

# The Spit and their Morphological Changes of Coleroon River Mouth, Nagapattinam District, South India

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## **Abstract:**

*Morphological changes of spits are investigated using multi-dated satellite images of Land sat 1991, 1999, and Resource sat 2008. Change in length of the spits that are under study. The results recorded significant changes in spit morphology. The study reveals that coastal processes, such as SW-monsoon influenced strong currents and long shore drifts are the main process for formation and growth of spits, whereas rivers influence/drift also plays a significant role. The statistical uncertainty estimation in spits morphology is prevalent wherever the coast is have an influence by human interventions. The study exhibits that combined use of satellite imagery and statistical techniques can be effectively used to understand the evolution of spits morphology.*

## **Introduction:**

Spit is a ridge/embankment kind of depositional barrier feature attached to land at one end, and the other in open water. It forms at the down-drift end of a littoral cell

and shows a wide variety of morphologies (Zenkovitch 1967; King 1979; Pethick 1984; Carter 1988; Ollerhead and Davidson-Arnott 1995). The morphology (location, shape and size) of spits is controlled by several factors such as long shore drift (Johnson 1925), tidal and fluvial currents (Fisher 1955; Venkatarathnam 1970), glacial and fluvial sediment supply (Guilcher and King 1961), wave refraction and angle of wave approach (May and Tanner 1973), and sea level rise (Redfield and Rubin 1962; Zenkovitch 1967).

Spits can form at the ocean and bay sides of inlets, and these are of great significance in understanding the morphodynamics of inlets and for managing navigation channels and inlets (Kraus 1999). Petersen et al. (2001)

## **Study area:**

In the study area, was situated in Nagapattinam district. The shoreline changes of erosion were noted during the period from 1991 to 2008 can broadly shows at the area of Coleroon River at Pazhaiyar.

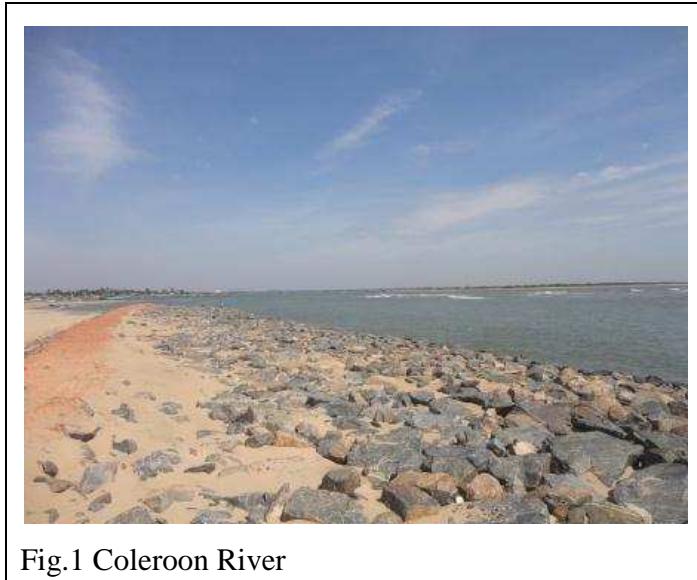
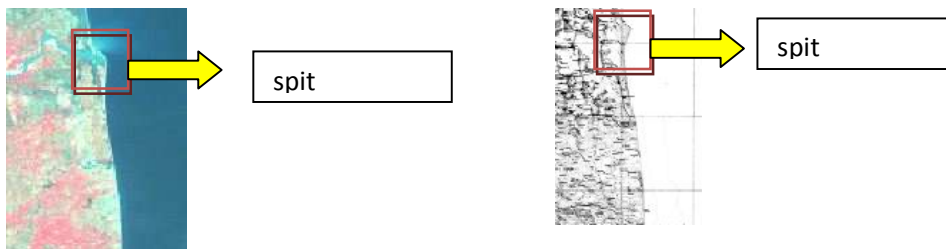


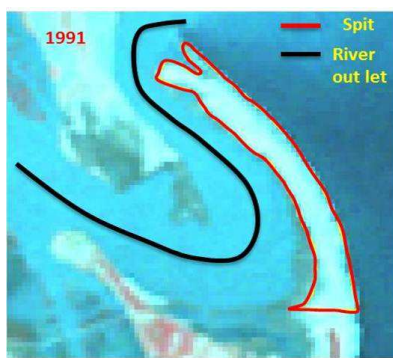
Fig.1 Coleroon River



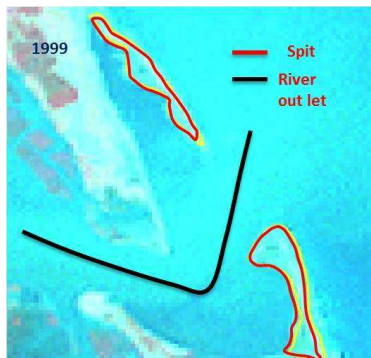
**Methodology:**

The base maps were generated and geo-referenced in ERDAS-IMAGINE software and digitized in ARC-GIS. The satellite data were downloaded from Landsat

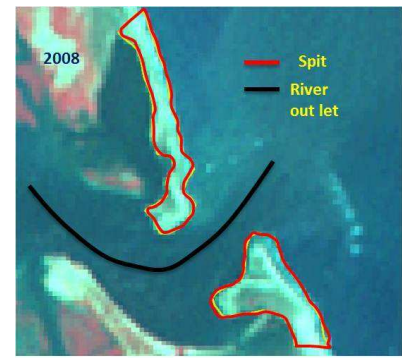
and Bhuvan websites these data was merged in ERDAS-IMAGINE. From all these data the changes was identified particularly on Coleroon river at Pazhaiyar. The different year changes were noticed by satellite data.



Spit of 1991



Spit of 1999



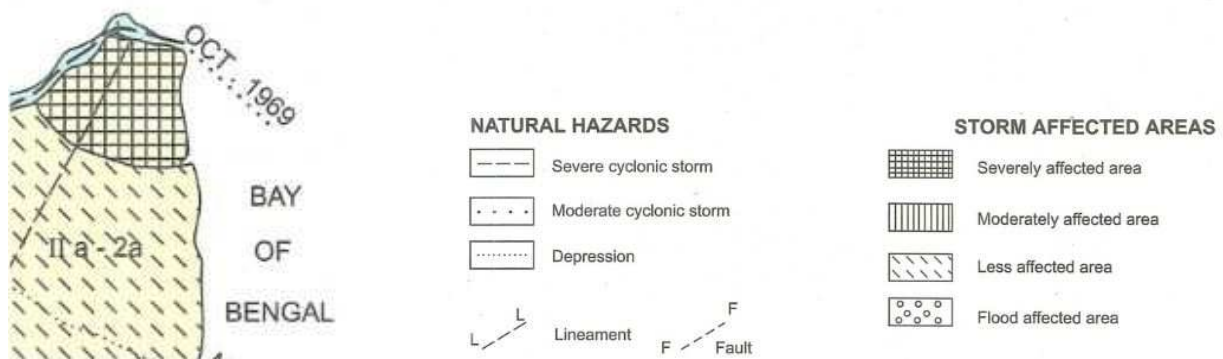
Spit of 2008

**Result:**

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The spit was digitised along shore line; the erosion and accretion were also observed. In this area GSI reported as natural hazard zone. In the month of October 1969 that particular area indicated as

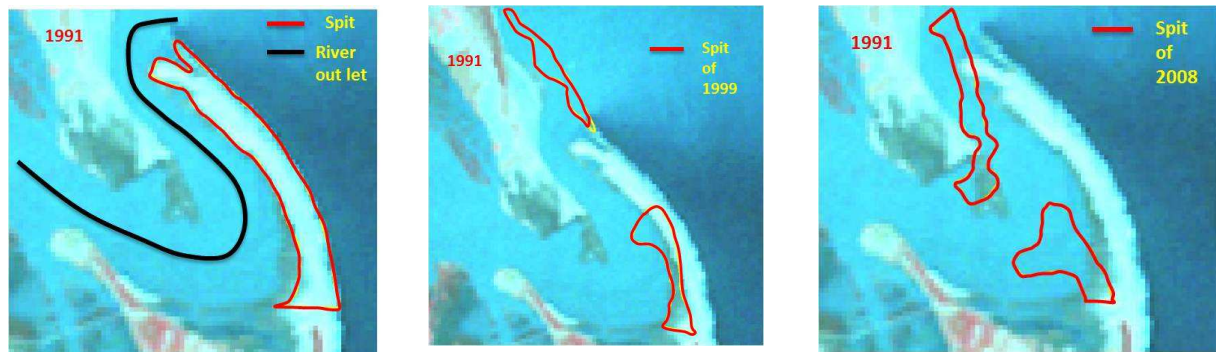
moderate cyclonic storm and severe cyclonic storm was noted and shown in fig.2. The Coleroon spit, located towards south of Pazhaiyar



### Spit in 1991:

In 1991 the Landsat data clearly shows the significant changes in length of coleroon river mouth. Length of the spit has been increased by 0.42 sq.km during 1991

respectively. The digitized part was overlay with the spit of 1999 and 2008. It clearly explain the changes happened to 1999 and 2008. This indicates more amount of deposition taken place to the river out.

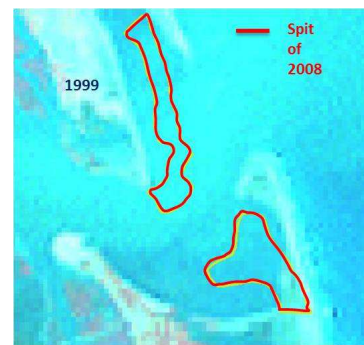
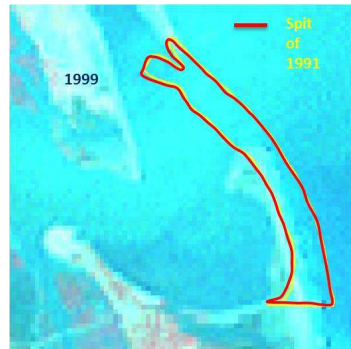
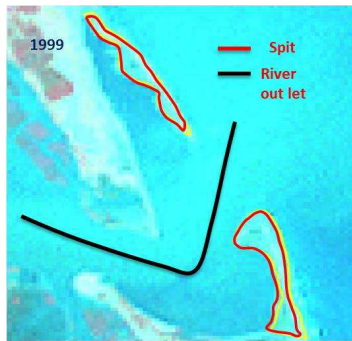


### Spit in 1999:

In 1999 Length of the spit has been decreased by the opening at the right side, the size of the spit reduced as 0.18 sq.km during 1999, at the same the opening of the

left side another spit was hosted the area occupied up to 0.11 sq.km The digitized part of 1991 and 2008 was overlay with the 1999. From the seaward side the deposition sand was dumped in the part of coleroon river mouth.

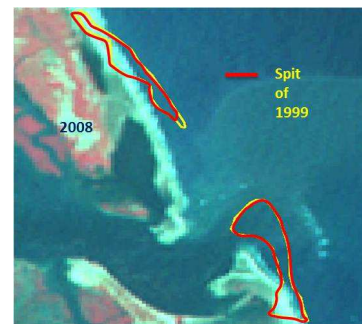
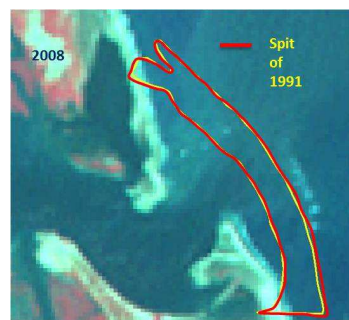
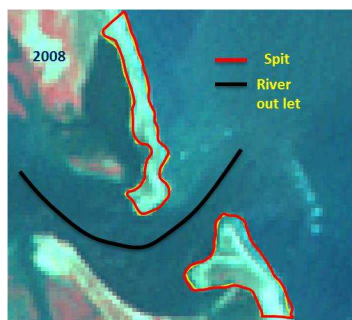




### Spit in 2008:

In the year 2008 Resource sat data clearly tells the spit was decreased in size the opening of the mouth was get little bit wider in size. Same as in the year 1999 in the opening at the mouth of the either side

got spit, like wise in the year 2008 in the mouth the spit was held on either side that was up to 0.18 at the right end of the mouth and 0.16 at the left end of the mouth. When compare with 1999 spit, the right side mouth of the spit area is equal in Sq.km, but spit shape is different.



| Table- 1                            | Year | Area(sq.km) |      |
|-------------------------------------|------|-------------|------|
| Spit of Coleroon River at Pazhaiyar | 1991 | 0.42        |      |
|                                     | 1999 | 0.18        | 0.11 |
|                                     | 2008 | 0.18        | 0.16 |

### Conclusion:

The study tells that the long shore drift is a prominent cause for the development and growth of spits, while river drift plays a major role in shaping as well as

growth of spits. The differential distribution of long shore current direction could be the primary agent for sediment redistribution and confinement within the study region, thereby keeping the prograded coast straight, smooth and stable.

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