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Changes in interannual variability of runoff in a conifer and deciduous hardwood mixed forested watershed

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The National Forest Management conducts forest management in National Forests for the fulfillment of multi functional roles of forest including long-term wood production management. On the other hand, there are few studies that evaluated the runoff characteristics including a state of the forest for a long term. This study was conducted within the Kamabuchi No1 experimental watershed (3.06ha) in North part of Japan. Hydrological observation has been continued in cold snowy region since 1939. It is the longest record in this region in Japan. The site is covered with Natural hardwood forest (ex. Fagus crenata, Quercus mongolica var. grosseserrata and Quercus serrata) and coniferous plantation forest (Cryptomeria japonica and Chamaecyparis obtuse) which planted around 1912 to 1916. Surficial geology is tuff and shaletic tuff of the Tertiary period and soils are clay loam. Meteorological observation was conducted Yamagata experimental forests located to 800m from the watershed to the northeast. A 71-year record (1939-2010) of the precipitation and runoff was used for an analysis of the flow-duration curve. Tree (DBH ≥ 6cm) census in the watershed was also conducted at 5 times (1942, 1950, 1957, 1979, 2008). The tree volume of Chamaecyparis obtuse is a regular tendency and the tree volume of Cryptomeria japonica linearly increased. Stem volume of oak trees has increased remarkably from 1942 to 1979 but there was a close tendency of an increase in 2008 because mortality of oak trees occurred in the watershed. Based on 5 times tree census, positive linear relationship was found between tree volume and age of stand. While the proportion of plentiful runoff has shown a tendency to decrease over long term, those of ordinary, low and scanty runoffs have tended to increase with increasing the tree volume.

Keywords: duration curve, cold snowy region, long term hydrological observation, runoff characteristics