

Influence of canopy interception on the recovery in water balance after clear-cutting at a small headwater catchment

ODA, Tomoki^{1*} ; EGUSA, Tomohiro¹ ; OHTE, Nobuhito¹ ; HOTTA, Norifumi² ; TANAKA, Nobuaki³ ; GREEN, Mark⁴ ; SUZUKI, Masakazu¹

¹Graduate School of Agricultural and Life Sciences, The University of Tokyo, ²Faculty of Life and Environmental Sciences, University of Tsukuba, ³Ecohydrology Research Institute, The University of Tokyo Forests, Graduate School of Agricultural and, ⁴Center for the Environment, Plymouth State University

The impact of forest disturbance on stream runoff has been well studied using the paired catchment approach, usually finding increased stream runoff following forest disturbance due to the decline of transpiration and canopy interception. However the recovery processes of transpiration and interception have rarely been directly observed under a recovering forest, therefore mechanisms behind recovery time of stream runoff following forest cutting is still not well understood. The objective of this study is to evaluate the contribution of interception to the change of stream runoff after forest cutting. This study was conducted in a pair of small headwater catchments, where one catchment was clear-cut in 1999 and planted with the same species in 2000. Annual runoff increased 200 to 300 mm/yr after forest cutting and the higher runoff remains 12 years after cutting. Interception ratio in the clear-cut catchment were lower than 10 % of precipitation in 2007, 2011 and 2012, and those in the control catchment were 20 to 24 % of precipitation. The mean annual interception was still around 300 mm/yr smaller in the young forest compared to the mature forest, although canopy cover and LAI were similar. These results suggested that the recovery of interception rate is an important controlling factor for the recovery of stream runoff after forest cutting, and not only canopy structure, but also the microclimate condition above the canopy of young forest could be also important factors affecting interception.

Keywords: forest cutting, water balance, canopy interception, headwater catchment