and presently cultivates 26 500 ha of the scallop, Patinopecten yessoensis, 10 000 ha of the arkshell, Scapharca broughtonii, 660 ha of the sea cucumber, Apostichopus japonicus, and 100 ha of the abalone Haliotis discus hannai. The company has been in existence for more than ten years. The total harvest in 2005 reached 28 000 tonnes, valued at more than US$60 million (US$18 million in net profit). To improve ecological conditions and the sustainability of the operation, the company is now thinking of developing seaweed cultivation and the construction of artificial reefs in more offshore environments. To date, about 13 300 ha have been optimized in this way.

Besides the development of demonstration activities and applied research to clearly show farmers and regulators the benefits of IMTA, basic research on IMTA has also been performed by some institutions of China, for example, the environmental requirements for the growth of seaweeds and shellfish to maximise the nutrient recycling efficiency tp the culture conditions (depths, relative position with respect to the fish cages in relation to the prevailing currents, distance from the cages and culture density).

To avoid spatial competition and serious environmental impacts in inshore region, developing the IMTA in offshore areas, such as suspending culture of fish, shellfish and kelp, sea ranching of sea cucumber, sea urchin, abalone, seaweeds and scallop is a trend for mariculture industry in China.

Seasonal retention and release of phosphorus in Shinkawa-Kasugagawa Estuary, the western Japan

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Estimation of mass balance of biophilic elements, such as nitrogen or phosphorus, is very important to understand the dynamics of these materials in coastal ecosystems. Phosphorus plays as one of the most effective material for the growth of primary producer or the eutrophication including occurrence of noxious red tides in the coastal sea. Phosphorus, discharged from a river, is varied in quality and quantity in estuary ecosystem, and then flow out to the coastal sea. We carried out 10-12 hours surveys during a high-low tidal cycle in May, August and November in 2006. Our objective is to estimate the phosphorus balance in Shinkawa-Kasugagawa estuary and to demonstrate the function of intertidal zone to coastal environment.

Hourly seawater samplings were conducted at boundary site between intertidal and subtidal area to estimate the abundance of phosphorus which flowed into or flowed out from intertidal zone. Collection of river water and measurement of flow rate of the river were also carried out to estimate the abundance of discharged phosphorus from the river. As a result, 40.9 kg of phosphorus (dissolved inorganic phosphorus+particle phosphorus) were discharged into intertidal zone from Shinkawa-Kasugagawa River, and 23.6 kg of phosphorus flowed out from intertidal zone to the sea in May. In August, 33.7 kg of phosphorus were discharged from the river and 12.4 kg of phosphorus flowed out to the sea. Therefore, 17.3 kg (42%) and 21.3 kg (63%) of discharged phosphorus from the river could be considered to trap in intertidal zone in May and August, respectively. On the contrary in November, only 2.6 kg of phosphorus were discharged from the river and 42.8 kg of phosphorus flowed out to the sea, showing 40.2 kg of phosphorus were released from intertidal zone.

Our results indicate that considerable phosphorus discharged from the river are trapped in intertidal zone during spring to summer, when various estuarine organisms are active, and are released drastically to the sea during autumn to winter.

Adaptive cooperative management of tidal flat by citizens - governments - researchers in the Yamaguchi Bay

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In the Yamaguchi Bay, which is located at the mouth of the Fushino River, fishery resources have been decreased quickly. The local government established a " committee of