

Research Trends and Results

Realization of Environmental Management for Riverine Estuaries

NAKAMURA Keigo (Dr. Eng.), Senior Researcher, SUZUKI Hiroyuki, Researcher, MAEDA Yoshiyuki (Dr. Agr.), Guest Research Engineer, KAI Takashi, Guest Research Engineer, HATTORI Atsushi (Dr. Eng.), Head, River Division, River Department

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1. Little known riverine estuaries

Riverine estuaries constitute a complicated environment where salt water and fresh water meet but serve as an important environment where various organisms live. However, the number of studies on riverine estuaries is very small as compared with rivers. For environmental management of riverine estuaries, it is necessary to identify perspective on their environment, which is different from that of rivers, and to clarify the physical environment of habitat that should be preserved.¹⁾ This paper introduces the concepts and studies for realizing such issues.

2. Perspective on riverine estuaries beyond river system

Environmental management of rivers is generally discussed based on such units as basin or water system, but it is important for riverine estuaries to consider biological relations beyond river system, such as inside of the bay. For example, crabs have a habit of returning to the riverine estuary where they were born or to the coastal area around the same estuary after they drifted as larva and spread widely in the sea. As peripheral river areas to focus on, the nine areas in the riverine estuaries as shown in Figure 1 are under consideration as the authors' proposal.^{Amendment of 2)} These areas were determined by considering the results of analyzing the data of the Census of Rivers and Riparian Areas, ocean currents, geographical conditions of inland seas and inside bays in riverine estuaries, etc. Target areas are roughly divided into the Japan Sea and Pacific Ocean sides, and are also divided according to inner bays such as Tokyo Bay and Ise Bay. By observing riverine estuaries according to these areas, results of observation can be utilized, such as restoration of tidal flat aiming at the state of tidal flat remaining in the same area, or assumption of organisms that can be revived.

3. Quantification of the habitat of organisms in riverine estuaries

Although topographic alteration, such as by river improvement, affects the habitat of organisms in riverine estuaries, quantitative relationship between them is not clarified. Therefore, the authors clarified the elevation difference preferred by main organisms in riverine estuaries using the results of the benthos survey in the Census of Rivers and Riparian Areas.³⁾ (Example shown in Figure 2) "Elevation difference" used herein represents the ground level relative to tide, using "Ground level relative to tidal oscillation" where high tide is 1 and low tide is 0.

By considering river improvement profiles using this relationship, minimization of the effect on the organisms that should be preserved, etc. can be expected.

4. For realizing environmental management of riverine estuaries

Using the relationship between organisms and elevation difference identified in this paper, it would be possible to grasp the characteristics of areas / river systems and changes in habitats, e.g. by tracking historical changes in the distribution of elevation difference used by organisms for each area / water system, and results could be used effectively for formulating policies on preservation and restoration. Furthermore, it would be necessary to study as well factors that define habitat of organisms other than elevation difference.

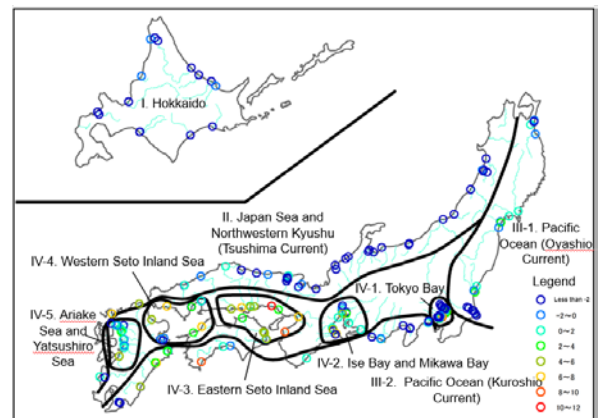


Figure 1: Nine areas of riverine estuaries (Values represent the indicators of diversity)

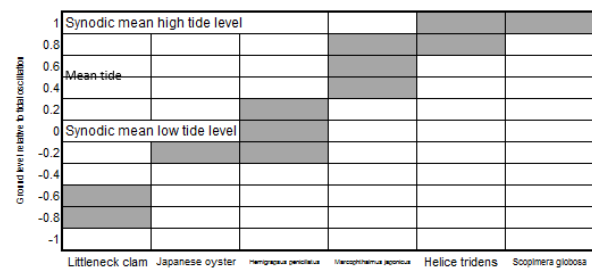


Figure 2: Preference of ground level relative to tidal oscillation

[Reference]

1) Nakamura et al. (2015): Toward Practical River Environmental Management: Concepts and Practice, Journal "Rivers", October issue, No.831, pp.50-54, 2) Nakamura et al. (2015): "An Attempt of Geographical Distribution Evaluation of Biodiversity in Riverine Estuaries based on the Census of Rivers and Riparian Areas," Collection of Presentations in the 19th Ecology and Civil Engineering Society Conference, p.36, 3) Maeda et al. (2015): Relationship between the Appearance of Benthos in Riverine Estuaries in the Country and Ground Elevation Preferred based on the Census of Rivers and Riparian Areas, same as above, p.35