



Short Communication

Impact of cyclone Yaas on fisheries resources of Eastern Sunderban part of West Bengal, India

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Abstract

West Bengal is a state with coastal districts in its south and south-western part and due to this; severe cyclonic events are common in this state. Since last decade, West Bengal has experienced several cyclonic events among which Yaas was the last one that hit in May, 2021. Cyclone has severe impacts on fisheries and aquaculture; it can alter hydrological parameters and habitat structure that lead to change in fish species assemblage pattern, fish diversity and finally can put impact on local livelihood and food security. The present work was aimed to gather preliminary information on the impact of Yaas on fisheries and aquaculture in Eastern part of West Bengal. The survey has showed post Yaas change in landing pattern with marine fishes contributed the major portion of the landing. Change in riverine fish diversity has also been observed with intrusion of brackish water species. With intrusion of salt water in local impoundments and ponds, intrusion of seeds of brackish water fishes mainly of *Lates calcarifer* has been observed that led to rise in fish seed availability and finally increase in employment and revenue generation for the local fish famers.

Keywords: Biodiversity alteration, Marine landing, Natural calamity, Storm, Salinity.

Introduction

West Bengal is a state of Eastern part of India which lies between 27°13'15"N to 21°25'24"N latitude and 85°48'20"E to 89°53'04"E longitude. The eastern part of the state is facing Bangladesh; Bihar and Jharkhand, these two states are present in the west; Nepal on the north-west side; Odisha on the south-west side; Bhutan and Sikkim on the eastern side and Assam on the north-east side. The southern part of this state is facing Bay of Bengal; thus this state is having some coastal districts namely North-24-Paraganas, South-24-Paraganas and East Midnapur.

Since the last decade, West Bengal has experienced numbers of cyclonic events, among which Amphan (hit in the month of May, 2020) and Yaas (hit in the month of May, 2021) are the two recent occurrences. Yaas was a kind of very severe cyclonic storm that made the landfall in Odisha and put impact both in Odisha and West Bengal.

Effect of any cyclone is crucial as it imparts multiple variations in the physicochemical condition of the aquatic environment. Organisms like fishes are influenced by any changes in the aquatic environment and are extremely vulnerable to even minor changes in their ecological niche¹. Cyclones can have severe impacts on fisheries and aquaculture. Cyclones can topple streamside trees into stream channels, which can obstruct and redirect the flow, alter habitat structure and patterns of sediment

scour and fill² which finally can impact the recruitment of the fish as well as assemblage pattern³⁻⁵. Intrusion of saltwater in the river can enhance the salinity which can result in the introduction of some estuarine varieties and upstream movement of non-tolerant species⁶. On the other hand, saltwater intrusion may result change in fresh water fish diversity as well as can put impact on freshwater aquaculture. Cyclone can even result in food scarcity, livelihood income, and a lack of security⁷.

The Indian subcontinent has a large aquatic region that is vulnerable to several natural disasters like cyclones. The Bay of Bengal's costal influence has a significant impact on the lower Gangetic zone in particular⁸⁻⁹. As reported by several authors^{10,11} cyclone Aila that struck in 2009 resulted in severe impact on the mangrove estuaries of the Indian Sunderban where altered hydrodynamics has reported to cause major changes in several biological communities including fish. The present work has been done with the aim to gather some preliminary information on the impact of cyclone Yaas on fisheries and aquaculture in Eastern Sunderban part of West Bengal.

Materials and methods

Observations were made on the basis of pre-prepared interactive schedule and questionnaire in accordance to assess the impact of

Yaas. The survey work was conducted for the duration of six months (June, 2021 to November, 2021) post-Yaas at Namkhana (latitude 21°46'12"N and longitude 88°13'53"E) and Kakdwip (latitude 21°52'45"N and longitude 88°11'29"E) area (Figure-1) and the documentation was prepared based on fisher's perception. For this purpose, questionnaire based survey and focused group discussion (FGD) were conducted. Around 150 active fishermen were integrated and interacted for the study.

from May-June resulted in 15.11 tonnes from Fraserganj. Out of the total catch, 82.5% (12.46 tonnes) were comprised of above mentioned species indicating shift in total marine fish composition. This might be due to the change in water salinity and total dissolved solid (TDS) levels. Influx of marine water due to the cyclone in the estuarine region might have also changed the fish schooling pattern. The post Yaas effect resulting in rainfall may have caused in reduced water salinity levels thereby resulting in availability of cosmopolitan brackish water fish species like *Mugil cephalous*, *Liza tade*, *Lates calcarifer*, *Platycephalus indicus*, *Odontamblyopus rubicundus*, *Hyporhamphus limbatus* etc. as observed riverine catch. It was also observed that more tolerant species, like crabs belonging to portunidae family like *Scylla serrata*, penaeid shrimps and benthic sole fish (*Brachiurus* sp., *Cynoglossus* sp.) survived with no such distributional effects from the cyclone. There was no such record of exotic fish perturbation in the region as reported from Kerala during the floodwater of 2018¹². Observation was also made for sudden rise in marine fish seed (spawn) particularly of *Lates calcarifer* (locally known as Bhetki) in different saline farms of Namkhana. Post Yaas and strong turbulent wind effect has created a sudden rise in fish seed of Bhetki. Naturally, the spawning occurs during new moon or full moon in the river mouth. As per the observations, abundant spawns were found to infiltrate local ponds and impoundments after the effect of the cyclone. This has certainly attributed towards rise in fish seeds availability for local aquaculture practitioners.

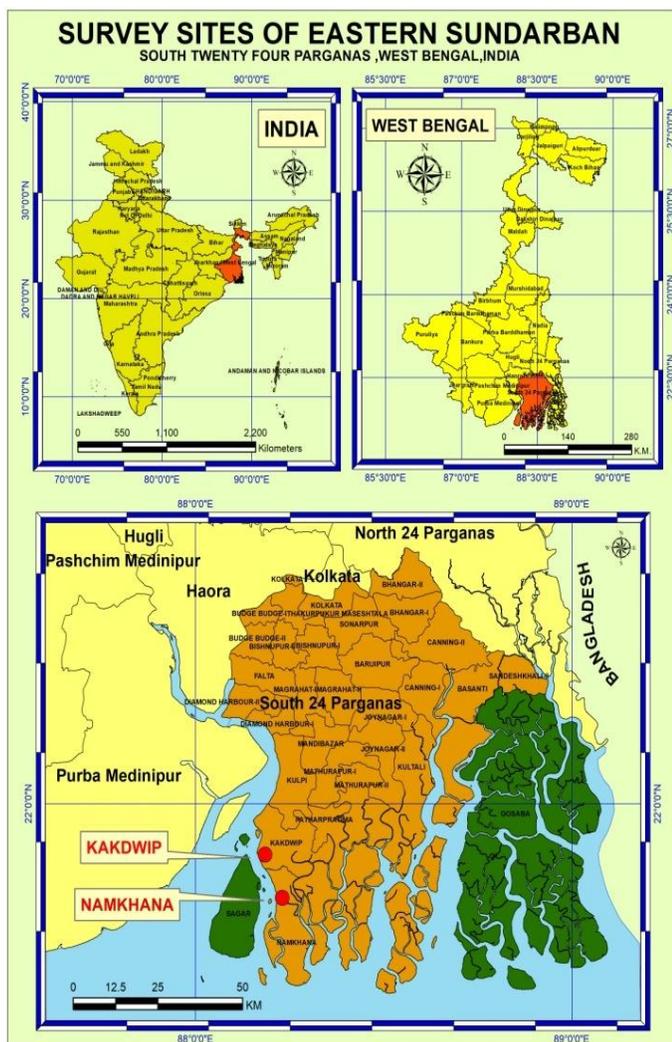


Figure-1: Location map of the study sites.

Results and discussion

The post Yaas effect following the successive rainfall showed major discrimination of fish species both in terms of diversity and abundance. During the exploration, major fish species in landings were from marine ecosystem. Although, detail species wise quantification were not confirmed, data from Kakdwip and Namkhana region showed dominance of marine fishes especially, *Tenulosa toli*, *Ilisha megaloptera*, *Coilia* sp., *Harpadon nehereus* etc. The total landing post Yaas extending

Conclusion

Our mother earth is unfavorably been influenced by numerous characteristic calamities which are exceptionally troublesome. However, it's post-impact can be diminished by applying the correct prudent measure. The present study indicates few impact of the post effect of cyclone on fishery resources. Among the resources shifting in marine catch was recorded. Induction and increase in brackish water fish species were also observed that has caused sudden changes in fish assemblage pattern. Moreover, adjunct effect of Yaas has also resulted in positive effect in rise of few species like Bhetki in local water bodies that has caused harvesting and marketing of such lucrative fish species resulting in enormous employment and revenue generation among the youths and people associated.

References

1. Ferrera, I., Reñé, A., Funosas, D., Camp, J., Massana, R., Gasol, J. M., & Garcés, E. (2020). Assessment of microbial plankton diversity as an ecological indicator in the NW Mediterranean coast. *Marine Pollution Bulletin*, 160, 111691.
2. Dolloff, C. A., Grette, G. B., House, R. A., Murphy, M. L., Koski, K. V., & Sedell, J. R. (1987). Large woody debris in forested streams in the Pacific Northwest: past, present, and

- future. Streamside management: forestry and fishery interactions, (57), 143.
3. Schlosser, I. J. (1991). Stream fish ecology: a landscape perspective. *BioScience*, 41(10), 704-712.
 4. Lenat, D. R., & Crawford, J. K. (1994). Effects of land use on water quality and aquatic biota of three North Carolina Piedmont streams. *Hydrobiologia*, 294, 185-199.
 5. Jones III, E. D., Helfman, G. S., Harper, J. O., & Bolstad, P. V. (1999). Effects of riparian forest removal on fish assemblages in southern Appalachian streams. *Conservation biology*, 13(6), 1454-1465.
 6. Van Vrancken, J., & O'Connell, M. (2010). Effects of Hurricane Katrina on freshwater fish assemblages in a small coastal tributary of Lake Pontchartrain, Louisiana. *Transactions of the American Fisheries Society*, 139(6), 1723-1732.
 7. Sulu, R. J., Eriksson, H., Schwarz, A. M., Andrew, N. L., Orirana, G., Sukulu, M., ... & Beare, D. (2015). Livelihoods and fisheries governance in a contemporary Pacific Island setting. *PLoS One*, 10(11), e0143516.
 8. Das, M. K., Sharma, A. P., Sahu, S. K., Srivastava, P. K., & Rej, A. (2013). Impacts and vulnerability of inland fisheries to climate change in the Ganga River system in India. *Aquatic ecosystem health & management*, 16(4), 415-424.
 9. Sahana, M., & Sajjad, H. (2019). Assessing influence of erosion and accretion on landscape diversity in Sundarban Biosphere Reserve, Lower Ganga Basin: a geospatial approach. *Quaternary Geomorphology in India: Case Studies from the Lower Ganga Basin*, 191-203.
 10. Mukherjee, S., Chaudhuri, A., Sen, S., & Homechaudhuri, S. (2012). Effect of Cyclone Aila on estuarine fish assemblages in the Matla River of the Indian Sundarbans. *Journal of tropical ecology*, 28(4), 405-415.
 11. Bhattacharya, B. D., Bhattacharya, A. K., Rakshit, D., & Sarkar, S. K. (2014). Impact of the tropical cyclonic storm 'Aila' on the water quality characteristics and mesozooplankton community structure of Sundarban mangrove wetland, India.
 12. Kumar, A. B., Raj, S., Arjun, C. P., Katwate, U., & Raghavan, R. (2019). Jurassic invaders. *Current Science*. 116(10), 1628-1630.