developing a healthy river basin" in 2002, and selected the basin of the Fishino River as a model field. In 2003, the natural environmental restoration law has been established. Based on this law, a "council of the river mouse and tidal flat restoration in the Fishino River" has been launched in 2004. The members of the council were consisted of thirty individuals and citizen groups, eighteen local and national governmental organizations, and nine researchers. There are a lot of living organisms which should be conserved in the bay, which include short-necked clam, eel grass, houseshoe crab, waterfowls, etc. Among them, short-necked clam and eel grass were in the most serious situation. In the past, there were 700 ha eel grass bed in this area, which decreased down to 32 ha in 2002. The council members have planted young plant of eel grass, and the eel grass bed has increased to 153 ha in 2005. Our researches of finding the suitable habitat for eel grass would have helped the activity.

About short-necked clam, the situation was more complicated. Fishery catch of short-necked clam was 653 ton in 1975, which is sharply down to zero ton in 1991. Although there are a lot of possible reasons for this problem: 1. High mud content on the bottom sediment, 2. Low nutrient in the water, 3. Toxic substances in the water, 4. Over fishing, 5. Predation, etc., we could not reach a concrete conclusion about the cause. The council needed to start from possible countermeasures together with monitoring and researches. Since the clearest change of the environment was rise of mud content, the local government conducted sand covering works at first. The council members also conducted tidal flat cultivation at the place where the sand became hard. Low nutrient, toxic substances and predation were left unknown. We conducted researches to know the effects of these unchecked factors. Our research revealed that predation had a huge influence on short-necked clam biomass, and protecting by nets is essential in this bay. We also showed the appropriate location of spawning based on current simulations. Recently the council has set up protecting nets at some places in the bay based on our proposal. We will continue this cooperative activity until we successfully restore this area in the near future.

Creation of SATO-UMI as a policy in Japan

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Circumstance of the Environmental Coastal Seas in Japan: In Japan, Effluent Standards of nitrogen and phosphorus are applied in the enclosed coastal seas. In particularly regional area (for example: Seto Inland Sea), Total Pollutant Load Control System of COD_{Mn}, nitrogen and phosphorus is added. As a result, remarkable pollution was improved, but the functional depression of material circulation, deterioration of the ecosystem including marine resources and citizen's unconcern for water environment were advanced. Therefore the Government of Japan promotes the verification of technologies for improvement of the water environment in enclosed coastal seas, pushes forward establishment of action plan to achieve the water environment quality that should be target in future indicated by the DO in the bottom layer and transparency. And recently the restoration of enclosed coastal seas by the creation of SATO-UMI is added.

The Creation of SATO-UMI as a National Policy: The creation of SATO-UMI as a national policy had its inception when it was designated as the environmental policy which should be started during the next one or two years in BECOMING A LEADING ENVIRONMENTAL NATION STRATEGY IN THE 21st CENTURY (MOE, June 2007). This strategy plans the creation of seas which are full of the natural blessings that various fishery products inhabit by integrating promotion of conservation and restoration of shallow area, water pollution control, and sustainable resources management.

Therefore, MOE has started supporting the advanced activities for the environmental conservation and evaluating the effects of them since 2008, and the know-how of these activities are going to be edited as a manual which serves as a reference when a new activity is started.

View point at Creation of SATO-UMI: MOE tidied up the concept of SATO-UMI as follows in cooperation with some experts in 2007.

- SATO-UMI is the coastal sea where human coexist with nature tied to living and the

traditional culture of people deeply with appropriate function of material circulation, high productivity and biodiversity under integrated coastal management by mankind.

- The creation of SATO-UMI can be a tool of the participatory and cooperative model for the integrated coastal management, because SATO-UMI is the concept of not only space, but also including human activities and can be gain the continuity if tied to the human habit.
- By material circulation, ecosystem and water amenity (these 3 elements are conserved by SATO-UMI), spot and body of activity, SATO-UMI is categorized into some patterns like Basin type, Fishing Village type and others.

Silvo-aquaculture: an ecosystem based management for sustainable coastal aquaculture in Thailand

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Mangrove forests in Southeast Asia have declined significantly over the past four decades due to many of human activities i.e. population pressure, wood extraction, conversion to agriculture and salt production, tin mining, coastal industrialization and urbanization including the conversion to coastal aquaculture. Silvo-aquaculture is an ecosystem based management for the sustainable used of coastal area for aquaculture that integrates mangrove and aquaculture for produce seafood in coastal areas especially shrimp farm. The large scale of silvo-aquaculture, an integrated 116 ha of shrimp farms with 160 ha mangrove, has been demonstrated at Kung Krabaen Bay, Chantaburi, Thailand. A number of 113 small scale farmers and community were educated in farm management practices based on ecosystem approached including with water irrigation, environmental protection, mangrove sea replantation, seaweeds conservation and fish stock enhancement in the bay. The annual shrimp production from this area was about 11.2 ton/ha/year while mangrove forest has been slowly increased at a rate 1.3 ha/year by natural reproduction and replantation. The study of water quality and nitrogen budget indicated that treatment system and the bay played it role on trapping and utilization of the nutrients from intensive shrimp farm.

The small scale silvo-aquaculture pond (5.2 ha) was demonstrated in the mangrove (Rhizophora apiculata) replanted natural shrimp pond (density about 11 tree/ha or 2,614 kg/ha) located in Nakhonsrithammarat, Thailand. Mud crab (Scylla serrata) and black tiger shrimp (Penaeus monodon) were stocked to supplement the natural recruitment. Little amount of fresh fish was supplemented as feed to enhance growth of crab. The result suggested that the biomass of mangrove was increased about 10% or about 29-74.49 $mgC/m^2/d$ or 0.15-0.37 $mgN/m^2/d$, while the rate of litter fall was about 6.7-32.3 $mgC/m^2/d$ or 0.06-0.29 $mgN/m^2/d$. The contribution of the mangrove tree to the production of culture species is comparatively low comparing to the other processors. This is probably due to slow degradation of the litter fall from mangrove tree. In addition, the result from nitrogen budget suggests that mud crab and shrimp are suitable for the silvo-aquaculture pond because they are benthic detritus feeders. The addition management techniques are probably needed in order to utilize/transfer nutrients to the culture species.

Phytoremediation of organically enriched sediment evaluation by a numerical model

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Evaluation of results from field experiments was made by a numerical model. The field experiments were those to remediate shallow enriched sediment by replanting mass-cultured benthic microalgae, *Nitzschia* sp. The observation results have already reported elsewhere, in which organic content of the sediment was significantly decreased and inorganic nutrient concentration was increased. However, the processes which may have occurred in the surface sediment were not clear with only stock data. Then we tried to evaluate how much amount of biophilic elements were cycled in the surface sediments. The model constructed in the present study is consist of 9