

学 位 論 文 要 旨	
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題 目	A mechanism of nutrients supply by groundwater discharge in a sandy beach (砂質性海浜における地下水の栄養塩供給機構)
<p>It is recognized that links among forests, rivers and seas is important, because biological and fisheries production in coastal zone is influenced by land-sea interaction. There are several nutrients supply systems in coastal zone. River runoff, probably the most major nutrients supply system, has been evaluated by many previous studies. In addition, <u>S</u>ubmarine <u>G</u>roundwater <u>D</u>ischarge (SGD) is considered as an important source of dissolved material into coastal zone, recently. For example, Johannes (1980) shows that SGD supplies several times as much as nitrate volume as river runoff. However, the knowledge on nutrients supply mechanism in sandy beach ecosystem has not been fully understood, yet. Thus, it is necessary to quantitatively evaluate freshwater discharge and nutrients supply in a sandy beach. The current research clarifies a significance of groundwater discharge as nutrients supply mechanism in a sandy beach. The major conclusions are as follows;</p> <p>(1)Continuous observation of groundwater level had been conducted to estimate the groundwater flow from the seepage face at Fukiagehama beach, Kagoshima Prefecture, Japan. As a result, groundwater flow from the seepage face was estimated as much as 0.65 to 0.86m³/m/day. Nutrients supply of SiO₂-Si, DIN and PO₄-P are estimated as 4.4 to 5.3g/m/day, 0.64 to 0.76g/m/day and 0.031 to 0.037g/m/day, respectively.</p> <p>(2)A water budget method is applied to estimate the freshwater discharge rate and volume in the Fukiagehama basin. It is estimated that the river flow was 44% and the groundwater flow was 55.3 to 56.0% of the total amount of runoff. The estimated quantity of groundwater flow can be as much as 4.0×10⁸m³/yr(= 12.6 m³/s). This estimated volume is nearly the same volume of river flow in Manose River. Nutrients supply from the groundwater of DIN and PO₄-P are estimated as 376.1t-N/yr and 18.3t-P/yr, respectively. Even though a macroscopic estimation(the first order approach), the groundwater flow is significantly important as a nutrient supply mechanism in the Fukiagehama basin.</p> <p>(3)A field observation on the concentration of chlorophyll-a in the coastal area in Fukiagehama had been conducted by using MODIS images. The estuaries sometimes exhibited high chlorophyll-a concentration (10μg/l) between spring and autumn, therefore, this suggests that nutrients supply from the land is important to the primary production in the nearshore zone of Fukiagehama.</p> <p>(4)Field measurements of flow rate and monitoring of water quality had been conducted to reveal characteristics of coastal groundwater at intertidal zone in Matsugaura Beach, Kagoshima Prefecture, Japan. The coastal groundwater flow rate is estimated as much as 12.6m³/day. Nutrients supply by the groundwater is estimated as much as 45.7 g-N/day and 0.5 g-P/day. The results show that the coastal groundwater is a key mechanism to supply nutrients into a coastal zone and maintain a local ecosystem.</p> <p>(5)The volume of groundwater flow is estimated in the Matsukawaura lagoon, Fukushima Prefecture, Japan, by using the water budget method. The groundwater flow is estimated as much as 7.7×10⁶m³/yr(= 0.24m³/s).</p>	