

Sato-Umi ; New Concept for the Coastal Sea Management

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“Sato-Umi” ; New Concept for the Coastal Sea Management

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Abstract

New concept of the coastal sea management named “Sato-Umi”, which is defined as “the coastal sea with high productivity and high biodiversity under the mankind’s interaction” is proposed. We have to realize the thick, long and smooth material cycling and the proper fish resources management in the coastal sea in order to establish Sato-Umi.

Key words : *coastal zone management, material cycling, environmental preservation*

1. Introduction

Some people say that “The Nature takes its best state without the mankind”. Is this true? There will be no environmental problem when the mankind would not be on the earth. However, there is no meaning to discuss on the environmental problem without the mankind.

There exists the nature which takes its best state under the mankind’ interaction. It is “Sato-Yama” in Japan. “Sato” means the area where people live and “Yama” means the forest in Japanese. Therefore Sato-Yama means the forest near the place where people live. The area of Sato-Yama was about 4,500,000 ha in 1987 and Sato-Yama occupied about 20% of the total area of forest in Japan of 25,000,000 ha.

We will discuss on the new concept of coastal sea management based on Sato-Yama in this paper.

2. Sato-Yama

The deciduous trees such as oak are planted in Sato-Yama and they are cut every 20-30 years to use them for mushroom cultivation or charcoal. The dropped leaves are used for the fertilizer in the rice field. The insects such as beetle come to Sato-Yama for tree honey and small animals such as squirrel come to Sato-Yama for acorn. Many flowers are bloom in spring because there is no leaf above them and many

insects such as butterfly come to Sato-Yama for flower’s honey.

The periodical disturbances by mankind, such as cutting plants and trees, are good for the high biodiversity at Sato-Yama. The beautiful and successful harmony between nature and mankind has been maintained in Sato-Yama.

Some parts of Sato-Yama have been devastated in recent years because many people abandoned their life near Sato-Yama in the country and moved to the city. The periodical disturbances have been lost in Sato-Yama and high productivity and high biodiversity also have been lost there. Therefore some city people go to Sato-Yama for part-work to re-establish the nature of Sato-Yama in recent years.

3. Sato-Umi

Can we make “Sato-Umi” similar to Sato-Yama? “Umi” means the sea in Japanese. We define “Sato-Umi” as “the coastal sea with high productivity and high biodiversity under the mankind’s interaction”^{1), 2)}.

In order to establish Sato-Umi, we first have to understand quantitatively the material cycling in the coastal sea. That is, we have to know, how much nutrients are loaded from the coast, how much are the primary, secondary and tertiary productions there. We have to clarify what kinds of actions by mankind are permissible or in-permissible in the coastal sea from the viewpoint to increase the production and biodiversity there. The important thing is to establish the thick, long and smooth material cycling in Sato-Umi (Fig.1).

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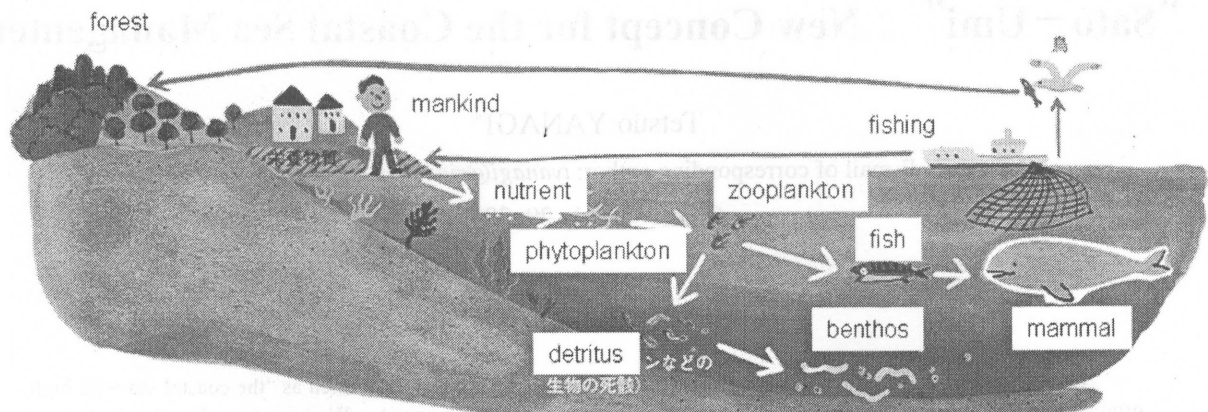


Fig.1 Thick, long and smooth material cycling in the coastal sea.

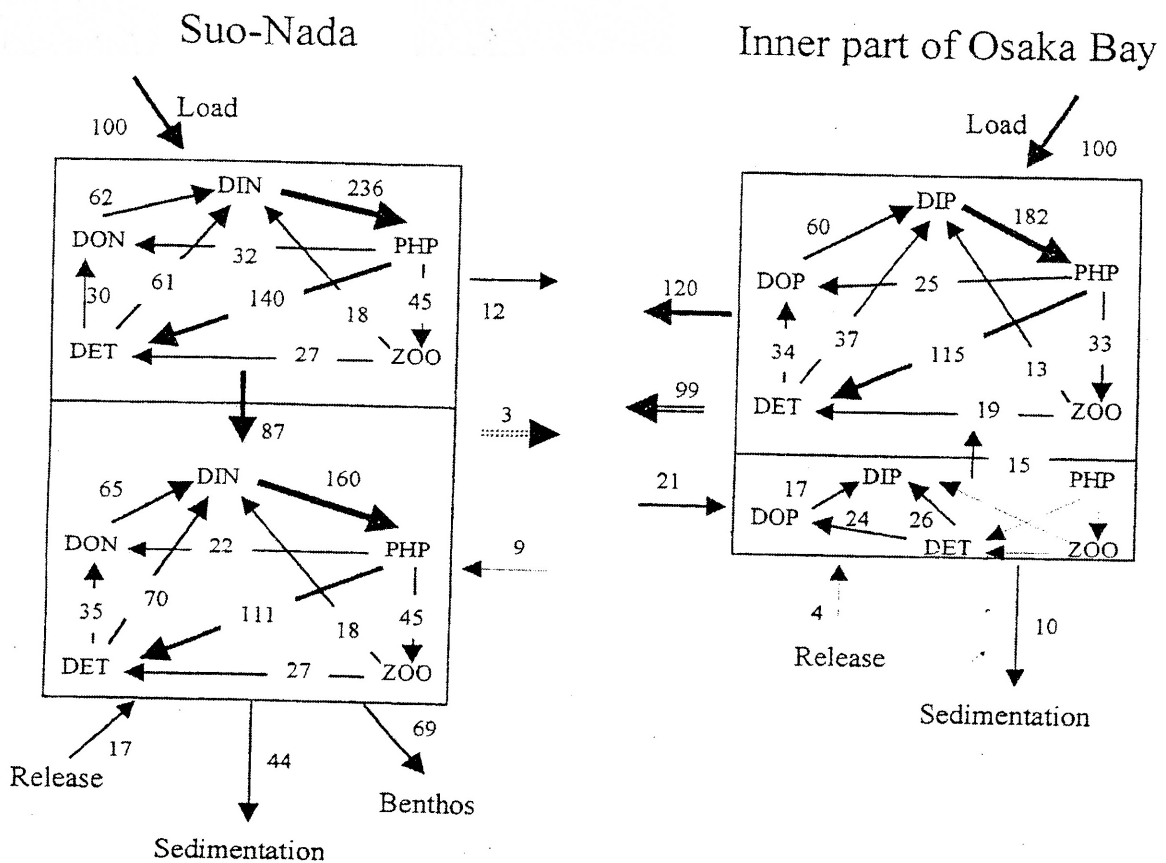


Fig.2 Biochemical element flux in Suo Nada (left) and Osaka Bay (right) calculated by box ecosystem model where the flux is normalized by the river load as 100. Primary production flux in Suo Nada is 236 and that in Osaka Bay is 182³⁾.

For example, the red tide has thick material flow but it has short and no-smooth material flow because the big biomass of dead phytoplankton sinks to the bottom to generate the oxygen-deficient water mass and

bio-elements such as nitrogen and phosphorus are not flown up to zoo-plankton. Therefore we have to prevent the occurrence of red tide and oxygen-deficient water mass in the coastal sea.

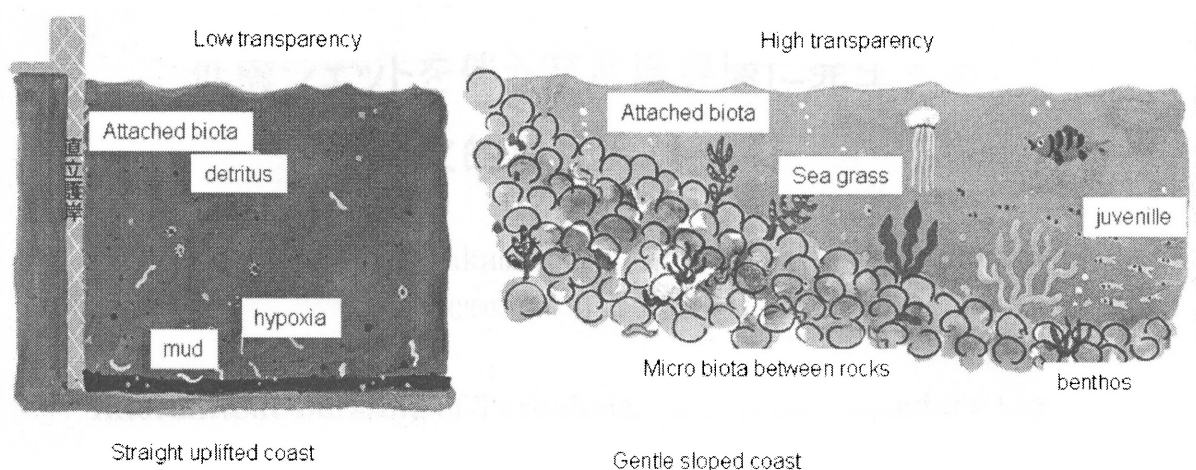


Fig.3 Straight and uplifted coast (left) and gentle sloped coast (right).

The material cycling in the coastal sea is governed not only by physical processes such as current and diffusion but also chemical-biological processes such as primary production and preying (Fig.2)³⁾.

Therefore it is very important to assure the living environment for many kinds of biota in Sato-Umi. For example, the gentle sloped coast is much better than the straight uplifted coast for the coastal environment because many kinds of biota can live along the gentle sloped coast where the environmental gradient is small (Fig.3).

4. Discussion

The trial of establishing Sato-Umi has just started now. We have to pile up many experiences in the coastal sea in order to establish Sato-Umi.

At first, the proper regulation of nutrients load from the land is necessary to prevent the occurrence of red tide and oxygen-deficient water mass. Next the preservation and rehabilitation of the shallow sea area whose water depth is less than 20 m is very important in order to assure the recruitment of fish in the coastal sea. Very wide shallow sea area has been lost due to the reclamation. Moreover tidal flat and sea grass bed, which are also very important not only for the primary production but also for the nursery ground of fish, have been lost due to the reclamation and the decrease of transparency. We have to recover such degraded coastal sea environment by some proper management activities.

The proper management of fishing activity is very

important for the preservation of fish resources though it is very difficult. We have some good and successful examples of fish resources management at Fishermen's Unions in the Seto Inland Sea, Japan such as Himeshima⁴⁾ and Misaki⁵⁾. We have to expand such good examples to the whole area of the Seto Inland Sea in order to establish Sato-Umi there.

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