



## Review Paper

# Coastal navigation in the bay of Bengal, a study of eastern coast of Orissa

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## Abstract

The paper tries to discuss a new dimension of coastal navigation in the Bengal Coast of Orissa. It discusses geographical location of different maritime landmarks in the Orissa coast. These landmarks facilitate coastal navigation to vessels and ships for long distance maritime voyage. These navigational landmarks played a dominant role in the identification of specific location of the coast. The paper further tries to delineate the role Moon, Stars and the Sun play in the coastal navigation of the country. In this geographical background, it further tries to describe the important role of the South West and North West monsoon in the coastal navigation of Bengal Coast of Orissa.

**Keywords:** Puri pagoda, black pagoda, balasore road, South west monsoon, North East Monsoon.

## Reviews of Literature

Periplus Maris Erithrei (*Periplus of the Erythrean Sea* (AD 60-100)<sup>1</sup>, was one of the important source which describes the role of monsoon in the history of coastal navigation. The author was a Greek navigator. He describes about the ports and harbours along the Arabian Sea and the Bay of Bengal anchorages, approaches to the ports, prevailing winds, sailing conditions and exports and imports. But he has not given any evidence on monsoon. Another important historical source was *Natural History* written by Pliny<sup>2</sup>. Here the author has described the arrival of monsoon in the coast of India.

The arrival of monsoon in India has been described by Kalidas. (AD 450) in the Sanskrit poem *Maghaduta*<sup>3</sup>. J Horsburg in his *India Directory*, has described navigational directions, port locations and navigational land marks in the entire coast of India<sup>4</sup>. He has also delineates the role of monsoon the Maritime transport of Colonial India. CN Parkinson in his monumental work *Trade in the Eastern Seas* has also discussed role of monsoon and port location in coast of India<sup>5</sup>. W Millburn, in his pioneering work, *Oriental Commerce Containing a Geographical Description of the Principal Places in East Indies, China and Japan*, has described several port locations and maritime routes in Asia<sup>6</sup>. But he has no described monsoon the coast in Orissa.

Sila Tripathy in his foremost paper *Monsoon wind and Maritime Trade- A Case Study of Historical Evidences From Orissa* has argued that monsoon played a dominant role in the trade and commerce in Ancient Orissa<sup>7</sup>. Ganeswar Nayak in his paper *Navigational Landmarks in the Eastern Coast of Orissa* has described major navigational locations in the coast of Orissa. But the paper is limited to the coastal Orissa<sup>8</sup>. B Arunachalam in

his paper *Navigational Landmarks on the Eastern Coast of India* has discussed major port locations, navigational points on the Eastern Coast of India<sup>9</sup>. In this paper, I have discussed navigational landmarks in the Eastern Coast of Orissa. Further, the role of local wind and monsoon were also discussed in this paper.

The Bengal coast of India, starting from the mouth of the River Ganga to Kanyakumari, had landmarks from time immemorial. Indian seafarers had been using important landmarks for recognition of different of different segment of coast and identification of specific port locations during coasting voyages as well as overseas voyages. While along the coast offshore at a visible distance from the land or while approaching the shore it was necessary to regularly identify specific landmarks.

Those were mouth of the river, vegetation character, the hills in the horizon, the skyline profile or any build up feature that stand out prominently, like rocks, bars and banks, islands or segments like sand and mud on the sea floor. Apart from this, the visible signs of the nature of sea-life were all practically useful indicators.

The east coast has relatively fewer port locations and also fewer identifiable landmarks. Further, the low gradient of the sea floor in the inshore waters makes it a marked surf zone and shoals, banks developed at frequent intervals at depths less than 10 fathoms of water. The river mouths are mostly bar ridden and the bars and spits are all of a shifting character. As result, the entire coast is relatively more dangerous to approach except in known waters. In this context, role of navigational landmarks play a significance. Role in coastal navigation. In coasting voyages the vessels have to keep at a distance in fairly deep water and approach only through rehearsed channel.

**Puri Pagoda:** Cultural features have provided traditional milestone over a long period of time. In the eastern coast, it gained importance because of its low plains and deltaic zones. The temple of Lord Jagannath is familiar as an important navigational landmark in the east coast of India. It is called Jagat of east coast by west coast mariners and seaman.

The Puri Pagoda has three globular buildings, surrounded by several smaller ones. They were of conical forms decreasing in diameter from their bases to their summit which are crowned with domes and an ornamental globe<sup>10</sup>. Of the three, the western Pagoda is the largest. The eastern pagoda was the smallest of the three. They are nearly one bearing W by N. When brought to bear NW they began to appear separated. When N.N.W they were perceived to be distinct buildings, though when seen far off they seem connected<sup>11</sup>. Moreover, they were situated upon lowland, dressed with shrubs and small trees. Many other white buildings were seen standing near them were of very small size in comparison with largest Pagoda.

**Black Pagoda:** The outstanding black pagoda to the North of Jagannath Puri is the famous Sun Temple of Konark<sup>12</sup>. When the black pagoda was seen from the mid sea it appears like a elevated rock rising unexpectedly at its end. It was further seen in the shape of a gable end of a house. Geographically the Black Pagoda is surrounded by red soil and destitute of trees. It is also smaller and blacker than Jagannath Pagoda. From Black pagoda the distance to the False Point port is 16 leagues. (4.8 km) and have to travel in the direction of NE by E.

**False Point:** It is situated on the Mahanadi estuary. It derived its name from the circumstances that ships proceeding north wards frequently mistake it for Point Palmira's a degree further north. The light house stands about 2 miles SW of the point in lat. 20°20' ½ N long and 86°47'E. Vessels and ships were asked not to come under 8 fathoms of water (above 24 feet of water), for the purpose of coming to the False Point Lighthouse.

**Point Palmiras:** This is called by the natives Mypurra. The landscape of point Palmiras is low and covered with Palmyra trees. Ships and vessels while move around the Point Palmiras in 15 fathoms of water can easily observe the Palmiras trees. It is situated about 5 or 6 leagues from the shore. In a clear weather Palmira's point can easily be seen. But in cloudy and rainy weather this land mark point cannot be seen. Ships and vessels therefore seldom notice the point while passing unless the weather was clear and the reef approached under 14 or 15 fathoms of water.

**Balasure Road:** The name of Balasure Road was given to the extensive bay formed between point Palmira's and the banks of the river Hoogly. It provides good anchorage to ships and vessels during disturbed weather in the SW monsoon. During the rough period ships and vessels cannot round the reef of the Point Palmira's. So, Balasure Road enables the vessels to anchor on the north side of it in smooth weather.

These limited traditional navigational landmarks had served the useful purpose of directing navigation in the historical past of the East Coast. These landmarks still continue to serve the interest of country crafts, inspire of the coming of light house and beacons in the 19<sup>th</sup> and 20<sup>th</sup> centuries.

**Traditional Navigation:** With the growing European activation in Orissa the age-old navigational method underwent a drastic change, as the indigenous practice could not withstand the modern technique. The introduction of machine made boats reduced the dependence on country boat which fully affected the existing skill and technique of navigation. It has 529 km long coastline extending from the Subarnarekha River in the North to the Sunapur Port in the South<sup>13</sup>.

So Mogul Governors who took keen interest in the Northern most part of Orissa. It chose Balasure as a ship and boat building center. They had also tried to make the coast safe and secure against pirates like *Feringis* and Arakanese raiders. The availability of ship and boat building materials like *dossutte* or double treated cloth, steel & iron articles and timber in the neighborhood significantly contributed to the factor.

**Celestial Navigation:** Star watching was for most seamen a keen pastime of practical utility. Every season they recognized a handful of star groups but not constellations. Identification was by analogy of appearance, invariable familiarity to them in the marine environment. The boatmen of this region calculated time by observing the position of the Sun in the day, in the night by the position of the moon and the other stars. They used the shadow of the mast in the daytime to determine time. Some aged boatman could know time at night by the help of nose. When they felt the speed of passing air was more in the right side of the nose that was more than 12 in the night. They also calculated time by observing stars. They knew that *Kuantara* or the morning star was seen at about 4 AM in the Eastern sky. Two *badadeulia* – *Tara* were seen in southern sky during 10 PM and 12 PM and the *Sanjua Tara* (the Evening Star) was seen in the west between 7 PM and 9 PM. The boatmen of Balasure measured the depth of water by a long bamboo stick, locally known as *Keralbaunsa*. They dipped the bamboo tied with a stone at its end into the water and calculated the depth. Sometimes they used to throw the anchor into the sea water and then pulled it out and measured the depth by calculating the length of rope. They had the knowledge that increasing depth meant movement towards deep sea, and decreasing depth as an indication of nearing the shore.

**Wind:** In Southern Orissa wind provide an important role in the history of navigation. In Southern Orissa mariners had knowledge of eight types of wind which were locally known as *Darigali* (west) and *Faigali* (East). *Turpgali* (North), *Parotogali* (South), *Molagali* (NW), *Turppagali* (NE), *Wadagali* (SW) and *Salompaigali* (SW). *Darigali* and *Faigali* blow between Oct and February<sup>14</sup>. *Darigali* blows in the night and morning which helps fishermen to move into the sea. *Faigali* which blows

during day, in the evening helps to return from the sea. *Molagali* blows during December. *Turpagali* generally blows from November to January and hinder the sailors going into the sea.

But the sailors of northern Orissa had different perception of the wind. They could identify varieties of wind which they called *Uttara* (Northernly), *Ishania* (NE), *Dakshina* (South), *Dakhin*, *Pichhadi* (SW), *Paschima* (West), *Rebina* (NW) in North Orissa.

**Sun and Moon:** Sun and moon played an important role in traditional navigation. By observing the position of the Sun, the boatman calculated time and direction in the daytime. Similarly moon helped them in this process in the nighttime. Besides, for direction they also took the help of some stars known from their forefathers. However they did not have knowledge about latitude and longitude. For finding directions, they used to take the help of traditional landmarks like big trees, big heaps of sand hills, lighthouse etc<sup>15</sup>.

They could also anticipate heavy rains when they marked a circle around the moon with stars in the middle. By counting a lunar month beginning from *Amabasya* to *Purnima*, they could predict high tide in sea. The boatmen had their own perception of marine environment. Flying of *Batashi* birds in the sky over the sea, big wave, not finding fishes for a day or two, some peculiar sound of the waves and the East-West sky becoming reddish were the signs of approaching cyclone.

But the boatmen of South Orissa calculated their time by observing the position of Sun, Moon and Stars. They opine that the Morning star *Kuan Tara*, *Kartika Tara*, *Punjha Tara* would be seen at about 3 to 4 AM in the East. Two *Badaddeulia Tara* are seen in the North sky about 10 PM to midnight and *Sanjua Tara*, the evening star in the West between 7 PM to 9 PM. The people of Sunapur estimate the depth of water by seeing the color of the water and measure the depth with a bamboo. Their routine work helps them to know the depth at different places in the sea.

## Monsoon and Navigation in the Bengal Coast of Orissa

The Bay of Bengal takes its name from that of the Moghul state of India. Between Peninsular India and Burma, it is the North – Eastern part of the Indian Ocean. It is bordered on the North by the deltaic region of the Ganga River and the Brahmaputra River. On the east are the Burmese peninsula and its extension to the south, the Andaman and Nicobar ridges<sup>16</sup>. Following International Hydrographic Bureau (1953) the Southern boundary extends from Dondra Head at the South end of Cyclone.

The Bay of Bengal is characterized by periodic monsoon winds<sup>17</sup>.

Seasonal low pressure areas developing over the Persian Gulf during the summer causes the wind system to blow persistently from the Southwest during this period<sup>18</sup>. In winter the monsoon, issued from a high pressure source forming over the Tibetan plateau, coming from the Northeast<sup>19</sup>. The Northern Indian wind system, coupled with the wind Himalayan Mountains, creates highest rainfall. The heaviest rain which comes during the autumn drains into the Bay of Bengal and this dominated the navigation<sup>20</sup>.

## Passage to Orissa Coast from Southern Part of the Bay of Bengal

**South West Monsoon:** From the commencement of April to middle of September, the South West monsoon prevails along the west face of the Bay of Bengal. During this period, ships travelling to Orissa Coast from Ceylon on Coromandel Coast were keeping a modest distance from the coast as the wind sometimes tending from the west. Ships and vessel were very careful not to approach the coast until to the North of Vizagapatam<sup>21</sup>. During this period, ships and vessels avoid the curvatures and large bays as the south east sea breezes which blow to them with considerable strength. In the south west Monsoon ships coming to Orissa Coast from Strait of Malacca (Between Malaya Peninsula and the Indonesian island) used to pass through between Pulo Brasses (off Achin Head of Sumatra) and Pulo Rando (northern most island of Indonesia)<sup>22</sup>. This passage helps the ships and vessels to safely navigate by the Nicobar Island to reach Point Palmira's and reach Orissa Coast<sup>23</sup>.

Ships coming from the Ceylon Coast for Orissa Coast in September were to keep safe distance from the land. If South-West winds were found steady, a direct course was followed for Point Palmira's in the Orissa Coast. If monsoon appended to be extended and the winds inclined from North to North East every advantage was taken to navigate on the east side of the Bay of Bengal<sup>24</sup>.

Ships and vessels leaving from Madras Coast or other southern ports of the Coromandel Coast to Orissa Coast, in the early part of the N.E monsoon, were easy to progress. During this period under the pressure of NE monsoon winds were light and blow from east but continued to pass along that coast. Here vessels and ships frequently met with N W winds, which was favorable for running over in the eastern part of the Bay of Bengal to reach Orissa coast.

**North East Monsoon:** From the beginning October to March North East Monsoon dominate in the Orissa coast. During this period, the coast of Orissa was avoided because it was a windward shore<sup>25</sup>. Because current was generally run to the SW along the coast. Further, the current to WSW off the Bengal sand head was probably increased much by the enormous discharge of monsoon rains from the Ganga and Brahmaputra River<sup>26</sup>.

Towards the end of December the southerly current started to increase on the Coast of Orissa. During these period ships approaching the entrance of Hooghly River and follow the navigational route of Point Palmira's or False Point in the Orissa Coast. From that place ships and vessels reach the entrance of Sager Channel, and easily reach Hoogly River<sup>27</sup>. But it was wise during entire N.E monsoon to navigate the middle of the Bay of Bengal or near the eastern side of Bay of Bengal. During the North East Monsoon, coast of Orissa was avoided<sup>28</sup>.

## Voyage from Orissa Coast to Madras and Ceylon

**North East monsoon:** From September to May ships and vessels going from Orissa coast to Malacca Strait (Between Malaya Peninsula and Indonesian Island), used proceed to the South East, and pass between Cape Negrais and Preparis Island (Cape Negaris also known as Pagoda Point is a cape in Burma, Myanmar, west of Irrawaddy Delta. It is located 133KM to NNE of prepares Island and 193 K.M. from the nearest point of the Andaman and Nocobart Island. It marks the boundary between the Bay of Bengal and Andaman Sea)<sup>29</sup>. The current of the Bay of Bengal generally rush to South West and South making it desirable to keep well to the east. If a ship and vessels fell to leeward (Place protected from wind.), she used to proceed to the West of the Great Andaman and passed between it and the little Andaman island, if current and wind were favorable.

It was therefore wise to keep **well to the east**, after leaving the pilot and proceed to the North of the Island Preparis. The currents between these island and Junkseylon were very much unpredictable in the North East monsoon. In the early part of North East monsoon ships and vessels mostly lay down to the NW, but at the close, in March and April, generally lay down to the SW and South.

**South West monsoon:** During the South West Monsoon ships leaving Bengal, whether going to Coromandel Coast, or to Ceylon Coast, to any places West of Malacca Strait, were advised to keep well to the west while crossing ships and avoid the Andaman Island. This place is full of sudden storms and dark cloud which did not allow the ships to proceed to the South.

The Ship King George left from Bengal Coast to Bombay by the southern passage left the pilot on 29<sup>th</sup> May 1791. On 7<sup>th</sup> June it experienced severe squalls and unsettled weather which made it impossible to weather them. So it was forced to proceed to the Prince of Wales Island<sup>30</sup>. Ships leaving Balasore Coast during South West Monsoon from April to September tries to prevent to proceed to the East. Ships after leaving the pilot proceed to False Point Port and then go to the Coromandel coast in safety<sup>31</sup>.

Ships leaving from Orissa Coast to Malacca Strait during the S. W monsoon used to voyage by the same route as in the opposite season. After leaving the pilot, they had to travel to the S.S.E as

the wind admits, a direct course was followed to the Great Coco Island (Burma).

Ships and vessel after passing the Coco Island or Landfall Island (Landfall is the northernmost island of the Andaman Nicobar Island) were keeping close to the wind for proceeding to the South. During S.W monsoon the archipelago of the island of the coast of Tennasserim (long narrow southern part of the country on the Kra isthumus, Burma) was not approached. To prevent either of these extremes, a course was followed from the Coco Island direct for Barren Island (Barren Island is an island located in the Andaman Sea). If ships were going to Prince of Wales Island or Malacca Strait it was not required to keep close to wind. However, it was wise to steer well to the south. A direct course was followed for reaching at Pulo Bouton (is an island in Indonesia) and from that place to Prince of Wales Island.

## Conclusion

These navigational directions discussed above were very important for vessels and ships navigating from Orissa Coast to Coromandel Coast. It was necessary for ships to follow navigational rules going to the Orissa Coast or to Ceylon Coast during the strength of SW and NE monsoon. These navigational landmarks play an important role during both NE and SW monsoon.

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