

AROSSIM COASTLINE

THEN AND NOW

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Sand dunes are Nature's line of defense from the raging sea. “They arrest blowing sand, deflect wind upwards, assist in the retention of fresh water and protect the hinterland from attack by waves, cyclones and storm surges and thus obstruct the ingress of saline marine water into the hinterland.” (A. Mascarenhas)

This study, documented with photographs taken over a period of twenty years, demonstrates unequivocally that the coastal landscape of Arossim and adjacent villages has been drastically transformed.

The 1989 photograph (fig.1) at Arossim beach, shows a chain of sand dunes protecting the coconut plantation from coastal waters. These natural sand barriers, estimated to be about 5000 years old (organic material found 7 meters below a dune at Colva has been carbon-14 dated by NIO scientists at 6430 years BP) had thus far protected and shielded the hinterland from the invasive Arabian Sea.



Fig. 1. In this 1989 photograph sand dunes are shielding trees

The later photographs – (figs.2-5), present a sharp contrast to this once pristine and unspoiled beach unrecognizable to our immediate ancestors.

The impact of human footprint caused by uncontrolled coastal development to promote tourism is now evident. Such a dramatic change within a short span of only twenty years should be a cause of concern.

The readily available sand from the dunes used for construction or transported elsewhere, along with the eradication of sand-binding vegetation, has greatly impacted the area. It is noteworthy that the oldest or mature dunes, furthest from the beach, were most likely the first victims.



Fig.2 In this 2010 the roots of trees are exposed from erosion and many have collapsed during the monsoon.



Fig.3 Sea water approaching the coconut trees



Fig.4. Fences do not prevent erosion



Fig.5

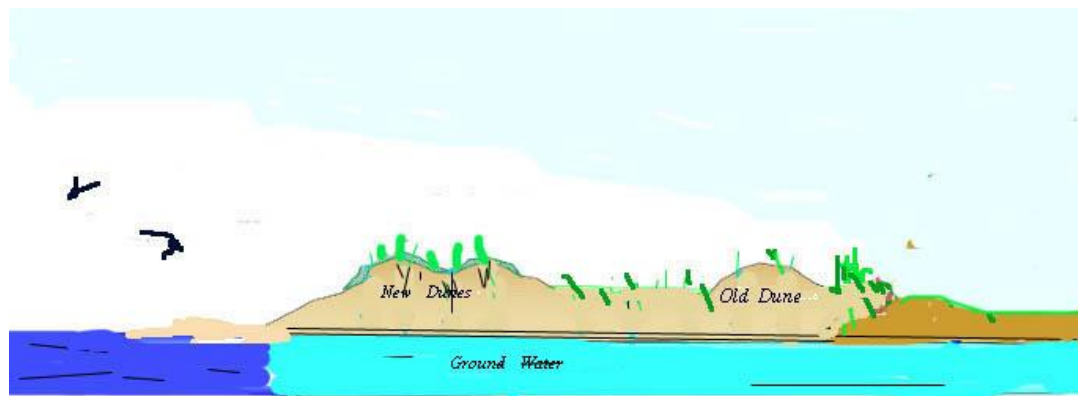
A study by the National Institute of Oceanography, of the coastline of Goa, with satellite imagery has also confirmed that anthropogenic activity such as, “constructions in sandy areas, beach resorts, coastal roads and sand mining has caused the desecration and elimination of sand dunes.”

(Ref. A. Mascarenhas, A Report on Coastal Sand Dune Ecosystems of Goa: Significance, Uses and Anthropogenic Impacts, National Institute of Oceanography (NIO), Dona Paula, 1998)

In 2010-2011, the National Centre for Sustainable Coastal Management - Ministry of Environment, Forest and Climate Change, in Chennai, also carried out survey of coastal sand dunes for the entire country and documented them with their coordinates, to pinpoint their locations and dune areas. A total of 99 dunes were recorded in Goa - 24 in the North and 75 in the South. Most were located in the villages of Cavelossim and Varca, in the South with 18 and 12 dunes respectively and 5 dunes (UID63 – UID67) in Arossim. It is not certain if these are still in existence. (Ref. <http://dstegoa.gov.in/Sand%20dune%20report.pdf>)

The flourishing cashew (*Anacardium occidentale*) and Jujube/Boram (*Zizyphus mauritiana*) plantations that once also covered the coastal area of Arossim are completely eradicated to make place for the resort hotels and golf courses. The sand-binding creepers that lined the shore line and protected the dunes are an endangered species. The roots of these volunteer creepers which fanned out beneath the dunes, helped to keep the sand from blowing away or washing out with the current.

Furthermore, an unknown number of tube wells bored at these resorts, to supplement the limited public water supply, for use in swimming pools, lawns and golf courses, may have caused other invisible problems. Excessive pumping can lead to subsidence of land resulting in lowering of ground water table allowing seepage of saline water into fresh water, thus increasing the salinity of adjoining rice fields. For lack of municipal sewage system, disposal of human waste in septic tanks appears to have contaminated the ground water as documented from studies by Goa University, that the water of the local wells is not fit for drinking. (Ref. Wendy S. E.C.D'Silva and A.G. Chachadi, *Proceeding of International Conference SWRDM-2012 Assessment of anthropogenic impacts on groundwater quality in coastal Goa*, Department of Earth Science, Goa University.)



A Section of the coastline showing the ground water under the dunes.

Fig. 6. An idealized diagram of a pristine and virgin coastline

The dire prediction by the *Intergovernmental Panel on Climate Change* (IPCC) is “that India will suffer more frequent and intense heat waves, extreme rainfall events and erratic monsoons, as well as more cyclonic activity, among other weather-related calamities in the coming decades”.

All indications at micro and macro levels point to the fact that the coastal plain of Goa is seriously affected and that we recognize the problem and begin the reviving process. (Also visit; <https://www.latimes.com/projects/cal-reviving-beach-dunes-help-california-with-sea-level-rise/>)

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