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## Upwelling Induced Anoxia in a Eutrophic Estuary, Southwest Coast of India: Influence of Lateral Inputs

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Hydrographic observations in the Cochin backwaters (CBW), southwest coast of India during the summer monsoon delineated the spreading of an unusually anoxic water mass in the bottom characterized by intense denitrification and formation of hydrogen sulphide, which have not been previously reported from any tropical estuaries. The coastal zone of western India experiences moderate upwelling during this period. The oxygen deficient ( $\sim 0.5 \text{ ml.l}^{-1}$  or  $22 \mu\text{M}$ ) upwelled waters, as it intrudes into the estuary through the bottom, is quickly depleted in the oxygen content to near-zero levels owing to the excessive demand for the oxidation of organic matter. Increased river inputs countering the penetration of upwelled waters cause strong stratification and poor ventilation leading to reducing conditions near the bottom. It was also observed that increased lateral inputs rich in organic matter have resulted in the development of anoxic conditions ( $\text{O}_2=0$ ), 2-6 kms inside the estuary, where the concentration of hydrogen sulphide increased up to  $12 \mu\text{M}$ . An increase in the nitrite concentrations (up to  $2.4 \mu\text{M}$ ) in the oxygen deficient waters compared to its levels at the Cochin inlet and corresponding to a decrease in the nitrate inputs indicated that denitrification was active. The intrusion of upwelled waters seems to be much stronger (up to  $\sim 16$  kms inside the estuary) compared to its first report in 1968, which is attributed to a decline in the river discharge and deepening of the estuarine channels. The expansion of oxygen deficient zone and formation of hydrogen sulphide are anthropogenically induced and could be destructive to the biological productivity and an increased emission of greenhouse gases from this region.

### Position

Postdoc

### Affiliation

Kerala University of Fisheries and Ocean Studies, Ernakulam, Kerala, India.

### Email Address

[martinnio@gmail.com](mailto:martinnio@gmail.com)

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No

**Primary author(s) :** G.D, Martin (Kerala University of Fisheries and Ocean Studies)

**Co-author(s) :** Dr REJOMON, George (Bishop Abraham Memorial College, Mallappally, Kerala, India.); Dr K.R, Muraleedharan (CSIR-National Institute of Oceanography, Regional Centre, Kochi, Kerala, India.); Dr P.M, Deepulal (Department of chemical oceanography, CUSAT, Kerala, India.); Dr GOPINATH, Anu (Kerala University of Fisheries and Ocean Studies, Ernakulam, Kerala, India.); Dr JOHN GERSON, Vijay (CSIR-National Institute

of Oceanography, Regional Centre, Kochi, Kerala, India.); Dr A., Biju (CSIR-National Institute of Oceanography, Regional Centre, Kochi, Kerala, India.)

**Presenter(s) :** G.D, Martin (Kerala University of Fisheries and Ocean Studies)

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