries, and higher than in the industrialized world. Again Haiti was an exception at 39% while Martinique, Barbados, and Puerto Rico had values closer to 20%. The average rate of natural increase of the region's population was 1.1, much lower than in some developing regions, but again Haiti and the Dominican Republic had much higher rates. Cuba, Puerto Rico, Barbados, and Trinidad and Tobago had lower rates of natural increase.

Urbanization and Migration

The Caribbean is one of the most urbanized regions in the world, and the level of urbanization has increased significantly during the last 50 years. In 1960, less than 40% of the population lived in cities, but today 62% is defined as urban. The official statistics for Guadeloupe and Martinique imply that virtually their entire populations live in an urban areas, while in the Bahamas and Puerto Rico the rates are as high as 90%. An important feature of Caribbean countries is that each capital town or city is much larger than the second largest urban center in its country. Puerto Rico, Trinidad and Tobago, Antigua, Martinique, and Jamaica each have more than 30% of their national population living in the largest urban center. This trend is called *urban primacy*.

Caribbean cities are generally much smaller than capitals elsewhere in the developing world. The largest, Port-au-Prince in Haiti, has an estimated population between 2.5 and 3 million people, closely followed by Havana and Santo Domingo, each around 2.1 million. The largest city in the English-speaking Caribbean is Kingston, with a population of 800,000. Because Caribbean islands are among the world's smallest sovereign states, seats of government, civil service, and port facilities may be located in capital towns that can barely be classified as urban centers by world standards. For example, Basseterre, capital of St. Kitts and Nevis, has a population of 15,000, while Charlestown, the largest settlement on Nevis, has a population of only 1,500.

Urban growth, as elsewhere in the developing world, is the result of both rural-urban migration and demographic increase. Towns and tourist areas offer more attractive employment opportunities than agriculture, especially for young people, and have better social services, educational opportunities, infrastructure, and housing. Rapid, unplanned, and uncontrolled urban growth has characterized Caribbean towns and cities since the 1960s and has resulted in poor housing in inner cities and squatter settlement in unoccupied areas, often in hazard-prone locations. Infrastructure development is unable to keep pace with rapid urbanization, and the flood of new and secondhand cars from Japan and Korea since the onset of trade liberalization in the early 1990s has contributed significantly to urban congestion. Another feature of urbanization has been rapid suburban development, especially upscale housing for the affluent middle classes, which has spread to the hills overlooking the old colonial towns and contributed to urban sprawl. The general visual impression of modern Caribbean towns and cities is one of haphazard, unplanned, and overcrowded urban development, in sharp contrast to the neat, precise gridiron street patterns laid out when the original colonial towns were founded. Indeed, old street patterns and colonial facades can still be discerned in the decaying urban fabric of historic downtown areas.

Caribbean island populations would be much larger but for overseas migration. The decision to emigrate reflects a mix of push (constraining) factors at home and pull (opportunistic) factors abroad. Depressed economic conditions and lack of livelihood opportunities are the usual driving forces. However, a major natural disaster can trigger a sudden exodus of people. A good example is Montserrat, where the Soufriere Hills volcano began erupting in 1995. Loss of life was minimal, but more than 8,000 of the island's 12,000 people left in the immediate aftermath of the eruptions, which rendered two-thirds of the island uninhabitable. The island's capital town, Plymouth, was buried under repeated pyroclastic flows and ultimately abandoned, and a new capital town and airport have been constructed in the tiny area relatively unaffected by the eruptions.

Migration as a response to negative economic conditions began immediately when Caribbean people were no longer enslaved. They left the plantations and settled the relatively unoccupied interiors of the larger mountainous islands as independent farmers, or moved to capital towns and cities to try their luck in paid employment. Around the same time, the interisland schooners plying their trade in the eastern Caribbean began to carry the first interisland migrants, initiating the intra-Caribbean migrations that continue today.

The first major international migration involved 5,000 Jamaicans who helped construct a railway across the Isthmus of Panama between 1848 and 1855. Jamaica's large labor force and proximity to Central America were important factors in the early migrations. Generally, between the 1880s and 1920s, Caribbean plantation economies were severely depressed, and overseas employment provided economic opportunities for an impoverished and disenfranchised population. Over the next 40 years, West Indians were attracted to construction projects and agricultural work in many countries bordering the Caribbean Sea. The failed efforts by the French to construct the Panama Canal from 1881 to 1888 attracted West Indian laborers, as did new banana plantations in Central America in the 1880s and construction of the Panama Canal between 1904 and 1914. More than 121,000 Jamaicans worked on Cuban sugar plantations between 1902 and 1932. In each of these examples, descendants of the migrants who stayed have added to a country's ethnic mix. After World War II, migration from the Caribbean to Britain, France, and the Netherlands became significant, as did migration from Puerto Rico to the continental United States. Since the 1970s, the United States, Canada, and Europe have attracted tens of thousands of migrants from all parts of the region, so that today vibrant Caribbean communities exist in many European, Canadian, and American cities.

The intimate relationship between the physical environment and the human population that has characterized the last 500 years of Caribbean history is critically important to the region's prospects for sustainable economic development. The United Nations defines Caribbean islands as small island developing states (SIDS)

and considers them a special case. Small islands have economic development problems markedly different from those of larger, continental developing countries. The constraints include limited land space, limited amounts of good arable land, exposure to natural hazards, high population densities, small internal markets, reliance on imported manufactured goods, high transportation costs, and expensive infrastructure. Limited or absent mineral resources are also a severe constraint. Of small island nations in the Caribbean, the only ones with exploitable economic reserves are Trinidad and Tobago (oil and natural gas), Cuba (oil and copper), the Dominican Republic (gold), and Jamaica and Guyana (bauxite).

Thus, many Caribbean countries have opted to take advantage of their tropical island environment and proximity to North American markets to develop tourism. This classifies them as service economies, not industrial or agricultural economies. Indeed, the future of traditional export agriculture in the Caribbean is uncertain. The region once held a comparative advantage for tropical produce by virtue of its cheap labor, tropical climate, good soils, and favorable terrain—but it was trapped in colonial dependency. Today, in an era of neoliberalism, it is difficult for traditional Caribbean export crops to compete with cheaper produce from larger tropical countries. The region as a whole is peripheral to the world economy, and many of the countries are economically marginalized at a time when the forces of trade liberalization and globalization are quite unforgiving. Thus, economic circumstances still limit opportunities for most Caribbean people, and migration is an agenda item for many, though the flourishing tourist industry clearly demonstrates how people of the region continue to adapt to a changing world and use their cultural resources in innovative ways.

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2

Contemporary Caribbean Ecologies

DUNCAN MCGREGOR

The Weight of History

The history of European horticulture in the Americas dates back to the second voyage of Christopher Columbus in 1493, which brought a variety of Old World seeds and cuttings to the Caribbean. As colonization increased and spread, Europeans introduced a wide variety of plants and animals to the region (along with diseases to which Native Americans had little or no resistance, such as smallpox). In this sense, early colonization enriched Caribbean ecology to a certain extent. Sugarcane, which was later to play an important part in ecological degradation, was among the successful introductions. On the other hand, wheat, a staple of the colonizers' diet, did not grow well in the Caribbean climate, which was hotter and wetter than that of Europe. Domesticated animals were also introduced by Columbus in 1493 and generally adapted well to the new environment.

The plantation era that followed was characterized by widespread ecological degradation, through the progressive depletion of both flora and fauna. Thus, the roots of Caribbean environmental degradation lie in the history of the plantation economies and the