Relationship between seasonal variations of primary productivity and the physico-chemical environment in highly cultivated coastal lagoon (Lake *Saroma*)

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Lake *Saroma* has an area of 150.4km^2 with an average depth of 8.7m and is the biggest lagoon in Japan. In addition, measured average salinity is 33psu as high as the coastal sea. In winter, Lake *Saroma* freezes up at all area and is receiving drift ice from the Sea of Okhotsk. While in summer, water temperature rises up to a maximum 22℃ with an annual range of 25℃ showing the seasonal environmental pattern in the study area. Lake *Saroma* houses the cultivation of scallops and oysters and this culture which occupied 79.3km^2 or 53% of the total area. Average scallops production amounted to 7000 tons per year. Bivalves are filter-feeding organisms, and are playing a significant role of material cycling. However, water quality problems such as anoxic events do occur in summer affecting natural productivity in the lake for bivalve culture. Aquaculture rapidly expanded for more over 20 years of all over the world and the production increase more than twice and account for one-forth of human demand for fish. Therefore, aquaculture must be done using an environmental practice to ensure sustainable production to meet the increasing demand for fish. These environmental problems at Lake *Saroma* may have impacts on the shape of scallop productions and furthermore it is imperative to address these problems. Thus, this study examined the physico-chemical properties, to understand the material cycling and ascertain the seasonality of remarkable phytoplankton community at five stations on east side of the lake.

Chlorophyll *a* (Chl *a*) concentration showed similar variation at all stations with respect to the upper and middle layer, while dissimilar variation was observed at the bottom layer. Phosphorus was possibly the limiting nutrient for this variation in the upper and middle layer due to correlative variation obtained in PO_4-P and chl *a* concentration. However in the bottom layer, temperature became the limiting factor until June while dissolved oxygen levels decreased to <2mgl^{-1} from the end of July. In addition, decreased photosynthetic-activities of phytoplankton were possibly due to anoxic condition at the bottom layer. Moreover, high nutrient concentration in bottom layer is attributed to nutrient elution from surface sediments, observed nutrient concentration in the upper and middle layer did not show a clear trend, thus, resulting to a possibility of water mass development at the bottom. Further research intends to ascertain the origin of suspended matter and sources of nutrient supply between new and regenerated production.