

# Point of Geological Interest: Reserva de Tauá

## Sea-level fluctuation throughout the Geologic Time

Throughout the Geologic Time, Earth has undergone many sea-levels rises and falling downs (Figures 1 and 1a). Sea Levels above the present one, verified during the Quaternary, can be identified by the recognized of ancient coast lines (ancient beaches, which limited continent and oceans). These are, indices of relative sea-level through the Geologic Time, resulted of a balance between the global and actual sea-level changes (eustasy) and the changes of the crust level (tectonism, isostasy and sedimentary influx) - Figure 2.

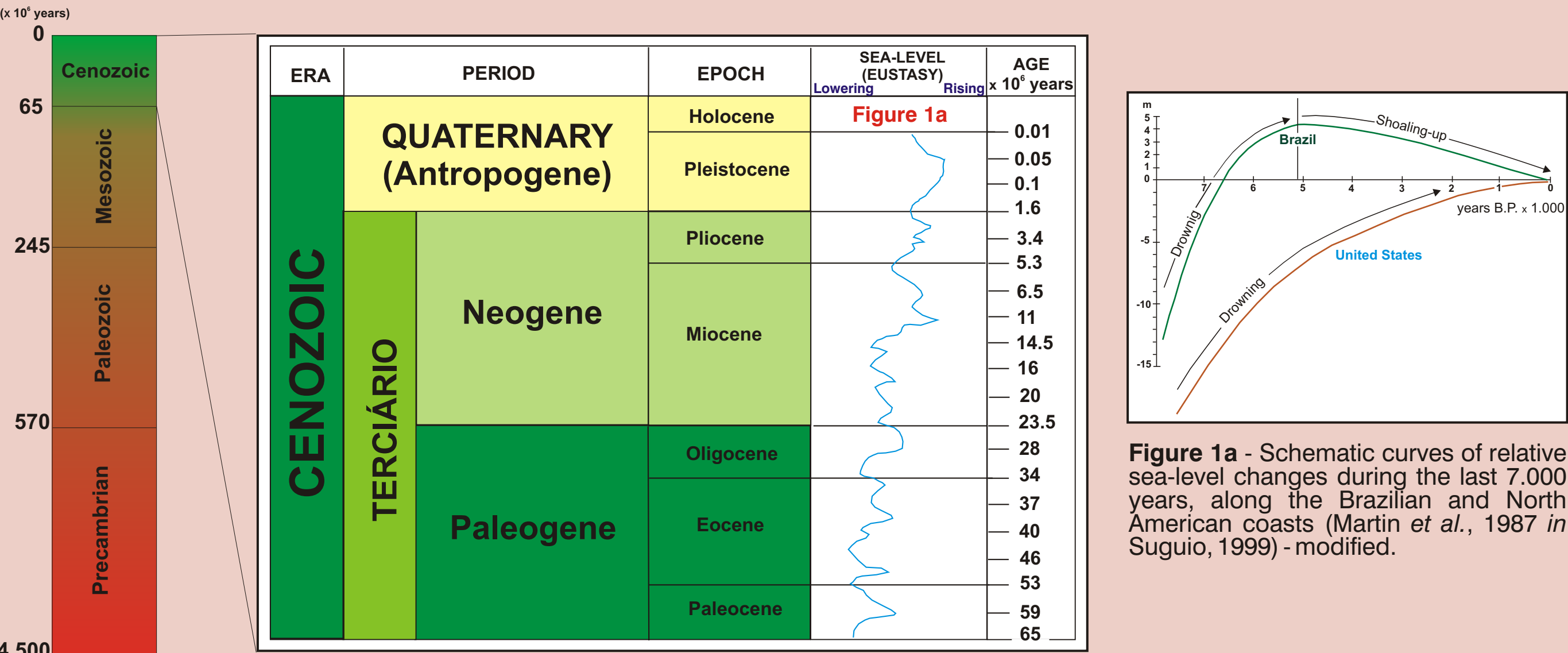


Figure 1 - Geologic Time and sea-level changes during the Cenozoic. Source: CENPES/PETROBRAS - Tecnologia de Rochas (modified).

### Marine regression

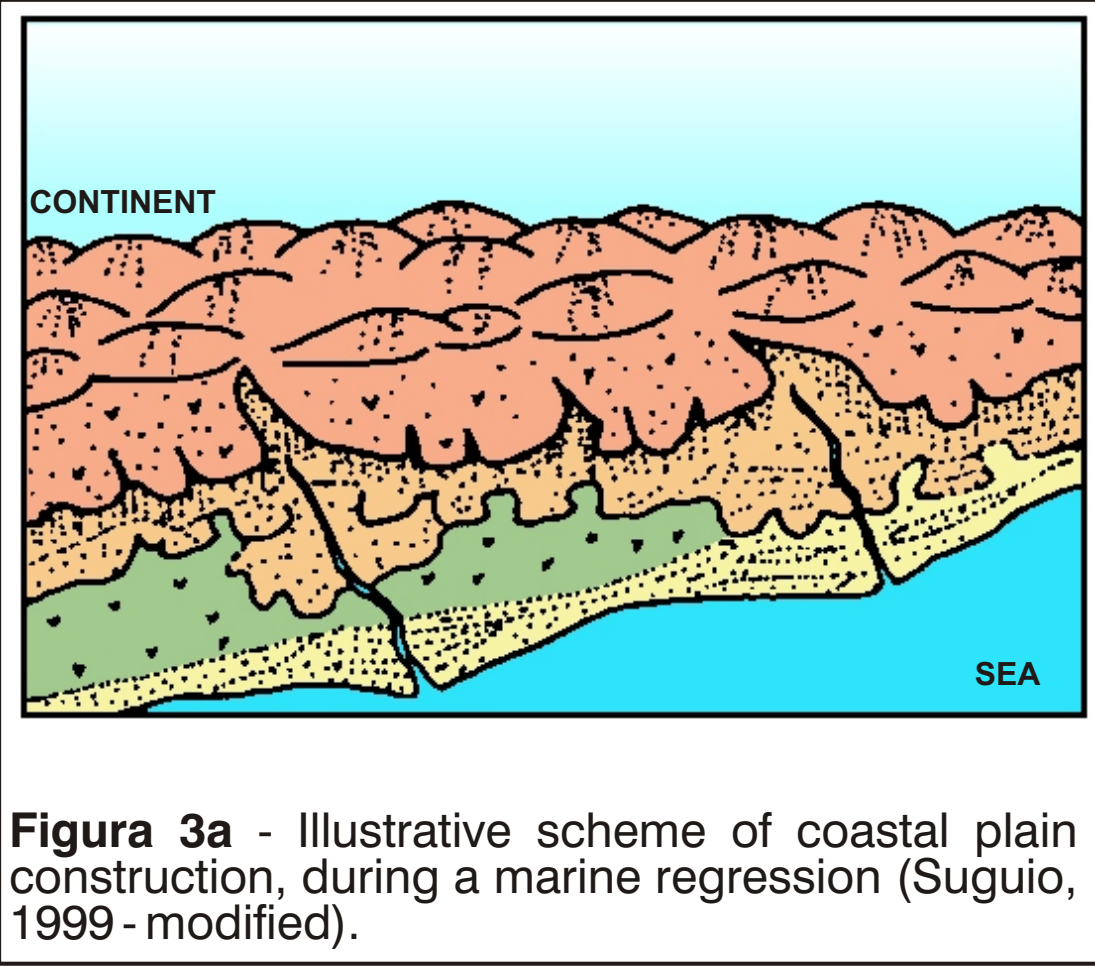


Figura 3a - Illustrative scheme of coastal plain construction, during a marine regression (Suguio, 1999 - modified).

### Marine trasngression

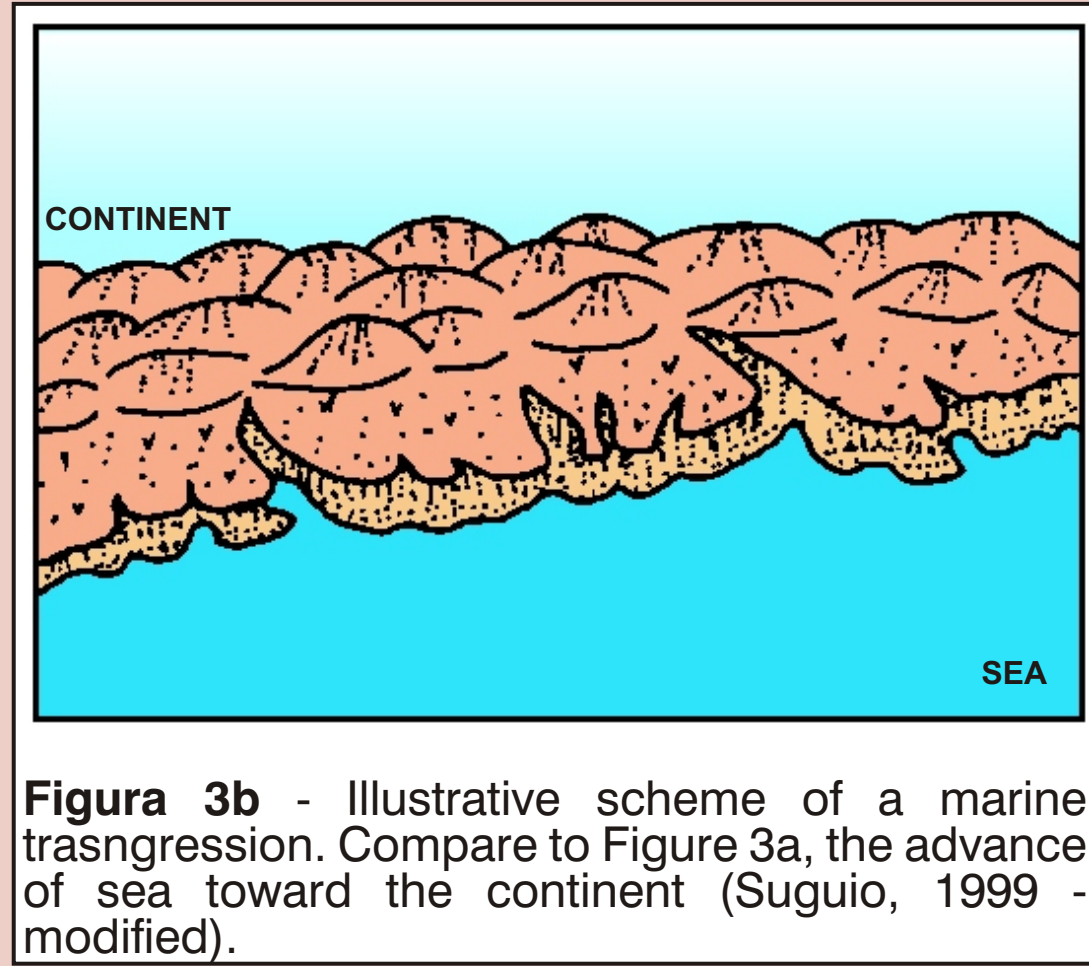


Figura 3b - Illustrative scheme of a marine trasngression. Compare to Figure 3a, the advance of sea toward the continent (Suguio, 1999 - modified).

## Possible evidences of sea level fluctuation in the Buzios region

### Rasa Beach

In the Rasa Beach (Figure 4 and Photography 1), there appears high cliffs reddish sediments (Figure 5). These are “dead” cliffs, that is, they were created by the erosive action of waves during a sea level higher the present one (see Figure 3b).



Photografy 1 - Rasa Beach view, taken from the topo of the cliffs.

These cliffs are constituted of an interbedding of coarse gravels and muddy sands. Although they are in the coastal zone, studies of Morais (2001) revealed these deposits can be interpreted as alluvial fans (Figure 6), genetically associated to tectonic activity during the sedimentation. These deposits occur near a very important regional fault (Pai Vitório Fault), which fault plain can be observed in the northern part of the Feia Island (Photography 1).

Sedimentary deposits of the Rasa Beach cliffs are associated to the Barreiras Formation, of Tertiary age. The occurrence of these fluvial deposits near to the beach points to fact that they were deposits in a lower sea level than the presente one, fluvial deposits are presently covered by the sea.

Similar deposits can be seen in the Colônia dos Pescadores in the Rasa Beach (Photographs 1 and 3).

The sea-level variations (eustasy) results from glaciations (glacio-eustasy by removing water from the sea), which in turn derives from global climatic changes; or from tectonics (tectono-eustasy by variations of the volume of the oceanic basins) or from the changing of the geoid shape (geoid-eustasy). Also, Earth's Crust movements (deformation of the continental blocks) can induce local sea-level changes by either the moving up or down of continental blocks.

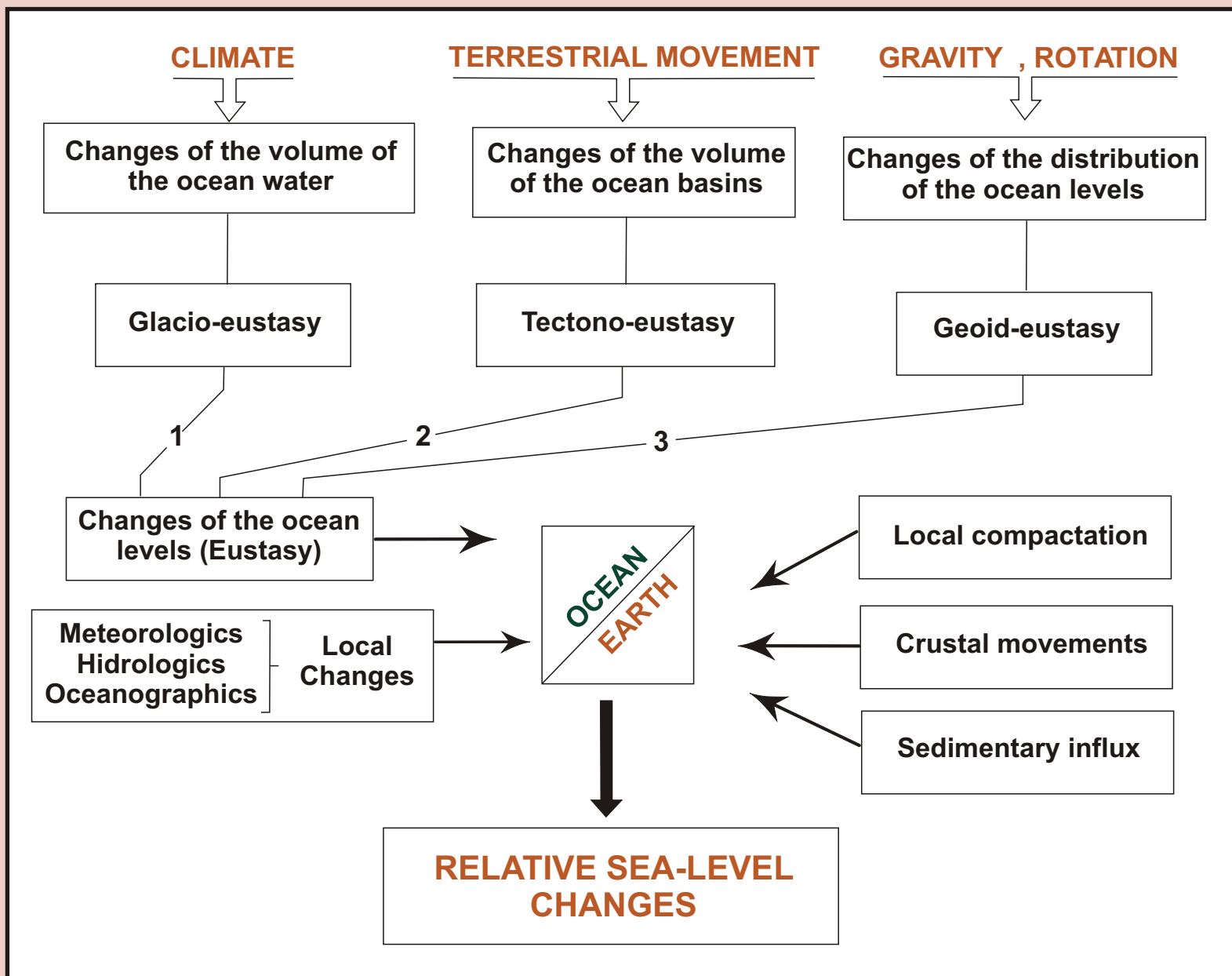


Figure 2 -Controlling factors of the relative sea-level changes. Source: Martin *et al.* (1996), modified.

Another important control in the sea-level change, affecting only locally is the sedimentary influx: in a determined region, a greater sedimentary influx than the capacity of sea erosion may cause a retreat of beach line to the ocean (marine regression - Figure 3a); where as an influx, smaller the capacity of sea erosion leads to a coast/beach line advance to the continent (marine trasngression - Figure 3b).

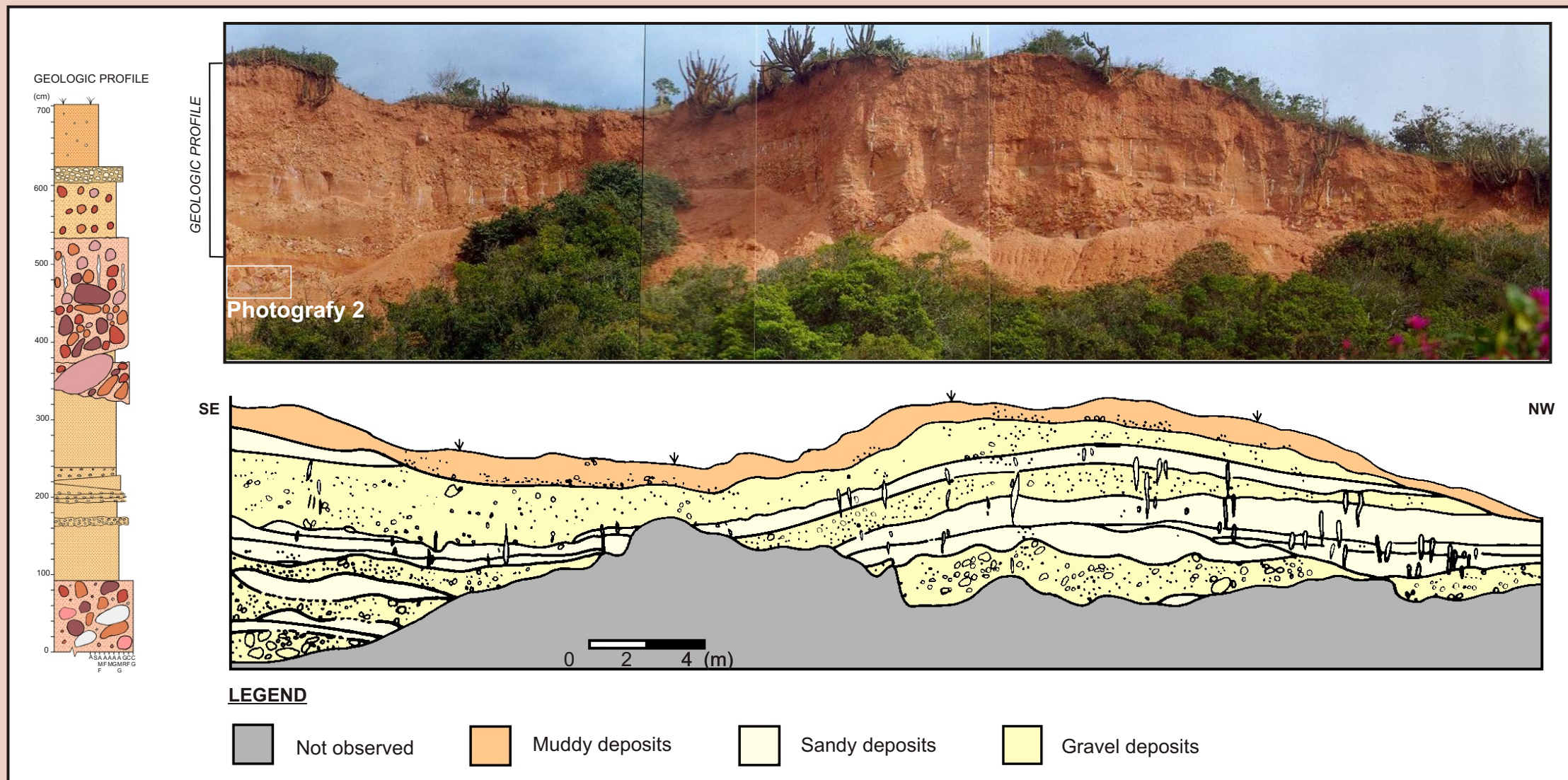
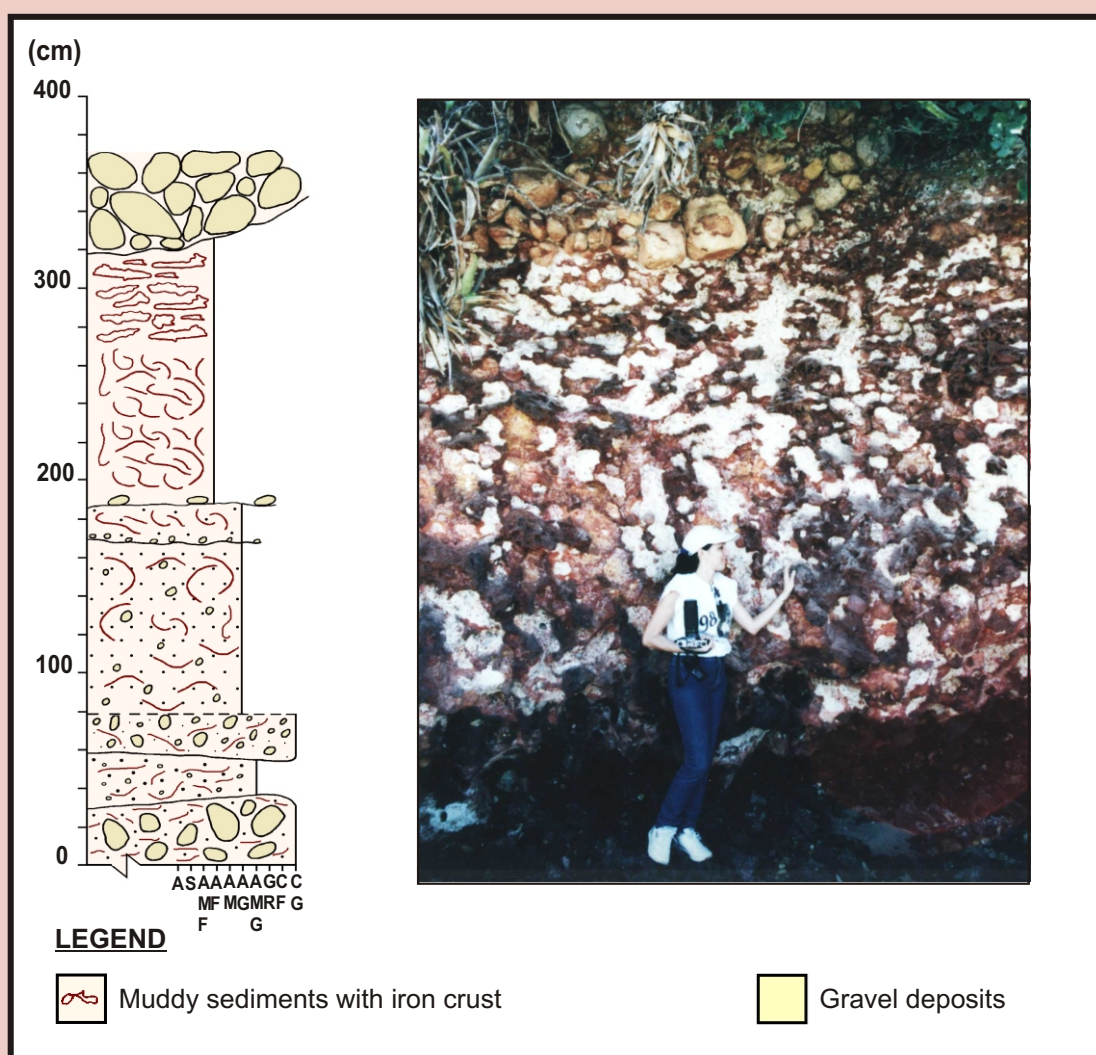
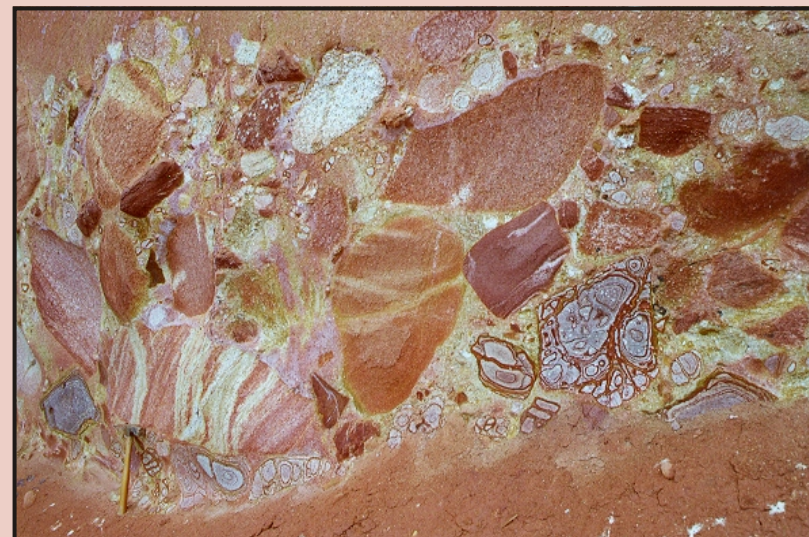


Figure 5 - Geologic section and profile representing the deposits of the Rasa Beach cliffs.



Photography 3 - Deposits of the Colônia dos Pescadores locality (Rasa Beach). Beside, the geologic profile representative of the deposits.



Photography 2 - Detail of the gravel, that constitute the deposits of Rasa Beach cliff. See the hammer like scale.

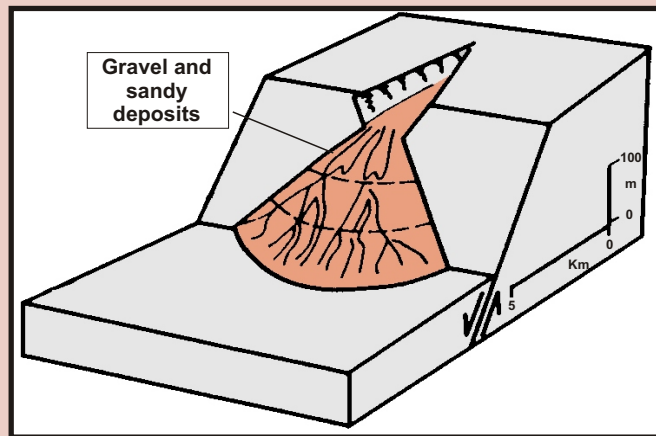


Figure 6 - Geologic origin interpretation of the sedimentary deposits of the Rasa Beach cliffs: alluvial fans influenced by tectonic activities. Source: Miall (1996) - modified.

**KNOWN MORE ABOUT BUZIO'S GEOLOGY:** You could found another panels of the Caminhos Geológicos Project in the Pórtico of the city, in the Orla Bardot (near Fishermen Monument), in the Geribá Beach (Marisco Point) and in the Lagoinha Point. In these “Points of Geological Interest” you will know why Armação dos Búzios is called “The Brazilian Himalaya”.

## Quaternary Geology of the Buzios Region

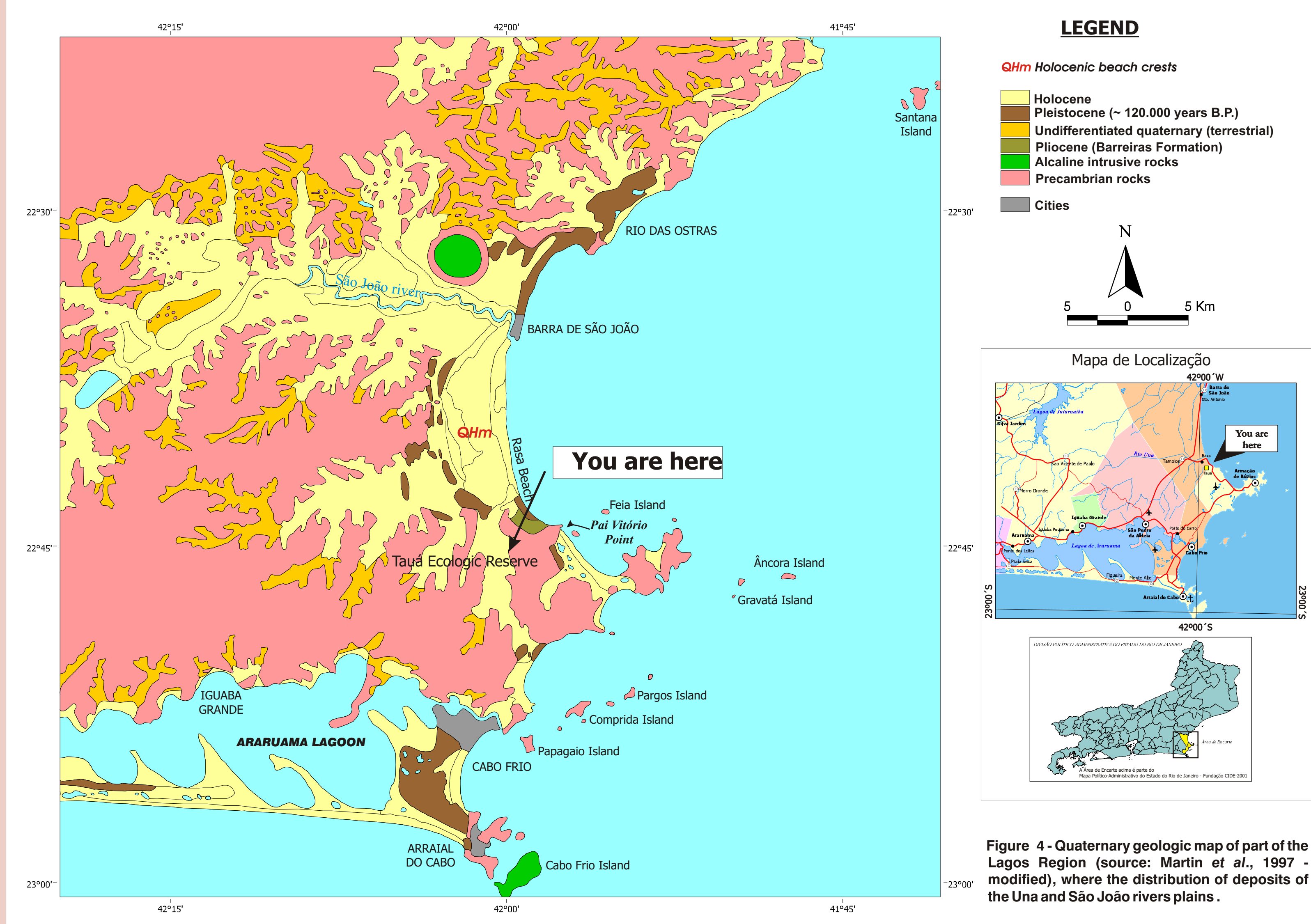


Figure 4 - Quaternary geologic map of part of the Lagos Region (source: Martin *et al.*, 1997 - modified), where the distribution of deposits of the Una and São João rivers plains .

The Quaternary deposits (pleistocenic e holocenic) of the Búzios region and vicinities are constituted of terrestrial sediments undifferentiated (fluvial and paludal deposits); palaeochannel sands; lagoonal sediments; litoral sands. These last present clearly the morphology of beach crests, like the strandplain besides the São João and Una rivers, which are recovered by the eolian action (dunes).

Precambrian rocks, and mesozoic-cenozoic alkaline intrusive rocks also occur, like the São João hill and in the Cabo Frio island. Tertiary aged sediments (Pliocene?) Are frequently mapped as Barreiras Formation.

### Tauá Ecologic Reserve

Located in the Pântano da Malhada, the Tauá Ecologic Reserve (Figure 4 and Photography 4) registers others evidences of relative sea-level changes in the Buzios region. The area of Pântano da Malhada is a low lying area, limited by holocenic coastal ridges. In the Tauá Reserve, it occurs an extensive deposits of mollusc shells of the species *Lucina (Callucina) pectinata* (Gmelin, 1791) and *Anomalocardia brasiliiana* (Gmelin, 1791) - taxonomic classification by Dra. Rita de Cássia T. Cassab (Museu de Ciências da Terra, DNPM-RJ). The first one, usually known as “amêijoia” or “lambreta”, lives in mangrove muds; the second known as “berbigão” ou “maçunim”, lives in intertidal zones muddy and protected beaches, where individuals dwell at shallow depths.

These shells point to a marine transgression in a recent past. During the coastal ridges construction, in the last marine regression, this area was abandoned by the sea water body.



Photography 4 - Shell deposit located in the Tauá Reserve, Pântano da Malhada. Detail shows the shells found in the place.

“Earth has taken some billion years to build rocks, minerals, mountains and oceans. Save this masterpiece!”

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**PROJETO CAMINHOS GEOLÓGICOS**

**DRM-RJ**  
DEPARTAMENTO DE RECURSOS MINERAIS  
drm@drm.rj.gov.br  
www.drm.rj.gov.br



Versão em português atrás deste painel

**Elaboração:** Rute Maria Oliveira de Morais e Cláudio Limeira Mello (Departamento de Geologia - IGEO/UFRJ).  
**Coordenação:** Kátia Mansur, Eliane Guedes e Flavio Erthal (DRM-RJ)