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Ecohydrological Aspects of an Artificial Forest in Japan -Case study in the Ochozu Experimental Watershed-

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Japan is a broadly forested country where 68% of the land is covered by forests. Therefore, almost all the hydrological events are somehow related to the forests, which led to initiate hydrological observations in forested watersheds in 1906, relatively early stage in the world. Recent recognition of the importance of ecohydrological perspective has enhanced and extended the role of forest experimental watersheds. However, experimental watersheds are scarcely distributed and only few ecohydrological researches have been conducted in Japan. Although Japan Long-term Ecological Research (JaLTER) has started the ecohydrological researches since 2004, it mainly concentrates on natural and secondary forests. However, artificial forests covering 41% of the entire forested area cannot be ignored because they are the forests that greatly influence the regional ecosystems because most of them become unprofitable and abandoned. Therefore, we have started ecohydrological research in an experimental watershed called Ochozu Experimental Watershed in the Kasuya Research Forest, Kyushu University since 2002. It is a suburban mountainous watershed located about 15 km east of Fukuoka city in western Japan (33º 38'N, 130º 32'E). The area is 9.5ha, the length of the main stream is 265m, the width of the watershed is 179m, the slope of the stream is 0.22 and the average slope is 0.37. The underlying bedrock consists of serpentinite and chlorite schist, and yellow-brown forest soil is predominant. It is mostly covered by artificial forest of Japanese cypress (*Chamaecyparis obtusa*) aged about 50 years along the stream channel. Secondary forests of deciduous and evergreen trees cover the ridges. Since most of the forests have not been pruned nor thinned, the canopy of the Japanese cypress was dense and the understory was scarce. Meteorological components and gross precipitations were measured at the east and west ridge, and throughfall and stemflow were measured at the middle of the watershed. Discharge was measured at the lowest reach. They were automatically measured and the waters were sampled approximately once every week for chemical analysis. Sapflows of Japanese cypress and the nearby soil moisture on the slope were also measured. Basic information has been gradually accumulated as follows. Nitrogen depositions (NO_3^- + NH_4^+) from bulk precipitation and throughfall+stemflow were estimated to be approximately 8, 16 kg N ha^{-1} yr^{-1}, respectively, suggesting that nitrogen deposition is relatively high and dry deposition is an important contributor to total nitrogen deposition as well as wet deposition. During storm event, hydrologic coupling among the slope, riparian zone and stream occurred and large amount of particulate constituents of T-P was run off with eroded soils, which implied that watershed where the forest floor is denuded may work as diffuse sources of phosphorus. Seasonal trend of transpiration of Japanese cypress was also obtained. These ecohydrological aspects of the artificial forest watershed and the link among these phenomena are discussed.

Keywords: Japan; artificial forest; Japanese cypress; watershed; ecohydrology