

Fluctuation mechanism of NO₃--N flux in steep mountainous stream covered by orange plantations in Setouchi-Region

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Mountainous stream play an important roll in process of dissolved matter transport from land area to the sea. So, it is necessary to demonstrate the fluctuation of dissolved matter flux from streams to the sea. In the catchments around the Seto Inland Sea, orange plantations distribute widely and about 2400kg/ha fertilizers are applied there during a year. Consequently, stream water and groundwater were acceleratory polluted by nitrate. On the other hand, eutrophication in Seto Inland Sea is also the Japanese environmental issue related to nitrate pollution in the land area. It is necessary to clarify the nitrate flux of river catchment from lands to the sea. Furthermore, because Seto Inland Sea has a large tidal fluctuation, we have to consider the hyporheic effect on the groundwater flow and nitrate flux. To demonstrate the fluctuation of NO₃--N flux in stream, and estimate NO₃--N flux runoff from an island covered by orange plantations to Seto Inland Sea, we investigated hydrochemical processes with observations at mountainous streams and shallow wells in a small catchment. The experimental catchments are located on Ikuchi Island and Shimo-Kamagari Island in southern Hiroshima of western Japan. These catchments are underlain by granite and sedimentary rock, orange plantations distribute widely from midstream to downstream. We collected water samples of stream and groundwater, and measured runoff at sampling points of streams. Water samples were analyzed dissolved ion (NO₃⁻, SO₄²⁻, Cl⁻, DOC, HCO₃⁻) concentrations, using the ion chromatography and TOC meter.

NO₃--N flux to the sea through the stream increased up to about five times of that at the base flow at the peak of storm event with 11mm of total rainfall. Total flux during the event is equal to cumulative flux for about 6days of base flow. The stream water level was higher than the groundwater level, and the stream runoff decreased with flowing down at the alluvial fan.

Stream runoff and NO₃--N flux fluctuated significantly from upstream to downstream in a catchment underlain by sedimentary rock. It is because sedimentary rock has poor intensity, there are many cracks in it than granite, and stream water leakage to groundwater occurred frequently.