

## The effect of freshwater input from rivers on the ecosystem in coastal waters

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High production in coastal areas is supposed to be supported by large organic and inorganic inputs from rivers. Therefore, excessive reduction of nutrient loads from rivers would decrease nutrient concentrations in coastal areas. This manifests in poor growth of seaweeds, which has been observed in Seto Inland Sea in recent years. However, primary production in coastal areas is not only supported by terrestrial nutrients, but also external nutrients derived from ocean and regenerated nutrients formed in hypoxic water at the bottom. Evaluation of the contribution of each source of dissolved inorganic nitrogen (DIN) to phytoplankton production in Ise Bay revealed that DIN consumption by phytoplankton exceeds the DIN supply from rivers and ocean. This indicates that a large amount of primary production depends on regenerated DIN within the bay rather than on newly supplied DIN, although the ratio of consumption to external supply differs seasonally. We have to pay more attention to the behavior of each source of nutrients for future managements of coastal waters.

The effect of the freshwater input from rivers on coastal areas is not only the nutrient supply, but also the formation of estuarine circulation, which plays an important role in coastal ecosystems. Since the flux of water by the estuarine circulation is considerably larger than the river discharge, it has large effects on the material transport and biological production in estuaries and bays. For example, larvae of temperate seabass do not distribute in the surface, but in the middle layer, and thus the landward flow effectively transports larvae to coastal areas from the spawning grounds in the offshore. Therefore, the year-to-year variation in the amount of juveniles in the coastal area shows that the survival of juveniles improves in the years when the river discharge increases.

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