

Water budget of lake Sai-ko, Shoji-ko and Motosu-ko in their catchment area

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Japan is twice as the world mean precipitation and rich in water resource. In particular, a volcanic body is good water reservoir and abundant with groundwater (Yamamoto,1970).

After Second World War, people and industries have concentrated in cities, and the demand of water has increased quickly in cities. Every year, a shortage of water has happened somewhere in Japan. It is necessary to research the water quantity exactly for predicting the future water resource and using it effectively(Itoh,2001).

The purpose of this study clarifies the daily water budget in the catchment area of Lake Sai-ko, Shoji-ko and Motosu-ko during last ten years from 1995 to 2004. Three lakes(former Se-no-umi), at the western site of Fuji Five Lakes, experienced unusual shortage of water and rapid rise of lake water level.

Shoji-ko was the least of the three lakes for the groundwater volume of in- and outflow of the lake. Shoji-ko is a naturally closed lake without artificial channel, but other two lakes, Sai-ko and Motosu-ko have an artificial channel respectively. Shoji-ko had minus budget of water, more outflow than inflow. Sai-ko had plus budget of water except November. The result showed that the water level of Sai-ko was the highest of the three lakes because of the most inflow of groundwater.

The catchment area of the three lakes was calculated 71.2 km², smaller than Marui(1995) and Yamamoto(1971).

If the calculation of evapotranspiration was correct and there was zero budget of groundwater out of the catchment area, the volume of water storage would be calculated from 0m³ on Jan. 1, 1995 to maximum 1.9 billion m³ on Dec. 31, 2004. It was enormous against 600 million m³, the whole volume of Fuji Five Lakes. The result depended on rainy tendency period in the last several years including 2004 that was a bumper year of typhoon. A large part of the water volume increased with a rapid rise of lake water level in 1998 and 2004. Supposing the volume of water storage continued to increase at the rate to 1997, the volume would be estimate 840 million m³ at maximum. However, the volume of water storage increased rapidly on 1998 and 2004. These events exceeded the gradual increase to 1997 and the ratio of water volume increased from 1999 to 2003.

Itoh (2001) suggested that the volume of water storage was the minimum level in the mid-1990s according his estimate on water budget in the basin of northeastern foot of Mt. Fuji. Perhaps the volume of water in the basin of our three Mt. Fuji Lakes would be minimum at the beginning of investigated period. We consider that the water resource is enough for population in this area, but the demand of water is increasing in Kanagawa Prefecture with many large cities. Therefore, 1.9 billion m³ volume of water will not enough in the future.

However, this study is not perfect for calculating water resource.It is necessary to research the investigation of groundwater flow in the northern foot of Mt. Fuji, determination of accurate catchment area, estimate of evapotranspiration based on influence of vegetation, the precipitation corrected to the elevation and water budget over 50 years in the minimum.