Isahaya Bay, Freshwater Lake To An Estuary Again

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The Ariake Sea is a meso to macro-tidal estuary or ROFI located in Kyushu Island, western Japan. It has distinctive features in the semi-enclosed seas in Japan, e.g. the largest tidal amplitude in Japan up to 6m, extensive mudflat which accounts for 40% of total tidal-flat areas in Japan and unique biota. The Isahaya Bay is a tributary of the western Ariake Sea. A class A river Honmyo River flows into at the head of the Isahaya bay. The inner 1/3 of the Isahaya Bay was shut off from the sea by a dike for the reclamation and disaster prevention in 1997. The mudflat and estuary in this area disappeared and a fresh water reservoir with an area of 26 km2 and mean depth of 1.1 m was constructed. The farming started in the reclaimed land in 2008 where the reservoir water is utilized for agriculture. On the other hand, several environmental and fisheries problems occurred after the end of 1990s in the Ariake Sea, e.g. increase in red tide, occurrence of hypoxia, decrease in bivalve catch etc. Some fishermen living in the coast of the Ariake Sea insisted that the major reason for the decrease of fishing must be the influence of the Isahaya dike construction and filed lawsuits against the Japanese government to take off the dike or open the gates to reintroduce sea water into the reservoir and recover the tide. In December 2010, they won a lawsuit and the judgement was confirmed at the Fukuoka High Court. According to the court decision, Japanese government must open the gates until December 2013 and keep them open for 5 years thereafter to confirm the influence of the dike construction. Now the government is preparing for the gate opening. However there is a intense opposition movement against the gate opening in the farmers and some fishermen who had been forced to change their fishing form under the influence of the dike construction. There are also problems from the scientific viewpoints. 1)The length of the dike is 7km but the total width of the gates is 250m. Therefore the gate opening will produce an environment that is different from now and before the construction of the dike. 2)How to distinguish the effect of gate opening and other natural variations? 3)The effect of gate opening is highly depending on the gate control procedure. How to decide it? We made numerical simulations of currents and hydrography for several cases of gate opening and found that there is a possibility of environmental degradation caused by the gate opening, e.g. enhanced stratification (it can generate hypoxia and/or red tide) and sediment deposition over the bivalve culture ground. To minimize the bad effects and to succeed the environmental restoration, it is needed to make wise decision of gate opening procedure. Keywords: Isahaya Bay, Ariake

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