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THE ASYNCHRONY FACTOR IN THE NESTING ECOLOGY OF ODISHA'S OLIVE RIDLEY TURTLES

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Olive ridleys (*Lepidochelys olivacea*) are well documented to nest along east and west coasts of India. These turtles have been categorized as 'Vulnerable' in the IUCN Red List and fall under Schedule I of the Indian Wildlife (Protection) Act, (1972). This phenomenon of mass aggregation in olive ridleys is found only in India, Costa Rica and Mexico coastal waters. In recent times, arribadas have also been observed at Nicaragua and Panama (Honarvar et al. 2008). India hosts three major mass nesting sites in Odisha i.e Gahirmatha, Rushikuly whereas the third site Devi river mouth nesting has being reduced although the mass aggregation in the nearshore waters are being reported. Even the nesting is reported to be above the sporadic nesting (High sporadic nesting or minor mass nesting site) but arribadas are no longer recoded. In the recently year minor mass nesting site at Cuthbert Bay in the Andaman Islands have being discovered. Rushikulya has had the most consistent record of mass nesting over the last decade, with mass nesting reported only during some years at Gahirmatha (Shanker et al. unpubl. data). Monitoring mass nesting at two major rookery Rushikulya, Gahirmatha as well as in two minor rookery Devi, Cuthbert Bay a can provide insights into population trends of olive ridley turtles. Nesting beaches for sea turtles around the world are facing major beach erosion. Historic nesting beaches of olive ridley marine turtles have been reduced and impacted by humans with the remaining beach areas facing risks of further loss (McClenachan et al., 2006, Seminoff et al., 2015). Reduction of suitable nesting beaches could negatively impact the stability of marine turtle population. Sea level

rise due to global warming has already resulted in severe coastal erosions in the 20th century and is expected to aggravate in the 21st century.

Coastal erosion leads to loss of suitable nesting area for sea turtles (Schlacher et al., 2008, Hawkes et al., 2009, Kuleli et al., 2011, McClenachan et al., 2006, Fujisaki et al., 2018). The availability of suitable nesting beaches is predicted to be reduced particularly on low lying coastlines and small islands as a result of rising sea levels (Fish et al., 2008). Enhanced frequency and intensity of hurricanes were also reported to increase nesting beach loss and decrease hatching and emergence success (Hawkes et al., 2009, Fujisaki et al., 2018).

The nesting beaches at the offshore islands of Odisha are exposed to extreme climatic conditions (Singh et al., 2000) such as highly cyclone, higher precipitation (Chittibabu et al., 2004), and strong seasonal winds (Singh et. al. 2000). These climatic conditions could affect the characteristics of the nesting beach resulting in dry sand with low moisture content, high temperature, elevated salinity, seawater inundation, and beach erosion. The cyclonic activity during last 122 years (1877–1998) (Singh et.al. 2000) both in terms of frequency and intensity over Bay of Bengal (BoB) has increased five times more than Arabian Sea. (Sahoo & Bhaskaran. 2015) Possible long-term beach loss at the major sea turtle nesting sites in Odisha can aggravate the reciprocal deleterious impacts of extreme climatic conditions on sea turtle eggs during the nesting season. (Das & Das 2024**)** shows that about 9820 km^2, or 32.40 percent area of the total Odisha coastline area are extremely vulnerable to cyclones and under these area (block) olive ridley rookery is situated. Thus, we studied the multi-decadal dimension of the outlines and the extent of Gahirmatha rookery by using available Google earth imagery to assess the long-term beach loss of the islands. In the early 1970s, mass nesting primarily occurred along Satabhaya to Ekakula beach. Gahirmatha came to the spotlight from 1974 onwards after the turtles started mass nesting on a 10 km stretch of mainland beach near Bhitarkanika extending up to Ekakula beach. By the early 1980s, mass nesting was observed near Ekakula Nasi beach. This main land Nasi beach was fragmented during 1999 super cyclone and due to “Coastal flooding and erosion resulted in a reduction of beach width, prompting sea turtles to shift their mass nesting activities to the emerged Nasi I, II, III and Babubali Island (Wheeler Island). After 2019 an increase in the accretion rate was observed in Ekakula Nasi. During 2020 it was elongated by 2.6 km which was further accreted to form 3.2 m elongated sand spit in year 2023. During 2025 the length of sand spit was 3.6 km where the turtle nested in en-mass after a gap of 33 years . This spit development

in the Gahirmatha region is correlated with the long shore transportation of sediment sand the dominant influence the southwest monsoon which is elicit by nearby developmental activities along the coast. The annual nesting profile of Gahirmatha showed an occurrence of two arribadas till 1998 (Hijmadi 2001). The first batch of mass nesting occurs during late December to mid-February and the second one during March to early April (Behera, 1989).

The northward migration of Olive Ridley nesting sites at the Rushikulya rookery is a critical biological response to escalating environmental and human pressures. While the Ganjam coast sees fewer mechanized trawlers than other Odisha regions, the historical impact of over a hundred thousand incidental deaths since the 1990s underscores a persistent threat to the population. This northward shift is increasingly driven by the synergy of climate change and extreme weather; frequent cyclones and heavy rainfall now trigger massive debris inflows that degrade traditional beaches and interfere with the turtles' nesting biology. Coupled with high predation from jackals, hyenas, and feral dogs during sporadic nesting events, these factors necessitate a dynamic conservation approach. To protect the species as it moves, it is imperative to implement robust monitoring of habitat displacement and enforce protective measures that cover both the shifting nesting grounds and the broader migratory corridors within the Bay of Bengal. For the long term protection, conservation and management of the species habitat use of coastal and nearshore areas for foraging and breeding, their movement corridors and migration routes are required to be continuously monitored. Department may conduct independent patrolling, apart from participating in joint patrolling exercise with Forest Department in prohibited areas. They shall book cases under OMFRA for illegal fishing in those prohibited areas. Awareness meeting with local fishermen and other stakeholders will be conducted regularly by DFOs. Increasing the frequency of joint sorties (at least one joint sortie per week and as and when required) and carrying out Night patrolling / shallow water patrolling by Coast Guard Vessels.

REFERENCES

1. Behera, M. 1989. Ontogenic development with special reference to sex differentiation in the olive ridley turtle, Lepidochelys olivacea (Eschscholtz), Ph D Thesis, Utkal Univ., Orissa, India.
2. Chittibabu, P., Dube, S., Macnabb, J., Murty, T., Rao, A. D., Mohanty, U. C. & Sinha, P. (2004). Mitigation of Flooding and Cyclone Hazard in Orissa, India. Natural Hazards, 31, 455-485. https://doi.org/10.1023/B:NHAZ.0000023362.26409.22

3. Das, S and Sibabrata Das **(2024)** Cyclone Vulnerability Assessment of Coastal Odisha: A Sub-district Level Analysis Journal of Integrated Disaster Risk Management 14 (1) ISSN: 2185-8322 DOI10.5595/001c. 119011
4. Fish M.R, Isabelle M. Côté, Jennifer A. Gill, Andrew P. Jones, Saskia Renshoff, Andrew R. Watkinson (2005) Predicting the impact of sea-level rise on Caribbean Sea turtle nesting habitat Conservation Biology, Vo 19, Issue 2 Pages 482–491
5. Hawkes L. S, Annette C. Broderick, Matthew H. Godfrey, Brendan J. Godley (2009) Climate change and marine turtle Endangered Species Research 7: 137–154
6. Honarvar S, Michael P. OConnor, James R.Spotila (2008) Density-dependent eVects on hatching success of the olive ridley turtle, Lepidochelys olivacea Oecologia 157:221–230
7. DOI 10.1007/s00442-008-1065-3
8. Kuleli T, Abdulaziz Guneroglu, Fevzi Karsli, Mustafa Dihkan (2011) Automatic detection of shoreline change on coastal Ramsar wetlands of Turkey Ocean Engineering Vol 38, Issue 10, Pages 1141-1149
9. McClenachan L, Jeremy BC Jackson , and Marah JH Newman (2006) Conservation implications of historic sea
10. turtle nesting beach loss Front Ecol Environ; 4(6): 290-296
11. Mohanty-Hejmadi, P. 2001. The history of sea turtle conservation in Orissa. In: Proceedings of the Workshop for the development of a National Sea Turtle Conservation Action Plan, Bhubaneswar, Orissa (eds. K. Shanker & B.C. Choudhury), pp. 4-8. Wildlife Institute of India, Dehradun.
12. Sahoo, B., and P. K. Bhaskaran. 2015. Synthesis of tropical cyclone tracks in a risk evaluation perspective for the east coast of India. Aquat Procedia 4: 389e396. https://doi.org/10.1016/j.aqpro.2015.02.052.
13. Singh, O. P., T. M. Ali Khan, and M. S. Rahman. 2000. Changes in the frequency of tropical cyclones over the North Indian Ocean. Meteorol Atmos Phys 75: 11–20.
14. Shanker, K., B. Pandav & B.C. Choudhury. 1999. Olive Ridleys in Orissa: further comments. Current Science 76: 1522-1523.
15. Thomas A Schlacher, Dave S Schoeman, Jenifer Dugan, Mariano Lastra, Alan Jones, Felicita Scapini, Anton McLachlan (2008) Sandy beach ecosystems: key features, sampling issues, management challenges and climate change impacts Marine ecology 29, 70-90