

Regional Analysis on the Decadal Variation of Water Quality from Ground-based and Remotely Sensed Data in Three Contrasting Coastal Systems of Ishikawa Coast, Japan

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Understanding and predicting change in the world's coastal zones requires baseline assessments for trends over a long time on regional scale. Using ground-based and remotely sensed data, this study examined trends of change over time in some water quality parameters from three contrasting coastal system (Kanazawa area- KNA, Noto area- NTA and Nanao area- NNA) of Ishikawa coast. Mean annual concentration of COD has decreased by ~20% and 48% at KNA and NNA, respectively, between 1984 and 2009, whereas, NTA which had lowest COD concentration in 1984 had increased by one-third (~31%) as at 2009, possibly as a result of human perturbation from tourism, agricultural and fishing activities. Observed trend showed a significant ($P < 0.05$) inverse corresponding relationship with DO especially at KNA and NTA. Similarly, within the last two decades, pH value has dropped between 0.14 – 0.18 along the coast (KNA, NTA and NNA), suggesting climate change impact on coastal waters quality of Ishikawa. The decreasing pH correlates with increase in CO₂. While total nitrogen (T-N) and phosphorus (T-P) loading have significantly reduced by 30-40% between 1984 and 2009 at KNA, there has not been significant reduction at NNA, suggesting a coastal system potentially vulnerable to eutrophication due to often restricted water exchange with the adjacent ocean. Also, annual time series of Chlorophyll a concentration derived from satellite image revealed increasing (more than tripled between 1997 and 2009) trends of phytoplankton biomass build-up (Chlorophyll a) at NNA. Although, there is uniform approach to the development of water quality standards in Japan; setting more strict standards will be required by the prefecture in collaboration with industry, stakeholders groups and coastal community resource users. An attempt, therefore, to maintain the coastal water quality through continuous monitoring of coastal developments and activities will be a more targeted and effective adaptation strategy. Further studies to this will detail on the socio-economic drivers of observed change and climate change impacts on Ishikawa's coastal living resources majorly at NNA and policy response required for future decision making.

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