
Cabo de La Vela (“La Vela” Cape) and Surroundings

2

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Abstract

The Cabo de la Vela is located in the Guajira peninsula, in the northernmost Colombia and NE from the Sierra Nevada de Santa Marta, the highest coastal massif in the world (5775 m). It lies in the southern border of the Caribbean tectonic plate, where the relative movement of the plate was responsible for the generation, rotation, and translation of basins and tectonic blocks north of Colombia; one of these blocks is the Jepirra Ridge, to which the La Vela Cape belongs. Before the Campanian, a subduction zone may have formed together with an intra-oceanic arc, represented now by the La Vela Cape; it became a back-arc and then an arc toward the end of Campanian (~74 Ma), when ultramafic rocks, gabbros, and andesitic dykes formed and were exhumed. From a structural and geomorphological standpoint, the Guajira consists of a broad coastal plain, interrupted north of the Oca and Cuisa Faults by isolated ridges. This results from the evolution of a marine platform, which, from the end of Oligocene to the Pliocene, was flat and stable, interrupted only by islands formed by the Jarara, Macuira, Cosinas, and Carpintero (including Jepirra) Ridges. As a result of Quaternary morphodynamic processes active on the emerged terraces, the great plain gave rise to the present erosional and depositional landforms, which are still under the influence of active processes.

Keywords

Cabo de la Vela • Guajira • Coastal environment • Dunes • Subdesertic environment

2.1 Location

The La Vela (The Sail) Cape is located in the Guajira peninsula, in the northernmost Colombia (N 12°12'20", W 12°10'23"). It belongs to the Jepirra Ridge, which—together with the Carpintero, Macuira, Jarara, and Cosinas Ridges—stretches in the northern part of the peninsula (Fig. 2.1).

It can be reached by road from Santa Marta (a 7 h drive) or Riohacha (a 3 h drive). Both cities are attended by regular

airlines flying to Bogotá and other Colombian cities. Recommended itineraries can be found at the end of this chapter. La Vela Cape is called Jepirra (meaning the sacred place, where the spirits of the dead go) by the Wayúu Indians, who occupied the territory much before the Spanish conquest.

2.2 Regional Aspects

The Guajira Peninsula is located NE from the Sierra Nevada de Santa Marta, the highest coastal massif in the world (5775 m a.s.l.). It is limited by two faults: the Oca Fault (E–W) and the Santa Marta-Bucaramanga Fault (N–S) and the Cesar Rancherías valley at the southeast (IGAC 2009).

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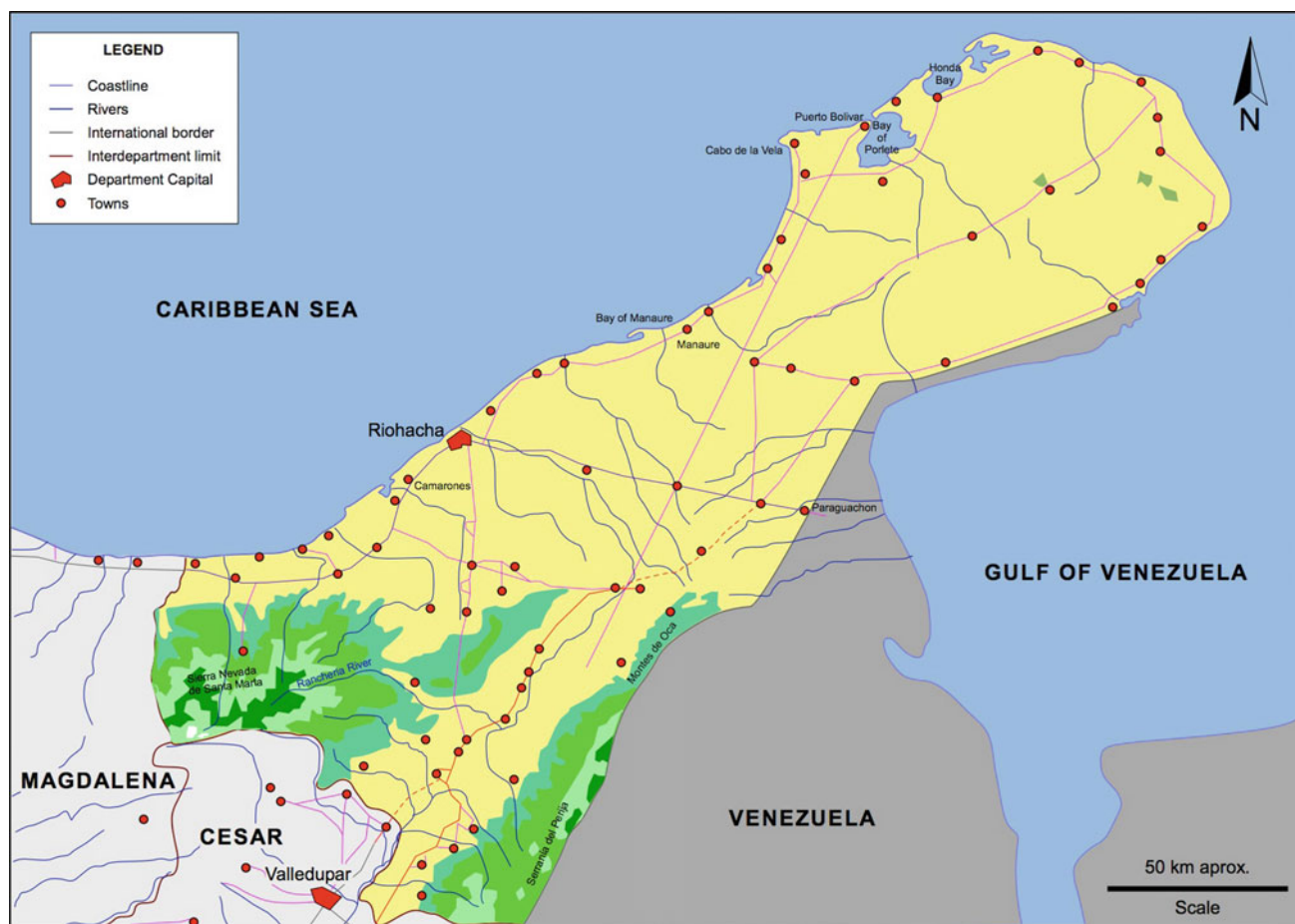


Fig. 2.1 The Guajira Peninsula

The Guajira Peninsula itself is usually divided into two parts: Baja (low) Guajira, the southern part bordering with the Sierra Nevada and the Alta (upper) Guajira, located north of the Rancheria River. The first receives annual rainfalls of 1250 mm and has temperatures of about 27 °C. The second is quite arid, with average rainfall of 150 mm/year, temperatures of 32 °C, and dominant trade winds blowing from NE, with speeds reaching 40 km/h (IGAC 2009). The La Vela Cape receives an average of 339 mm of rain per year. The plain is cut by several morphostructural ridges, such as Macuira, reaching 870 m a.s.l. at the Palúa Mount, covered with humid forest above 550 m a.s.l., which captures humidity directly from the atmosphere, a unique feature in Colombia (IGAC 2009), and the Carpintero Ridge, 200 m.a.s.l., which on the coast becomes the La Vela Cape, characterized by its cliffs. Jarara, Cosinas, and Simarua are other ridges similar to Macuira, but without forest cover (Guerra 2003) (Fig. 2.1).

The region has five main urban centers (Table 2.1) and smaller villages, with a total population of almost 650 000 inhabitants, of which 50 % are native indigenous, mainly from the Wayúu ethnic group (IGAC 2009).

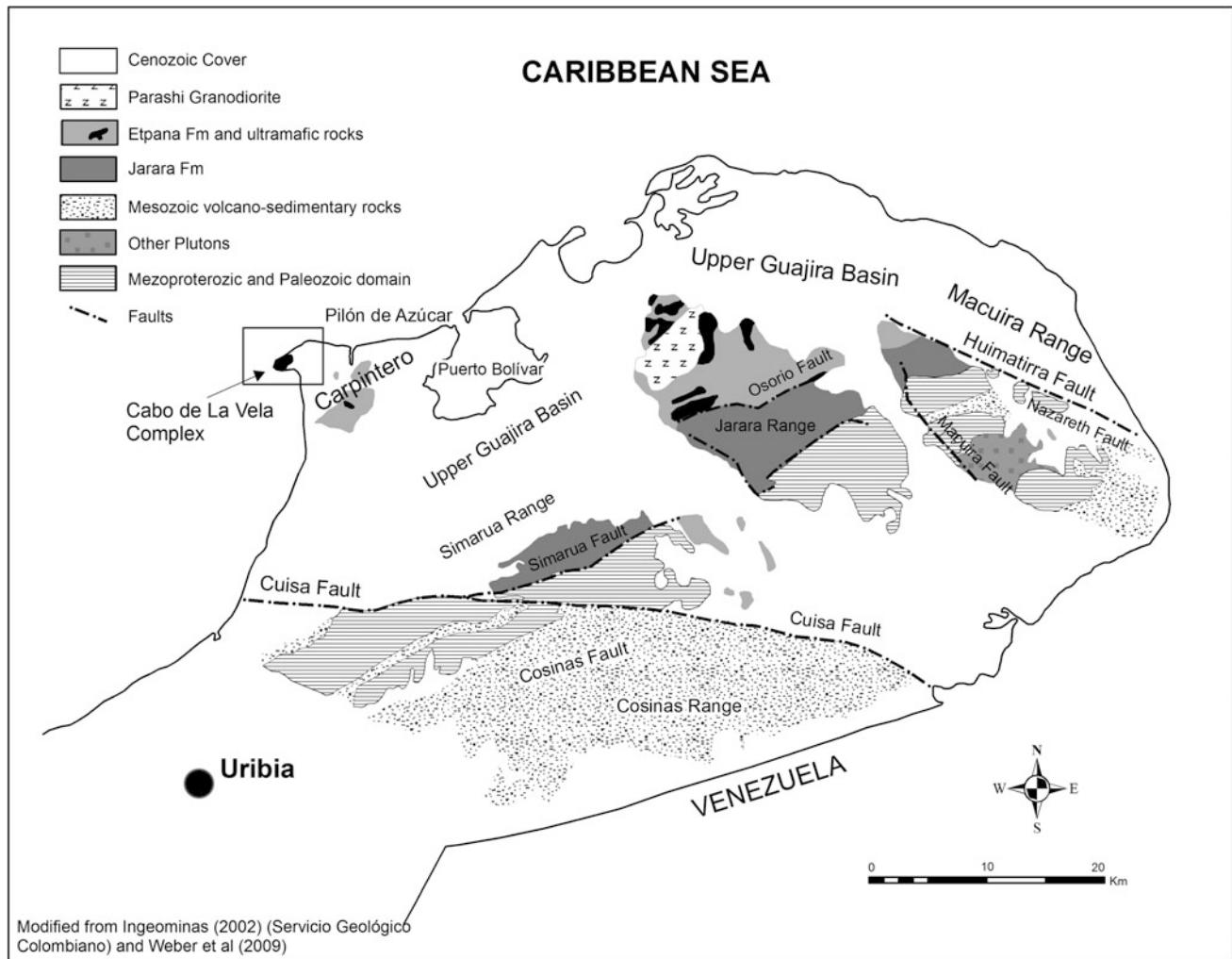
2.3 Geology

The La Vela Cape lies in the southern border of the Caribbean tectonic plate, north of the Oca fault (Nova et al. 2011), where some isolated structural blocks were uplifted; one of these blocks is the Jepirra Ridge, to which the La Vela Cape belongs (Figs. 2.2 and 2.3).

The evolution of the La Vela Cape area is bound to the change in tectonic trend, which occurred during Jurassic–Lower Cretaceous, when the proto-Caribbean oceanic crust was generated during the separation of the North and South America plates (Weber et al. 2009). The relative movement of the Caribbean Plate was responsible for the generation, rotation, and translation of basins and tectonic blocks north of Colombia. Before the Campanian, a subduction zone may have formed together with an intra-oceanic arc, represented now by the La Vela Cape. It became a back-arc and then an arc toward the end of Campanian (~74 Ma), when ultramafic rocks, gabbros, and andesitic dykes were formed and exhumed. (Fig. 2.4).

Table 2.1 Guajira Municipality Population (*Alcaldía Municipal* of Dibulla (2012), *Alcaldía Municipal* of Riohacha (2012), *Alcaldía Municipal* of Manaure (2012), *Alcaldía Municipal* of Maicao (2012), *Alcaldía Municipal* of Uribia (2012))

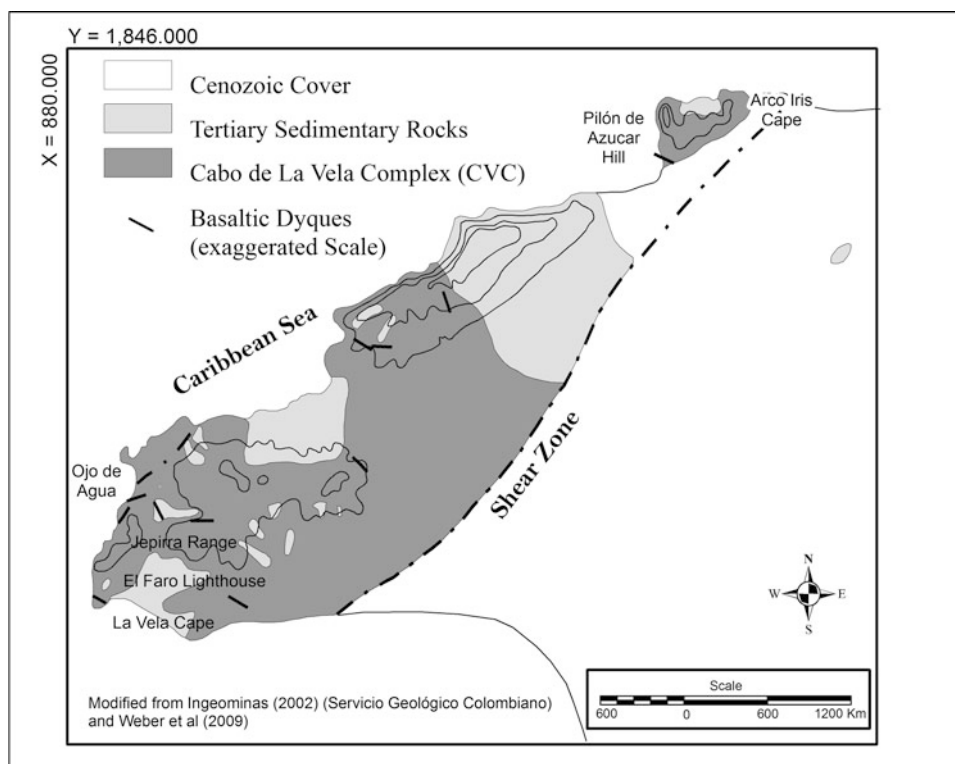
Municipalities	Total population	Urban population	Indigenous population (%)
Dibulla	29.446	4.761	33
Riohacha	222.354	186.733	26
Manaure	92.232	37.999	68
Uribia	156.496	11.071	95
Maicao	148.427	101.567	26

**Fig. 2.2** Geologic map of the Guajira Peninsula

Associated with this evolution, the Etpana Formation was formed in place of the rift zone, while the Jarara Formation originated near the arc. During the Late Cretaceous and Paleocene, the proto-Caribbean Plate and the South American passive margin collided, and subduction of the former under the latter began (Hernandez et al. 2003; Cardona et al. 2007; Weber et al. 2009). During Paleocene and Early Eocene, sedimentation did not occur (IGAC 2009). During

the Eocene, shallow marine sedimentation began in the Guajira, depositing marine to continental sedimentary sequences (Chicangana 2011). The Cuisa Fault began to displace the Alta Guajira block from the Sierra Nevada-Baja Guajira block. During the Oligocene, the Guajira Peninsula started its northeastward translation, which could explain its present geographical position, despite having been formed tens of kilometers away (Hernandez et al. 2003) (Fig. 2.4).

Fig. 2.3 Geologic map of the Cabo de la Vela area



Weber et al. (2009) called “La Vela Cape ultramafic complex” the rock assemblage which includes principally serpentinized ultramafic rocks, gabbros, and andesitic dykes and forms low hills, sometimes covered by Cenozoic sediments and separated by extensive plains formed on other Cretaceous rock massifs, which apparently present some similarities (Ingeominas 2002). The Etpana and Jarara Formations are associated with these rocks, both from chronological and geological standpoints (Weber et al. 2009).

Ultrabasic rocks are mainly serpentinites. Gabbros occur as small lenses in serpentinite bodies, which are coarse grained to pegmatitic and, as serpentinites, show foliation, banding, and polygonal granoblastic texture, characteristic of high-temperature crystallization. Hornblendites are found near the borders of gabbro dykes or in serpentinites (Cardona et al. 2007; Weber et al. 2009). These mineral assemblages suggest that these rocks were formed under greenschist and pumpellyite-prehnite facies (Weber et al. 2009). Mafic volcanic dykes cross the other rocks and show thicknesses of up to 2 m. They possibly consist of basalts, andesites, and phaneritic to small-grained aphanitic, with a green to greenish-gray color and porphyritic texture (Weber et al. 2009).

The Etpana Formation is a Cretaceous low-grade meta-volcanic-sedimentary body, consisting of phyllites, greenschists, serpentinites, gabbros, and rodingites intruded by the Parashi Stock, which consists of quartz diorites and porphyritic rocks (Zapata et al. 2010). It is unconformably

overlain by Palaeogene–Neogene conglomerates (Ingeominas 2002). The Jarara Formation is formed by phyllites, which grade into muscovite schists, chloritic schists, metamorphosed quartz, and locally quartzites, gneisses, and hornblende rocks. Its contact with the Etpana Formation is faulted in the Jarara Ridge, along the inverse Osorio Fault, and it is overlain unconformably by Paleogene and Neogene sediments (Ingeominas 2002).

Cenozoic Macarao, Siamana, Uitpa, Mongui, and Castillete Formations, the latter bordering the La Vela Cape shore, were deposited during a transgressive–regressive marine cycle between the end of Eocene and part of Oligocene. Tectonic activity interrupted sedimentation and is expressed by small folds, faults, and unconformable contacts between the Macarao and Siamana Formations. Sedimentation was interrupted again at the end Pliocene due to the beginning of Andean orogeny; in north of the Oca Fault, sedimentary units were slightly folded and the platform was lifted several meters above sea level (Ingeominas 2002).

Quaternary deposits which cover these formations include thick to very thick deposits of materials mainly derived from the surrounding ridge erosion and were considered by Ingeominas (2002) as partially erosional and depositional terraces formed during the Pliocene and Pleistocene. Alluvial plain deposits consist of gravels, sands, and clays in variable proportions and in part of Aeolian deposits, cover flat, sunken areas (Ingeominas 2002; Khobzi 1981). Aeolian sands, which cover large areas of the Guajira

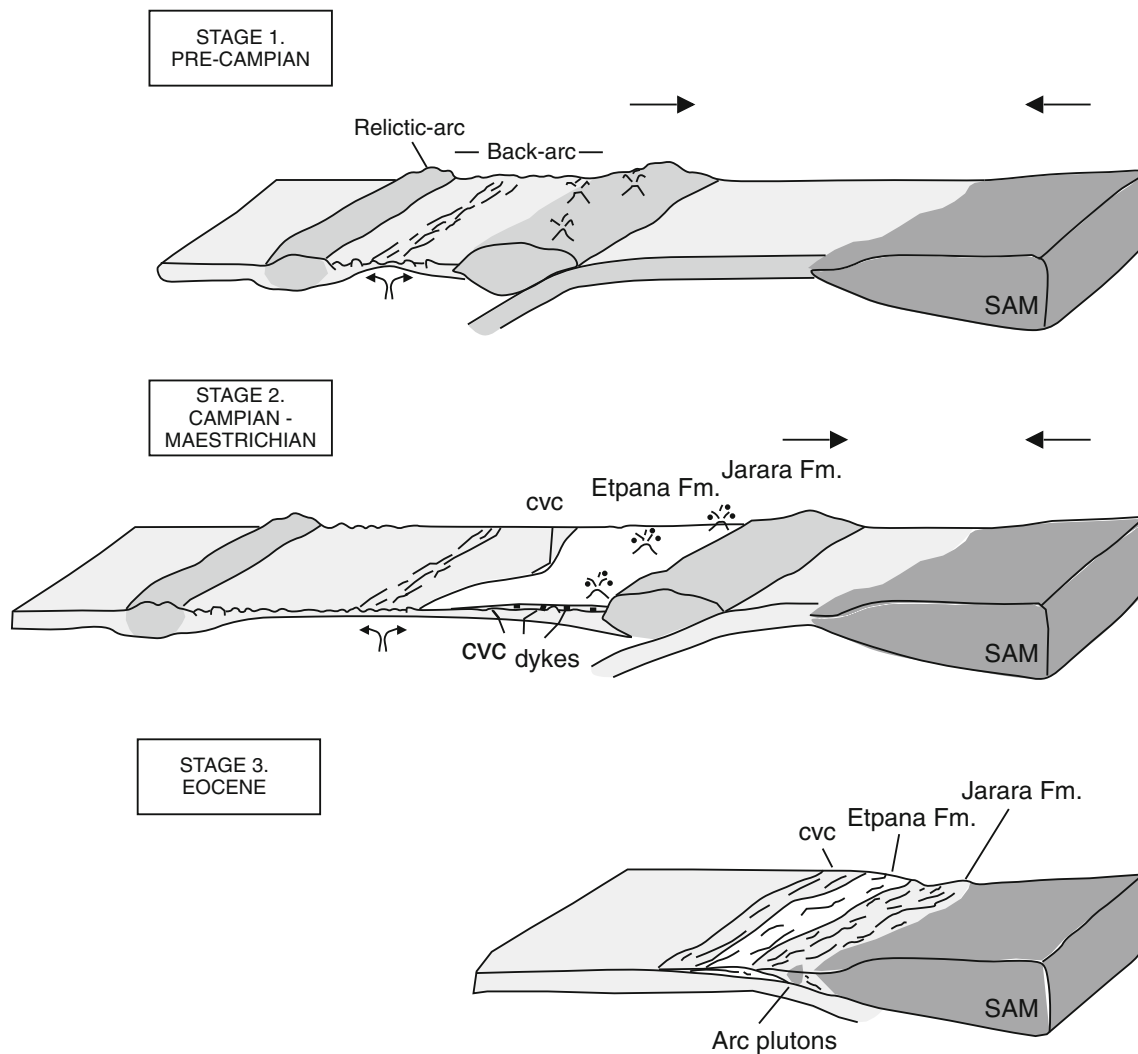


Fig. 2.4 Tectonic evolution

Peninsula and which in Alta Guajira cover the N–NE slopes of the ridges, have been interpreted as products of a large plain stretching in the N–NE coast, as a consequence of a Pleistocene marine regression (Ingeominas 2002). Beach and coastal deposits, as well as alluvial bed deposits, are also widely distributed (Fig. 2.5).

From a structural standpoint, the Guajira peninsula is located north of the Oca Fault, which together with Cuisa Fault, located northward, belong to the same E–W fault system that cuts an older N–NE regional trend, and caused vertical and eastward movements of the blocks which make the different ridges of the peninsula (Ingeominas 2002).

The EW Cuisa fault stretches for more than 80 km and separates pre-Mesozoic Cretaceous metamorphic rocks and Cenozoic sediments of the northern block from pre-Mesozoic Cretaceous metamorphic rocks and Mesozoic sediments from the Cosinas area. It is covered by Oligocene

sediments in the west and by recent materials in the east. Ingeominas (2002) suggests two kinds of movement: a right-lateral strike, with a displacement of 28 km, and another along the dip, which uplifted the southern block with respect to the northern one.

2.4 Geomorphology

In north of the Sierra Nevada de Santa Marta, the Guajira consists of a broad coastal plain, interrupted north of the Oca and Cuisa Faults by isolated ridges (Fig. 2.2). This pattern results from the evolution of a marine platform, which—from the end of Oligocene to the Pliocene—was flat and stable, interrupted only by islands formed by the Jarara, Macuira, Cosinas, and Carpintero (including Jepirra) Ridges. These islands acted as wave breakers and enabled



Fig. 2.5 Alluvial deposits. *Photography Michel Hermelin*

development of reefs and sedimentation in a relatively quiet sea and a stable tectonic environment (Ingeominas 2002). As a result of morphodynamic processes which were active during the Quaternary on the emerged terraces, the great plain gave rise to the present erosional and depositional landforms which are now under the influence of the active processes (Fig. 2.6).

The coastal zone is flat or slightly undulated and consists of Cenozoic sedimentary rocks partially covered by Aeolian deposits (dunes) (Figs. 2.7 and 2.8) and alluvial and marine deposits (beaches, bars, lagoons). It is cut by numerous streams, most of them were seasonal. Altitudes do not exceed 100 m a.s.l. Sands were originated by the erosion of the sedimentary beds during a drier period, prior to river and creek cutting (IGAC 2009). Sea level lowering during the Pleistocene uncovered large plains in the N–NE coast, which supplied sand that is now stored in the northern ridges.

Dune fields, mainly parabolic, are found along the coastline, in the salt flat areas, and along the valleys between ridges (Ingeominas 2002); they can be clearly observed on the NE slopes of La Vela Cape or limited by alluvial plains. Their distribution obeys to bioclimatic rather topographic factors; the principal orientation is 63° NE, related with trade winds, which have conserved the same orientation at least

since the beginning of Holocene, as evidenced by old and recent dunes (Khobzi 1981). These dunes exist together at Arco Iris (Rainbow) Point and Pílon de Azúcar (Sugar Loaf) and may reach heights ranging from centimeters to meters. Emerging dunes are very common on the plain, and their distribution may cause partial vegetation burial. The extensive development of dune systems in the area around the La Vela Cape might be an indicator of dryer climates during Holocene, perhaps associated with lower sea level. Slightly more humid phases could explain the presence of certain types of soils. Dune sands are quartz, possibly because the original carbonates dissolved after the formation of soil related to marine regression.

Alluvial valleys related to the Rancheria River watershed include many wadis capable of producing erosion and transport during rainfalls. The first part of the road to La Vela Cape follows one of the wadis; a thin-stone desert pavement in formation can be observed in its walls and a crust several millimeters thick covers the soil (Fig. 2.9). The wadis dissect the soil forming channels which may reach a width of four meters (IGAC 2009). Deep incisions of the wadis form terraces, which were carved in the recent alluvial and aeolian deposits but also in Paleogene and Neogene sedimentary formations. Two levels have been identified.

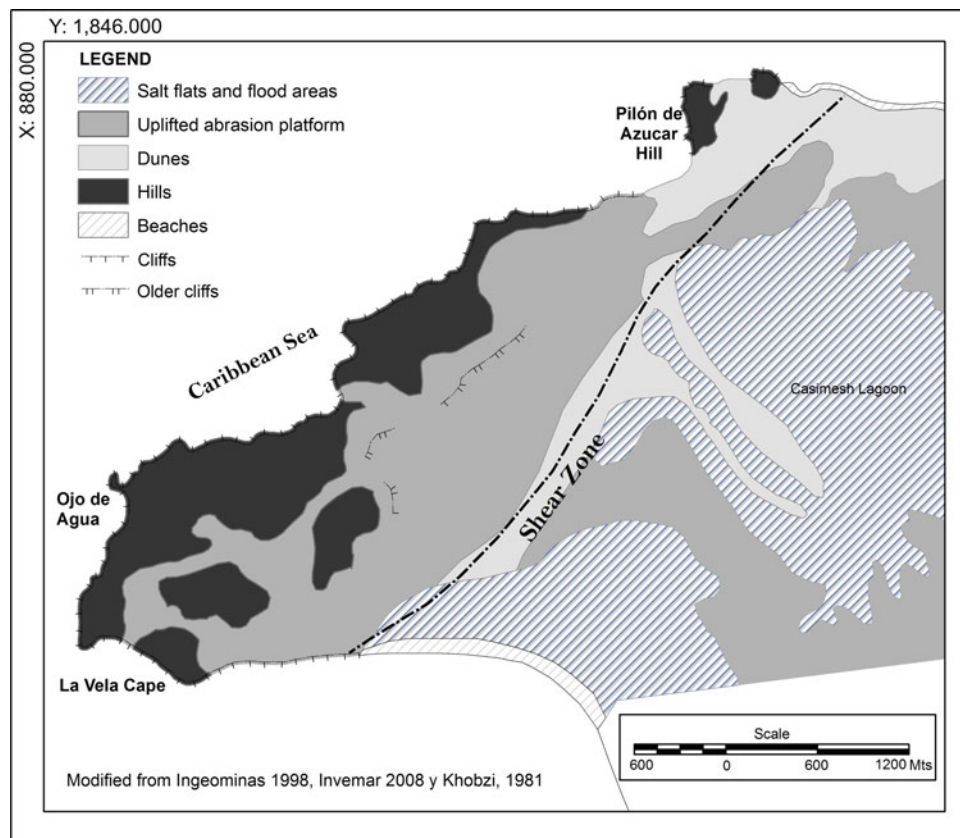


Fig. 2.6 Local geomorphological map of the Cabo de la Vela site



Fig. 2.7 Dunes. *Photography Michel Hermelin*



Fig. 2.8 Vegetated dunes, in the ore ground, desert pavement. *Photography Michel Hermelin*

Floodplains, which include salt flats, are extensive; following the rainy season, water evaporates or drains very slowly due to poor soil permeability. The Kasimesh Lake, around the Vela Cape, is considered by Khobzi (1981) a sebkha and has a considerable extension during rainy periods, while during dryer periods, the most of its area is a sebkha.

Bars, beaches, lagoons, salt flats, and dunes form along the coastline. Beaches measure from 2 to 15 m in width approximately, formed of terrigenous and biogenic sands, and also of quartz, feldspars, oxides, and rock fragments from neighboring rocky formations and shell fragments. Locally, longitudinal dunes cover the back beach. Beach barrier systems with widths reaching tens of meters can be observed behind the beaches. They are used to build houses; behind the barriers are flood areas with salt flats and lagoons, and coastal dunes reach height of 3 m and show no vegetation.

Ridges

The coast around La Vela Cape is characterized by rocky points, bays, and small islands associated with the Japira Ridge, commonly considered as part of the Carpintero Ridge. La Vela Cape (Figs. 2.10 and 2.11) and Pilón de Azúcar (Sugar

Loaf) (Fig. 2.12) are small mounts formed on ultramafic rocks, which show terraces and old reddish dunes, pediments, and uplifted abrasion platforms related to recent sea level changes (Holocene thermal optimum, Ingeominas 2002; IGAC 2009; *Alcaldía Municipal Uribia of 2012*). Gullies produced by seasonal wadis are common on deeply weathered rocks, with scarce vegetation mounds and high slopes.

A good example of abrasion platform can be seen at the Arco Iris Point, NE of Pilón de Azúcar. It lies about 4 m a.s.l. and was formed from sedimentary rocks of the Castillete Formation, consisting in fossiliferous limestones resistant to erosion, intercalated with slightly compacted calcareous sandstones (*Alcaldía Municipal of Uribia 2012*). The upper part of this sequence apparently corresponds to beach rocks, as deduced from its composition of sands, typically found in beaches, its slight seaward dip, its low angular lamination, and lapiez-type erosional relief. It would coincide with the shallow marine environment origin attributed to this formation. In the Pilón de Azúcar lower slope, several older reddish dunes occur, some protected by vegetation and other partially destroyed, and undulated to flat areas are covered by desert pavement (Fig. 2.13).



Fig. 2.9 Desert pavement. *Photography Michel Hermelin*



Fig. 2.10 La Vela Cape looking toward SW. The old lighthouse is visible. *Photography Michel Hermelin*



Fig. 2.11 La Vela Cape. *Photography oriented toward NW, Michel Hermelin*



Fig. 2.12 Pilon de Azucar, a promontory formed of ultramafic rock. *Photography Michel Hermelin*



Fig. 2.13 Vegetation. Photography Michel Hermelin

2.5 Vegetation and Land Use

The La Vela Cape lies in the life zone called “subtropical desert scrub” (Holdridge 1967), characterized by low vegetation cover with cactus and spiny bush scrub. Isolated bushes with rounded crowns oriented by the wind are dominated by *trupillo* (*Prosopis juliflora*) and giant cactus (*Lemaireocereus griseus*). In a lower proportion, *dividivi* (*Caesalpinia coriaria*) and *palo verde* (*Cercidium praecox*) are found. Tuna (small cactus, *Opuntia wentlandi*) is the most aggressive species during colonization of degraded areas due to overgrazing. Species like *Sesuvium portulacastrum*, *Heterostachys ritteriana*, *Batis maritima*, *Philocene vermicularis*, *Lycium tweedii*, and *Castela erecta* occupy recent dunes, while salt flats have no vegetation. When soils are sandy, a homogeneous community of *Castela erecta* grows sometimes in combination with other species such as *Jatropha gossypifolia* (IGAC 1978 in Alcaldía Municipal of Uribe 2012) (Fig. 2.13).

In the Carpintero Ridge, vegetation is also very scarce. Near wadis, small trees such as *trupillo*, *palo verde*, *dividivi*,

and *guamacho* remain green even during the dry season. Land use is reduced to extensive grazing by small flocks of goats and sheep. Agriculture is practically absent and food is brought from Venezuela and other regions of Colombia.

Fishing activity has been carried out by industrial fishing fleet. Artisanal extraction of marine salt, gypsum, and talc exists; pearl fishing was an important activity at the beginning of the colonial time (IGAC 1978 In Alcaldía Municipal of Uribe 2012).

2.6 Cultural Aspects

The northern Guajira (Alta Guajira) is a territory belonging to the Wayúu community, characterized by its strong ties to traditions, a social organization based on family clans, and a high dispersion in the territory. They live on grazing and fishing activities; water is scarce and health conditions are precarious; education is limited and electricity exists only in large population centers. They speak their own language (Wayuunaiki).

Wayúus proceed from a pre-Colombian society of food collectors without chiefdoms, which is now divided into fishermen and cattle raisers. The organization is based on matriarchy: family tradition is transmitted by women. They live in small groups of houses (*rancherías*, *pichipala*) with communal water wells and cemetery.

Wayúus believe in a supreme being, *Maleiwa*, the Creator, together with secondary gods. Several places have a special significance, like Jepirra, a ridge in the La Vela Cape, which is considered sacred because this is where the Wayúu souls rest. In this place, Wayúus may live and goats may graze, but the land cannot be sold and white people cannot live there. A *Wayúu* dies twice: the first when death occurs, the soul is liberated from the body and lives in Jepirra; then he dies for the second time 5 or 6 years later, and the body remains are exhumed and carried to the cemetery of the locality where the deceased was born. Then the soul starts its definitive travel through the cosmos toward the Milky Way, signaled as the Dead Way (EPM 2002).

2.7 Further Recommendations

In the Guajira Peninsula, secondary roads are sometimes poorly defined and road signals are scarce. The best way to reach Cabo de la Vela is through a travel agency in Riohacha, which will provide a four-wheel-drive vehicle with a native driver and arrange lodging and food at one of the “hotels” in the village. Magnificent sunsets can be observed from the Cape and it is worth spending the night there.

The Tayrona National Natural Park is located 10 min by car from Santa Marta. It offers spectacular beaches made of white sands, many of them dangerous for swimmers due to strong waves and currents. The beaches alternate with rocky shores consisting of enormous granitic blocks forming tors, which deserve a visit. Interesting archeological remnants can be visited at *Ciudad Perdida* (Lost City) located in the Sierra Nevada slopes. Excursions lasting 5–6 days can be organized from Santa Marta or Bogotá. With clear weather, the road from Riohacha to Santa Marta offers a magnificent view of the Sierra Nevada de Santa Marta. The best time is during the early morning hours.

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<http://www.springer.com/978-3-319-11799-7>

Landscapes and Landforms of Colombia

Hermelin, M. (Ed.)

2016, XXIII, 219 p., Hardcover

ISBN: 978-3-319-11799-7