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Annual evapotranspiration increasing in response to the climate warming detected from small forested catchments in Japan

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Evaporation rate from the wet canopy is high for forest due to its community height, and transpiration rate is also high even in a dry period because of a high sustainability of tree with a long life against stresses. Long-term observations conducted in Kitatani in the Tatsunokuchi-yama Experimental Forest with broad-leaved forest in Okayama Pref., Kiryu Experimental Watershed with Japanese cypress forest in Shiga Pref., and Shirasaka Experimental watershed with broad-leaved forest in Aichi Pref. demonstrated an increasing trend of the annual evapotranspiration in response to that of the annual air temperature since 1990 (see Figure). However, this may turn over because further warming will give a high dry stress to the forest in near future, resulting in a natural decrease of the stand density and/or forest decline. A more serious result is concerned for an inland area of the continent where some of the precipitation source is derived from the land evapotranspiration. The data bases by Forestry and Forest Products Research Institute and The University of Tokyo Forest are greatly appreciated.

Figure. Comparison of the trend of annual loss with that of annual air temperature based on the long-term data obtained from three small forested catchments, namely, Kitatani in the Tatsunokuchi-yama Experimental Forest of Forestry and Forest Products Research Institute, Kiryu Experimental Watershed of Kyoto University, and Shirasaka Experimental Watershed of University of Tokyo Forest.
The cumulative anomalies curve in the figure represents the trend by the curve gradient (Lozowski: J. Climate 2,1989).

Keywords: climate change, evapotranspiration, forest hydrology, forestry, long-term hydrological observation, water resource