5 Saint Martin/Sint Maarten and Saint Barthélemy

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Abstract

St. Barthélemy and St. Martin are small islands among the northernmost of the outer, coralline Lesser Antilles arc and are separated from one another by a narrow channel. Both islands are characterized by undulating coastlines with cove-like white and golden sand beaches and impounded salt ponds, offshore islets, dry landscapes (though the higher peaks on St. Martin do support slightly more rain-dependent vegetation), and landforms combining ancient volcanics with more recent sedimentary geology. St. Barthélemy and the northern part of St. Martin are culturally and politically connected to France, while the southern part of St. Martin (known as Sint Maarten) is linked to the Netherlands. Both islands are hilly, and while St. Martin's larger size affords it some space for coastal plains, St. Barthélemy has significantly less flat land. Both islands are popular tourist destinations with St. Martin attracting more cruise ships and resort-based tourists and St. Barthélemy focusing on a smaller-scale, luxury tourism niche. Tropical cyclones occasionally threaten these islands, but the greatest hazards may be droughts and any disruption to the energy system since rainwater catchment and desalination provide the majority of the freshwater to both islands.

Keywords

Arid • Binational • Coralline • Mountainous • Tourism

A Toponymic Note

In this chapter, both islands will be referred to by shorthand names: Saint Barthélemy will be called "St. Barth" (read with a silent 'h'). This island is also frequently referred to in the literature as "St. Bart's" or "St. Barts," and less frequently in modern times as "St. Bartholomew," though this toponym is used in certain historical texts and maps. With regard to Saint Martin/Sint Maarten, following Benoît (2008) and other authors, distinct names for the two parts of the island, for the island as a whole, and during explicit discussion of the divided nature of the island will be used. The island of Saint Martin/Sint Maarten will be designated as simply "St. Martin." When discussing the distinct sides, the Dutch side will explicitly be referred to with the toponym "Sint Maarten," while the French side will be referred to as "Saint Martin", with no abbreviation of the word "Saint". When discussing the divided political geography of the island itself, both names will be used, separated by the virgule (i.e. "Saint Martin/Sint Maarten").

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5.1 Introduction

5.1.1 Orientation

Saint Martin/Sint Maarten (Fig. 5.1) and Saint Barthélemy (Fig. 5.2) are two small islands (87 and 21 km^2, respectively) located near the northern limit of the Lesser Antilles archipelago. Only Anguilla and the Virgin Islands reach further north. Politically, Saint Barthélemy is an overseas collectivity (*collectivité d'outre-mer*) of France, having achieved that status with independence from Guadeloupe in 2007. Saint Martin/Sint Maarten is a binational island, as its dual names indicate, divided by a roughly east–west border separating the French and Dutch sides of the rather triangular island. The larger (53 km^2), northern, French side is called Saint Martin, and the smaller (34 km^2),

C.D. Allen (ed.), *Landscapes and Landforms of the Lesser Antilles*,
World Geomorphological Landscapes, DOI 10.1007/978-3-319-55787-8_5

southern, Dutch side is called Sint Maarten. Saint Martin, like St. Barthélemy, is an overseas collectivity of France. Sint Maarten was a part of the Netherlands Antilles until that union's dissolution in 2010, after which Sint Maarten became an autonomous country within the Kingdom of the Netherlands.

The islands of St. Barth and St. Martin evoke landscapes and seascapes that come as close to the stereotypical image of "tropical paradise" as exist anywhere. Beaches of soft white or golden sand and warm, electric-blue water are backed by thickly vegetated mountains, alive with fruit trees, tropical birds, land snails, tortoises, and iguanas. Of course, as with other islands in the Caribbean, human activity, from subsistence agriculture to slave-based industries to international tourism, has altered the landscape on each island in its own way, both historically and today.

5.1.2 Previous Work

The most detailed, accurate, and influential early academic work on the landscapes and landforms of these two islands is the 1950 Ph.D. dissertation by Christman, later condensed and published as a journal article by the same author (1953). Christman's *Geologic Map of Saint Bartholomew* (Fig. 5.3) remains the standard some sixty-five years after its creation, although a 1983 map by Westercamp and Andreieff is more recent and technically superior. Christman's, however, remains popular owing perhaps to its sepia-tinted, monochromatic beauty, and English legend and accompanying text. The most accurate and functional colonial-era cartography of St. Martin, St. Barth, and several other islands in the region was done by Samuel Fahlberg in the eighteenth century (Reinhartz 2012).

In addition to the foundational work by Christman, notable earlier research into the geology, geography, and physical landforms of St. Martin and St. Barth includes Cleve's (1871) work, Spencer's (1901) report, and Vaughan's extensive work throughout the region, conducted throughout much of the first third of the twentieth century (e.g., 1918, 1926).

More recent work has focused upon specific questions of volcanism, tectonics, sedimentary geology, caverns, and biogeography. In addition to their geological interest, each island—but primarily St. Barth—has been the subject of anthropological and linguistic studies (Benoist 1964; Maher 2013), focusing upon its isolation, both as a function of its insularity and as exhibited within the island itself, owing both to topography and settlement patterns.

5.2 Setting

Previous literature on the Lesser Antilles region has failed to establish agreement regarding the island arc to which St. Barth and St. Martin belong. Fink and Fairbridge (1975) place both within the outer, "limestone" arc, while Cambers (2010) places St. Barth in the inner, "volcanic" arc and leaves St. Martin in the outer, "coralline" arc. Standing on the islands, evidence of their volcanic origins, especially in contrast to the nearby low and sandy Anguilla, remains apparent. These volcanic features, however, are not geologically recent and are in many places overlain by Miocene or later sedimentary rock. The islands in the inner, recent-volcanic arc, however, often show basaltic or pyroclastic geology at or near the surface. Many have erupted within historical time, including the most recent major eruption in the region—that of the Soufrière Hills volcano on Montserrat in 1995. By contrast, most of the rocks of volcanic origin on St. Martin and St. Barth date primarily from the Eocene to the Oligocene (Tomblin 1975). For this reason, this chapter places both islands firmly within the outer arc, while noting that the two arcs do indeed converge in the immediate vicinity, closing the gap that separates, for example, St. Vincent from Barbados or even Antigua from Barbuda. Only at Guadeloupe, where the two arcs are close enough to converge within one island, is the gap narrower.

The island of St. Martin lies between 18.0° and 18.1° North latitude and between 63.2° and 63.0° West longitude. Shaped roughly like an equilateral triangle leaning to the right, this island contains the point of highest elevation within the broad undersea plateau, called the Anguilla Bank, from which both islands rise. St. Martin is an island of hills, valleys, and impounded bays. The coastline is irregular in both morphology and topography, with sandy beaches, spits, and bars, alternating with rocky coasts, themselves comprised of limestones, marls, basalts, and porphyrites (Vroman 1968). The beaches consist of white to golden coralline sand, not the dark, volcanic sand of the geologically younger, volcanic islands to the south. The basement rocks on St. Martin are comprised of the ancient, silicified volcanic tuffs common to the other islands in the region (St. Barth and Anguilla especially), some of which remain exposed, forming the island's mountainous areas (Schwartz 2010). On St. Martin, these tuffs form the Pointe Blanche formation, named for the cape at the island's southernmost point, an area where the formation is most visible (Sypkens-Smit 1995). On St. Barth, rocks of the same age and provenance are referred to as the St. Bartholomew formation (Christman 1950).

Fig. 5.1 General physiographic map of St. Martin and surrounding islands. The island is separated into the French Saint Martin and the Dutch Sint Maarten. Place names and the descriptions of physiographic features such as rivers, lakes, and mountains reflect this political division (e.g., river vs. ravine). While the island officially has two separate place names, the more popular "St. Martin" is cartographically used to represent both nations. Cartography by K.M. Groom

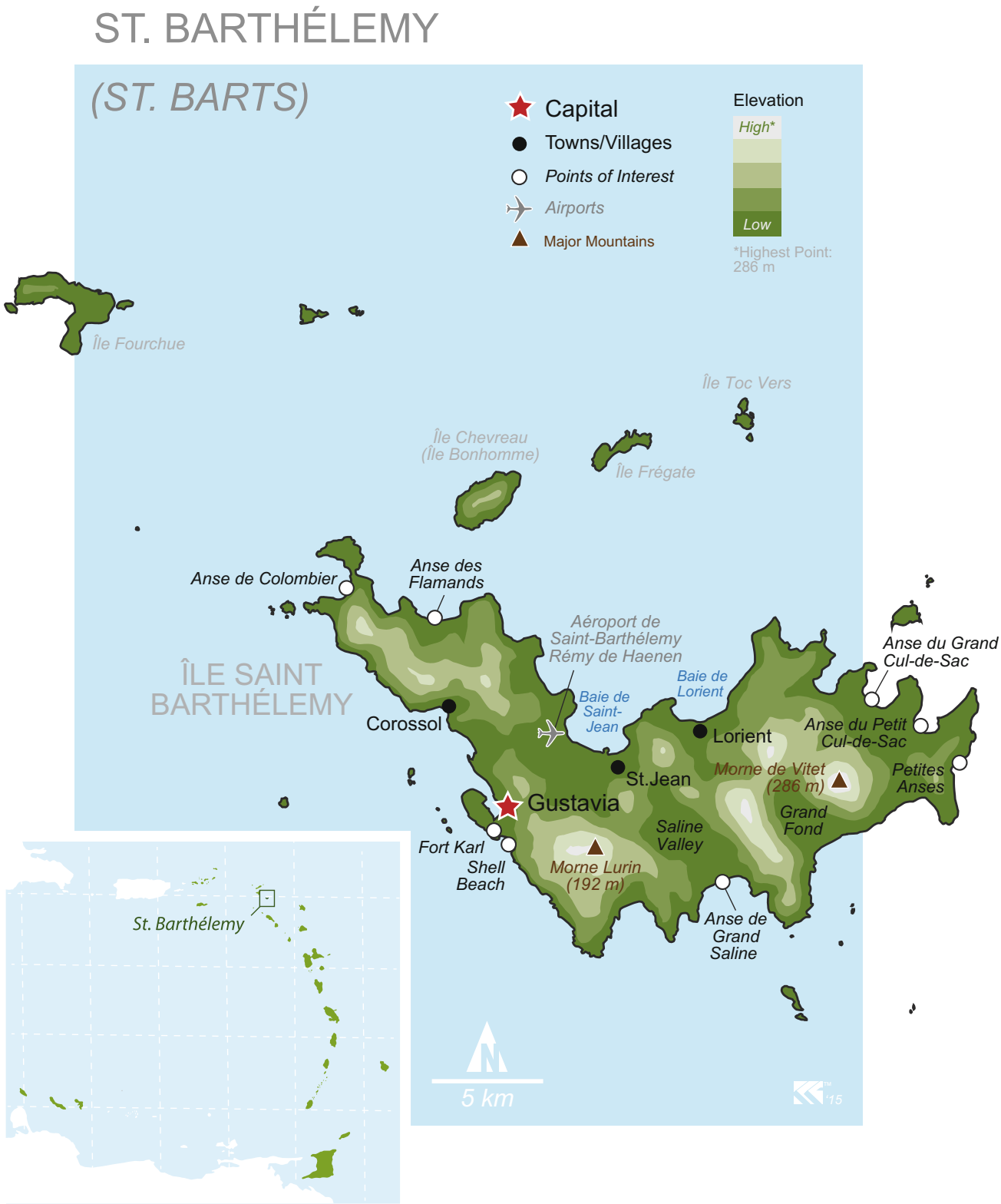

Fig. 5.2 General physiographic map of St. Barthélemy, colloquially known as St. Barts with surrounding islands. French place names and physical descriptions signify the islands political affiliation with France. Cartography by K.M. Groom

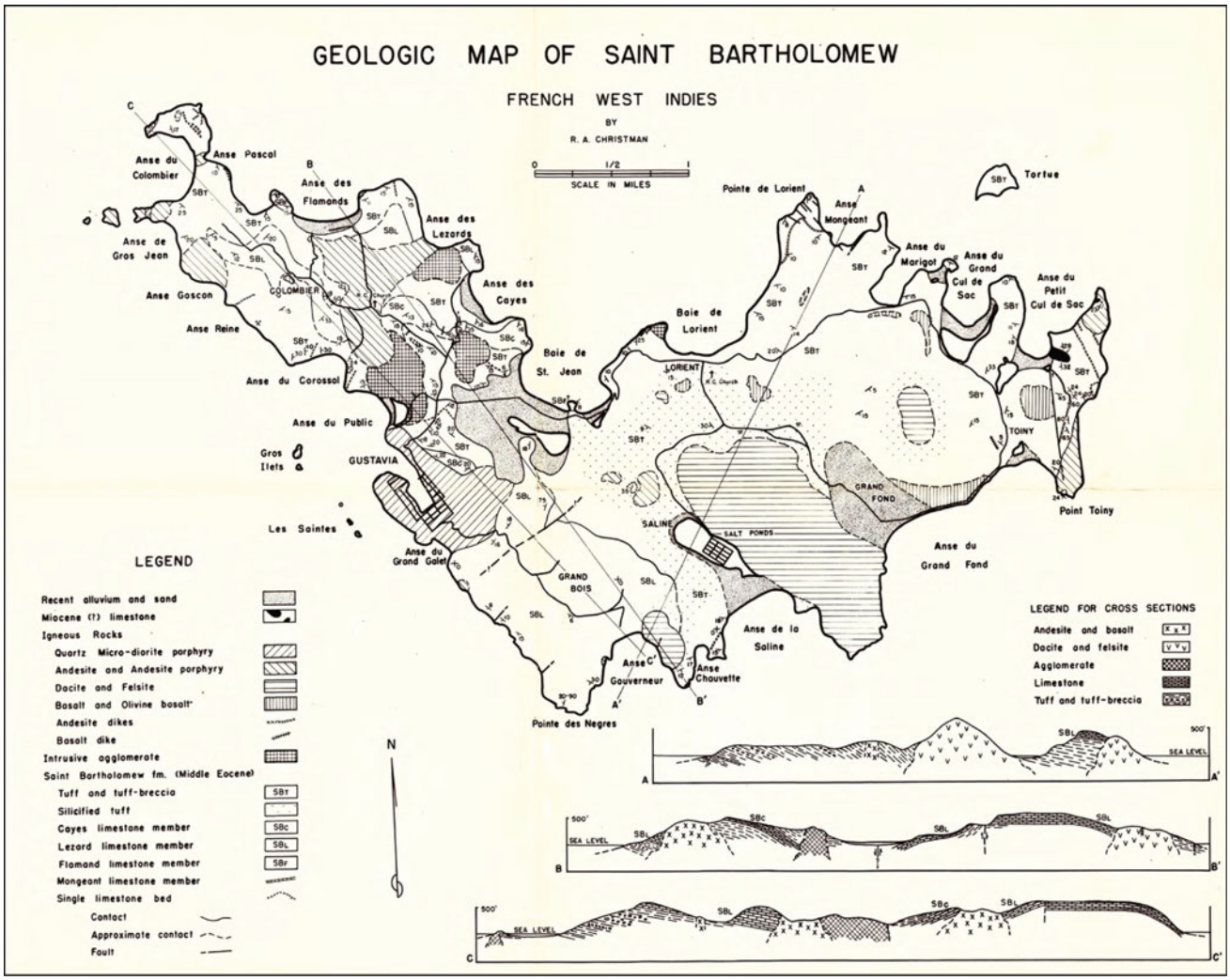

Fig. 5.3 "Geologic Map of Saint Bartholomew" by R.A. Christman, published in 1953. The detailed regional categorization, three cross sections running along the northwest–southeast and northeast–southwest diagonals, and pleasant aesthetic enhance the popularity of this map

St. Barth lies at 17.9° North latitude and between 62.9° and 62.8° West longitude. The island is shaped like a crescent opening north, or, if one is so inclined, like a smirking smile. The rolling coastline alternates between rocky shores and embayed coves, most of which feature sandy beaches at their landward extents. Like St. Martin, the structure of St. Barth is primarily composed of ancient volcanics overlain by Eocene limestones. Westercamp and Andreieff (1983) found evidence for three separate phases of volcanism, the first two occurring below sea level and coincident with the sedimentation processes that led to the limestone layers. According to these researchers, the volcanic center that produced the tuffs found on both St. Barth and St. Martin is thought to have been located near St. Barth's present north coast and offshore near the present islets of Île Chevreau (also called Île Bonhomme) and Île Frégate.

Both islands experience a climate marked by stable temperatures and seasonally variable precipitation. Average monthly temperatures range from 25 to 28 °C throughout the year. Diurnal temperature variation is more extreme than seasonal variation, ranging by about 5 °C from day to night. Monthly rainfall varies throughout the year, with a marked shift from rainy to dry seasons. On both islands, rainfall peaks at about 130 mm in October and is at a minimum, about 45 mm, in February. St. Martin's more mountainous interior does afford that island slightly more rainfall at higher elevations than St. Barth receives.

The soils of St. Barth are thin, rocky, dry, and relatively infertile. The native flora is largely xerophytic and agriculture has long been challenging. On St. Martin, owing to the higher elevations and the precipitation that this topography captures, soil layers are thicker and ephemeral streams leave

deep, dry "ghauts" in some valleys, a feature mostly absent from the St. Barth landscape.

5.3 Landforms

5.3.1 General Landscapes

Rather than being dominated by a single volcano, as are several of the islands in the Lesser Antilles (e.g., Saba or Nevis), both St. Martin and St. Barth are characterized by numerous peaks, valleys, and—especially in the case of St. Martin—low coastal plains. Christman (1950) identified two separate mountain chains traversing St. Martin: the larger of which is roughly geographically central on the island, extending from Koolbaai Berg (Cole Bay Hill) in the south to Mount O'Reilly in the north (though perhaps a better origin is at Cay Bay Hill, slightly further south than Cole Bay Hill). This cordillera includes Pic Paradis, the island's highest point of elevation (424 m). Christman's second mountain range is a smaller, southeastern chain stretching from the island's southernmost point, Pointe Blanche, to Les Deux Frères, the two hills that stand behind the southern shore of the Baie de l'Embouchure, on the island's east coast.

Between these mountain chains lies the major valley on St. Martin, which extends from Philipsburg in the south to Baie Orientale in the northeast, then makes a westward traverse of the island, broken only by low hills, across to Grand Case, on the northwestern coast. This western extension of the valley is where the smaller, French side airport is located.

The other major valley on St. Martin begins at the Great Salt Pond and Little Bay on the island's south coast and trends northward. This valley is enclosed on three sides by ridges that converge at the international boundary to form the island's larger mountain chain. The valley, which is located entirely within the Dutch side, contains the villages of Cul-de-Sac and St. Peters.

The Terres Basses peninsula, as the name suggests (at least to Francophiles), is a low-lying area, punctuated by a single rise—Morne Rouge at 52 m. This peninsula, which Schwartz (2010, 303) describes as a "double tombolo," but which could also be seen as a single, large tombolo with a flooded interior, encloses Simpson Bay Lagoon (sometimes spelled *Simson*), the island's largest inland water body (Fig. 5.4). The two isthmuses that frame the bay are low, narrow, and predominantly sandy, though limestone terraces and cliffs may be found on the southern isthmus from Cupecoy to Maho Bay (Fig. 5.5) and on Terres Basses proper from Point Plum to Pointe du Bluff. The cliffs can reach heights of up to six meters, though most are much lower, and occasionally contain erosional features such as arches. The island's international airport is located on the southern spit.

St. Barth is a V-shaped island—others, beginning with Christman (1953, 67) have understandably likened it to a "boomerang"—with three main mountainous areas containing two major valleys and numerous small coastal plains. The westernmost mountainous area is the northwestern, leeward side of the island where peaks remain lower than 200 m but drop precipitously toward the beaches at Flamands, Colombier, and, to some extent, Corossol. The central mountains are found in the south of the island—the point of the V—and form a single complex constituting the foothills of Morne Lurin (192 m), this region's highest peak. The eastern mountains form a semicircle on the island's windward side, hemming in the Grand Fond Valley (Fig. 5.6), which faces the predominant wind and waves of the island's southeast coast. In the eastern portion of this semicircle of peaks is found Morne de Vitet, the summit of which, at 286 m, is St. Barth's highest point.

Between the central and eastern mountainous areas lies the Saline valley, the location of St. Barth's largest site for salt making, now defunct. Between the foothills of Morne Lurin and the mountains on the island's leeward side lies a saddle, the northern slope of which is the site for the island's airport. The airport itself has attained a certain degree of infamy as one of the more difficult landings, certainly in the Caribbean, perhaps in the world. The 650-m runway, short by almost any standard, slopes downhill[1] toward St. Jean Beach, where it terminates mere meters from the waterline (Fig. 5.7).

Around this mountainous skeleton, the island's deeply embayed coastline spreads like a fringe (Fig. 5.8). Eroded tongues of ancient lava flows, shaped by prevailing currents and capped in some places by cemented sediments, laid bare in others, circumscribe the island with an undulating ring of bays and headlands that trap coastal sediment, forming discrete beaches and imbuing a sense of place to each as its own entity.

The St. Barthélemy Channel separates St. Martin to the north and St. Barth to the south by a distance just less than 20 km at its narrowest point. Numerous islets, rocks, and reefs dot this channel, creating convenient anchorages or dangerous hazards, depending upon the attentiveness of the sailor. Two of these islets, Fourchue and Tintamarre, feature interesting geologies and human histories.

Fourchue is a small (roughly 0.5 km^2), uninhabited islet in the St. Barthélemy Channel belonging to St. Barth. This islet is rocky and denuded—the former quality an example

[1]The slope is downhill on the most common approach. Sometimes, though, owing to wind conditions, controllers opt to bring pilots in over the beach, in which case the runway slopes uphill from the perspective of those aboard the landing plane and terminates below a hilltop traffic roundabout on a busy stretch of road.

Fig. 5.4 Aerial view looking north toward Simpson Bay Lagoon, center, framed by its twin isthmuses. Mainland St. Martin is to the *right*; the Terres Basses peninsula is out of the frame to the *left*. The low island in the background is Anguilla. Photograph by D. Fielding

Fig. 5.5 Limestone terraces at Cupecoy on St. Martin. Photograph by R. Fielding

of the region's volcanic history and the latter owing to its resident herd of goats—and is a popular destination for yachters and snorkelers. Historically, the islet has been associated with both pirates and slave traders and occupies a rather liminal space within the historical political geography of St. Barth. As islands often do, Fourchue became a sort of unofficial entrepôt for illicit commodities—including human cargo—that would otherwise have been forbidden (Maher 2013).

Île Tintamarre is a small (0.9 km^2), flat island located 3 km off St. Martin. Politically, it is a part of Saint Martin. Currently uninhabited, Tintamarre is a popular day-trip destination for tourists, who come for its beaches, reefs, and mud bath. The island was once home to a population of more than 100 people and even supported an international airline, the *Compagnie Aerienne Antillaise*, run by the late Rémy de Haenen, a celebrated resident and local official on St. Barth (Casius 2005).

Fig. 5.6 The Grand Fond valley on St. Barthélemy. Photograph by R. Fielding

Fig. 5.7 The runway at Aéroport St-Jean-Gustav III (SBH), recently renamed for Rémy de Haenen, on St. Barthélemy, as seen from an airplane making the most common approach. Baie de Saint-Jean is visible at the end of the runway. Image from Fielding (2014)

According to one mid-twentieth century historian, St. Barth "lacks almost all natural advantages except an excellent harbor" (Ekman 1964a, 17). Indeed, Gustavia does represent one of the best natural harbors in the region (Fig. 5.9), provided the vessel's draft is not too deep. This natural harbor is framed by *La Pointe*, the peninsula on the south, which adjoins the main island at a low saddle beneath the 34-m hill on which Fort Karl formerly stood. The saddle gives way to Shell Beach, one of the more unique beaches on St. Barth.

Shell Beach (*Anse de Grand Galet*) is not made up of pebbles as the French name would imply, but of bivalve and mollusk shells, deposited on the beach by waves after having been dredged from Gustavia harbor. This beach also features large (up to 4 m diameter) boulders of sedimentary rock. Some of this beachrock contains shells that retain their natural color and shape, an indication to one researcher of their young age (Vroman 1968).

The eastern coast of St. Barth, and to a lesser extent, Lorient Bay, exhibits an interesting example of coral

Fig. 5.8 Northeastern view of the undulating St. Barthélemy coastline, including the rocky Petite Anse, Anse des Flamands, and in the distance, Baie de Saint-Jean. Also visible are three offshore islets, from left: Île Chevreau (also called Île Bonhomme), Île Frégate, and Île Toc Vers. The sargassum raft barely shown at the bottom of the image was part of an island-wide presence during the winter of 2014–15 and continuing to the time of this writing (see Hazards section). Photograph by R. Fielding

pavement. The attached reef has colonized nearly the entirety of two bays—Anse de Grand Cul-de-Sac and Anse de Petit Cul-de-Sac, as well as the nearly beachless east-facing coast known as Petites Anses.

5.3.2 Salt Ponds, Baymouth Bars, and Piscines Naturelles

Both islands display several variations of inland saltwater features, both natural and anthropogenic. When circumnavigating St. Martin, one notices the abundance of baymouth bars and salt lagoons contained therein. Perhaps the most prominent are Simpson Bay Lagoon—contained within the isthmuses that connect the main island to the Terres Basses peninsula—and the Great Salt Pond, held back by the baymouth bar upon which the town of Philipsburg, the capital of Sint Maarten, is situated (Fig. 5.10).

On St. Barth, the large salt pond near the eponymous *Anse de Grand Saline* is no longer in operation but stands as a landscape of remembrance to one of the island's major historical industries—salt making (Fig. 5.11). The dryness of this island limited its agricultural potential (and challenges its present, seemingly-insatiable development for tourism) but made it an ideal site for evaporation ponds. The island government has recently begun efforts toward environmental restoration at the site of the former salt pond.

In at least two locations on St. Barth, ancient coastward lava flows have formed natural pools, replenished by breaking waves but otherwise separated from the sea. These sites are known as the Washing Machine, owing to the turbulence caused when large waves enter, and, simply, *Le Piscine Naturelle*, or the natural swimming pool (Fig. 5.12). Both are popular with swimmers, though the former is more accessible than the latter owing to a walking path that does not require the hiker to cross private property.

5.3.3 Caverns

Both islands feature caverns in places where the soft limestone is exposed and susceptible to erosion. Sypkens-Smit (1995) refers to, and includes photographic plates and schematic maps of, caverns at several locations along the Terres Basses peninsula of St. Martin. These caves have yielded important findings related to the paleofauna

Fig. 5.9 Aerial view, facing southeast, of Gustavia, St. Barth, showcasing the natural harbor. Photograph by D. Fielding

Fig. 5.10 Aerial view, looking north, of Philipsburg, Sint Maarten, situated between the Great Salt Pond (Groote Zoutpan) behind the town and Great Bay (Groote Baai) in the foreground. Photograph by D. Fielding

(McFarlane 2013) and human prehistory (Haviser 1991) of the region. Sadly, from the perspective of science, and inexcusably from the perspective of national heritage, one of the more artifact-rich caves on St. Martin was "definitively ruined some hours after the discovery by using explosives and pouring in concrete" by a hotel construction team (Dubelaar 1985: 171). On St. Barth, no artifacts or significant fossils have been reported, but Lenoble et al. (2012) have documented and charted numerous caverns and rock overhangs. These tend to be clustered in the south and east of the island with the greatest concentration among the foothills of Morne Lurin and near the coasts at their bases.

Fig. 5.11 The salt ponds at Saline on St. Barth. Saline Beach (Anse de Grande Saline) is visible between the mountains in the background. Photograph by R. Fielding

Fig. 5.12 The "Washing Machine" on St. Barth. Photograph by R. Fielding

5.4 Heritage and Tourism

5.4.1 History

The standard history of St. Martin is contained in the straightforwardly titled, *History of Sint Maarten and Saint Martin* (Hartog 1981). While dated, this text addresses much of the history of the island before mass tourism began to flourish there, though it does so from a decidedly Eurocentric perspective. Another valuable, locally flavored history is *Beyond the Tourist Trap: A Study of St. Maarten Culture* (Sypkens-Smit 1995), which is, as the name implies, primarily focused on the island's Dutch side.

The best locally produced (and certainly locally flavored) history of St. Barth is Bourdin's *Histoire de St. Barthélemy* (1978), published originally in French with side-by-side English translation. Maher's (2013) text on the linguistic geography of St. Barth provides a surprisingly thorough account of the history of the region, including not only St. Barth and St. Martin, but also St. Kitts, Guadeloupe, and islands further afield. Maher relies heavily upon the work of Per Tingbrand for information about the Swedish period of St. Barth's history.

5.4.2 Colonialism and Politics

Saint Martin/Sint Maarten is famously the "world's smallest binational island" (Schwartz 2010: 302). In response to frequent disputes between the French and Dutch settlements on the island, the 1648 Treaty of Concordia established the first border—altered several times later—between the two sides. While the existence of a border has led to the diverging political structures on the island, the actual border poses no barrier to travel, whatsoever. One would only stop to take a souvenir photograph—never to show a passport. At each point where the road crosses the border, a small marker stands with the French and Dutch flags on either side. The border, of course, does not separate regions of physical geographical difference, nor are the human geographies noticeably different on either side, except in a few minor ways. English is more prevalent on the Dutch side than on the French, but neither side is difficult for a monolingual Anglophone traveler.

St. Barth has been referred to as "history's shuttlecock" (Maher 2013: 29), owing to its back-and-forth transfer, first between the French and British and later between the French and Swedish colonial governments. This volley was not unique to St. Barth, of course, and could describe any number of islands throughout the Lesser Antilles. The near-century of Swedish colonial rule (1784–1878) gave St. Barth the name of its capital, Gustavia (previously known as *le carénage*, simply, "the place where boats are hauled out of the water"[2]), as well as an enduring cultural affinity for the Scandinavian country. St. Barth stands alone as a formerly Swedish Caribbean possession.

5.4.3 Tourism

St. Martin has embraced tourism, to the nearly full exclusion of other industries, since the 1956 economic development plan initiated by the Technical Economic Council of the Netherlands Antilles. According to Hartog (1981), it was this plan that rejected agriculture, livestock, fishing, mining, and industry as viable parts of St. Martin's economic future. During the next decade, the 1960s, several projects were started with the goal of developing the island's infrastructure for tourism. The specific focus was on the airport, water and electricity supplies, roads, and hotels. Today Sint Maarten—and to a lesser extent, Saint Martin—widely embraces tourism. The port in Philipsburg is equipped to handle multiple large cruise ships simultaneously. Princess Juliana International Airport is one of the busiest in the region and one of the few that can accommodate large, long-haul jets. The island hosts over one million visitors per year and offers resorts, casinos, tours, and watersports for activity-seeking tourists.

Tourism on St. Barth is of a different character than tourism on St. Martin. While the industry has its start at roughly the same time period, the mid-twentieth century, the current status is quite different. Maher (2013) traces the beginning of tourism there to the arrival of David Rockefeller in 1958. After Rockefeller bought property on the

[2]Technically speaking, the town is called Gustavia and the port was called *le carénage*. The earliest evidence of the distinct identities of the port and the town is from a March 24, 1788, report to Stockholm from Johan Norderling, a Swedish judiciary, who wrote, "The Carénage (one portion of the harbor of Gustavia) is above all else unceasingly beautiful; I never refrain from admiring it" (cited in Ekman 1964b: 8). There remains some confusion about the Le Carénage/Gustavia distinction within the popular press today. For example, one tourist book states that "the town of Carénage was renamed Gustavia in honor of the Swedish king" (Didcott and Didcott 1997: 7). The actual situation seems to be that there was no proper town near the port until Sweden took possession of St. Barth and built up the harbor area. Thus, the name *Gustavia* and the town itself emerged simultaneously at or near the site of the port, which had been—and for a while continued to be—known simply by its descriptor, *le carénage*. Maher's (2013) history supports this interpretation, as do certain earlier documents, for example, a periodical from 1800, which first refers to "Le Carenage, near which stands Gustavia, the sole town in the colony," and later states that "Le Carenage had no town belonging to it before the island was in possession of Sweden" (Anonymous 1800: 68). Today, the port is officially called the Port of Gustavia (*Port de Gustavia*) and still "looks as if it had been drawn by a child asked to sketch an ideal harbor" (Ekman 1964a: 224).

island and built a vacation home, other wealthy foreigners—first Americans, then Europeans—began to follow suit. By the end of the 1970s, the economy of St. Barth had been thoroughly transformed from the agrarian and maritime character of the past to one wholly focused upon tourism. Despite the single focus on one sector, tourism development has been strictly regulated on St. Barth. While many environmental activists, scholars, and journalists decry the saturation of the island's roadways with cars, its slips with yachts, and its beaches with villas and guesthouses, the trend in St. Barth remains one focused on luxury, rather than mass, tourism. Hotels remain small, both in physical size and number of guest rooms allowed in each. Prices remain high, compared to other Caribbean islands, and the port in Gustavia cannot accommodate large cruise ships (although ships do occasionally anchor offshore and transport tourists to St. Barth via tender). The wealthy clientele whose presence on St. Barth precipitated the island's tourism development have continued to constitute its target market even as the island is "discovered" by a more middle- to upper-middle-class tourist set. Still, according to Cousin and Chavin (2013: 188), the touristic appeal of St. Barth continues to be based upon its "insular exclusiveness, tropical exoticism, French refinement, and Euro-American cosmopolitanism."

5.5 Hazards

Both islands are vulnerable to hazards that might cut off their supply of imported resources. St. Barth, especially, is dependent upon imports for much of its subsistence. With no fresh surface water or groundwater, St. Barth has long been vulnerable to drought. Despite the waste-to-energy powered desalination plant, in operation since 2001, fresh water on St. Barth remains in short supply (Fielding 2014). Additionally, the fuel for the incinerator—municipal and industrial solid waste—is primarily obtained through imports in the form of consumer goods and packaging. Any hazard, such as a hurricane, that disrupts the importation of these goods would also threaten the fuel supply for the desalination plant.

5.5.1 Hurricanes

The location of St. Martin and St. Barth in the northern Lesser Antilles places the islands within the path of tropical cyclones. According to analysis by Caron (2011, 192), both islands have been "flooded" by five storm surge waves, produced by Category 4 or 5 hurricanes since 1851. The eye of a storm need not pass directly overhead to cause substantial damage. Hurricane Omar, as cited by Caron (2011), passed 100 km north of St. Barth—thus, at least 70 km north of St. Martin—and still resulted in major damages to both islands. Damage from hurricanes includes both the destruction of infrastructure and the erosion of coastlines.

5.5.2 Earthquakes and Tsunamis

While neither St. Martin nor St. Barth sits on a known fault line, the nearby seismic zones off Puerto Rico and further south, in the Windward Islands, are known to produce earthquakes that can cause tsunamis. Caribbean volcanoes are also rarely, but powerfully, tsunamigenic. Despite the multitude of potential causal events, such as earthquakes, terrestrial volcanic eruptions, submarine volcanic eruptions, and landslides, both in the region and further afield, tsunamis in the Caribbean are rare. One team of researchers analyzed the data and historical descriptions related to 91 extreme wave events that occurred throughout the Caribbean region between 1498 and 2000 and determined that between 27 and 36 of these wave events represented true tsunamis (Lander et al. 2002). Of these, only one is definitively known to have caused damage on St. Barth and St. Martin: the November 18, 1867, tsunami caused by a 7.5-magnitude earthquake with an epicenter located between St. Croix and St. Thomas in the Danish West Indies—now the US Virgin Islands (Zahibo and Pelinovsky 2001). An earlier teletsunami, generated across the Atlantic in 1755 by an earthquake near Lisbon, Portugal, caused a 4.5-m wave on St. Martin. Though no specific effects were recorded from this tsunami, one author states that "lowlands on most other French islands were inundated," indicating the possibility of flooding and damage on both St. Barth and St. Martin (Lander et al. 2002, 64).

5.5.3 Nearshore Development

Both islands display frequent tourism-oriented development in close proximity to the shore. Perhaps this is best epitomized by Princess Juliana International Airport (SXM) and the famous Maho Beach on Sint Maarten. This west-facing, 320-m-long beach is situated directly across a two-lane street from the base of the airport's only runway. Because of SXM's role as a regional hub—one of the few airports in the Lesser Antilles that receives trans-Atlantic flights—large airliners regularly approach low over the beach, which is open to the public. The low-flying jumbo jets have become a major tourist attraction in their own right (Fig. 5.13). The spectacle notwithstanding, the proximity of the airport to the beach, serves to highlight the issue of coastal development and its exacerbation of both islands' vulnerability to a host of hazards including coastal erosion, storm surge from

Fig. 5.13 A KLM 747, arriving from Amsterdam, approaches Princess Juliana International Airport over Maho Beach for landing. Photograph by D. Fielding

hurricanes, tsunami, and perhaps most insidious—sea level rise due to climate change.

5.5.4 Sargassum

While not a hazard to life or property per se, the recent influx of sargassum seaweed (*Sargassum natans* and *S. fluitans*) has certainly been hazardous to both islands' tourism-based economies. This issue is by no means restricted to St. Martin and St. Barth. Rather, it has affected nearly all the islands and mainland beaches in the Caribbean basin. While some amount of sargassum has always been present in the waters and on the beaches of the Caribbean, 2011 saw an unprecedented increase in its quantity. This influx was repeated in 2014 and 2015, owing to the right combination of sea-surface temperatures, nutrient availability, and ocean currents bringing sargassum from its blooming sites in the Atlantic into the Caribbean (Doyle and Franks 2015). The sargassum problem is one of overabundance. A small amount of the plant is beneficial as habitat for marine fauna while at sea and performs services of beach nourishment and shoreline stabilization onshore (Doyle and Franks 2015). In larger quantities, however, the associated odor, insects, and unsightliness of sargassum on beaches, along with the risk of damage to fishing gear and boat motors, tend to outweigh the plant's natural benefits. While innovative uses for sargassum are being tested—including use as a fertilizer, animal feed, or dune stabilizer—most efforts in the Caribbean, including on St. Martin and St. Barth, focus on techniques for its speedy removal from beaches frequented by tourists. In St. Martin, this effort is primarily the responsibility of beachfront resorts, while in St. Barth the municipality manages the removal of sargassum from popular beaches.

5.6 Conclusion

St. Martin and St. Barth are exemplary forms of Lesser Antillean geography, both human and physical. While both lie within the outer, limestone arc, evidence of past volcanism remains on the surface or just below. The beaches, mountains, bays, and vegetation are typical of the region but

perhaps somewhat more concentrated here, owing to the islands' small areas. Each island also reflects the history of European colonialism in the Caribbean—Saint Martin/Sint Maarten has its famous international border and St. Barth, as "history's shuttlecock" (Maher 2013, 29), has its history of European power shifts woven into its very fabric. While the climatic and tectonic processes that shaped the islands are still evident in the form of natural hazards, tourists continue to arrive—along with their attendant infrastructural growth and development—drawn by the densely packed variations in human and physical geography present on these small, lovely islands.

Acknowledgements Fieldwork that directly contributed to the completion of this chapter was supported by the Faculty Research Grants program at the University of the South. Other fieldwork, which helped acquaint the author with these islands through research on other topics, was funded by the University of Denver's Internationalization Grant program and the American Geographical Society's Bowman Expedition Fund. Finally, special thanks to my wife, Diane Cooper Fielding, who accompanies me in the field often, but most recently (and memorably) to the islands discussed in this chapter while eight months pregnant. Figures 5.4, 5.7, 5.9, 5.10, and 5.11 are hers.

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