Nutrient discharge mechanism in a mountainous small catchment degraded by forest fire, Setouchi region.

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The Setouchi region has the annual rainfall of about 1000mm, and forest fires often occur in a dry season. After fire, water repellency of surface soil would become strong rainfall. This phenomenon causes the decline of infiltration rate, and increment of overland flow, and soil erosion, and nutrient flux. Because Seto Inland Sea has remained the eutrophication problem, it is necessary to confirm the effect of forest fire on nutrient discharge around the sea. The objective of this study is to clarify the nutrient discharge process in the burned catchment with considering the rainfall-runoff process.

We observed runoff and nutrient flux on two catchments located on the rural area of Takehara city, Hiroshima prefecture, western Honshu Island, Japan. The each catchment is covered by grasses after forest fire, whereas by secondary forests. In addition, we collected the water samples of rainwater, soil water, and river water. Measurements of electric conductivity, pH, water temperature were carried out as well as water collections. Chemical components of water sample were analyzed, using ion chromatography and ICP spectrometer. Nutrient storage capacity of the soil was low on the burned catchment, as compared with that in the forest catchment. In 1999 when it was much annual rainfall, the difference of input and output in the burned catchment was negative. It means nutrient reaching and discharge from soil in this catchment.

The cation component changed with the increase of event rainfall amount. SiO2 was the main component at the event with less than 20mm in burned catchment and 40mm in the forest catchment, respectively. Moreover, the main component changed to Ca2+ at the event with more than 20mm, and to Al with more than 100mm on the burned catchment, respectively. But, Al was not the main component on the forest catchment.

These components indicated well correlation with the rainfall-runoff process. Main runoff component shifted groundwater discharge with SiO2 to subsurface flow on the hillslope with Ca to Al at the events with the increase of rainfall.