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Oligotrophication In The Seto Inland Sea, Japan

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DIN (Dissolved Inorganic Nitrogen) concentration in Harima-Nada and Bisan Strait, the Seto Inland Sea has decreased from 1994 (Tada et al., 2010) though TN (Total Nitrogen) concentration kept nearly the same value. DIN value in Harima-Nada is only about 1/10 of TN. Cell density of diatom, which is the main species of phytoplankton in Harima-Nada, did not change but the major species of diatoms has changed from Skeletonema spp. to Chaetoceras spp.. Only the change of DIN without that of TN suggests that the decomposition of TN to DIN decreases, that is, the material cycling of nitrogen by biochemical processes was active in the past but is not active now. It is suggested that the material cycling of biochemical elements including DIN, DON (Dissolved Organic Nitrogen), PON (Particulated Organic Nitrogen) has changed due to the marine environment change, especially the change of related marine ecosystem. History of eutrophication and oligotrophication in the Seto Inland Sea is schematically shown in Fig.1. In the 1960s, when the raid economic growth began, the nutrients concentrations were low but the bio-diversity was high and the fish production was not so low in the Seto Inland Sea. Due to the increase of nutrients loads from the land during the rapid economic growth, the nutrients concentrations increased and the fish production also increased. Then the maximum fish catch was attained in 1985. The total nutrients loads control was begun in 1979 under the framework of Special Law but the TP and TN concentrations in the Seto Inland Sea did not change until the 1990s due to large supply of nutrients from the Pacific Ocean compared to the nutrients supply from the land. On the other hand, the bio-diversity and the fish production in the Seto Inland Sea continued to decrease due to the hypoxia, destruction of shallow areas environment, especially the decreasing area of tidal flats and sea grass beds. From the late of 1990s, DIN began to decrease mainly due to the change of material cycling of nitrogen related to the change of biochemical processes by changed marine ecosystem in the Seto Inland Sea. Fig.1 suggests the multi-phase quasi-steady state of material cycling and nutrient concentration in the Seto Inland Sea. Fig.1 History of eutrophication and oligotrophication in the Seto Inland Sea