Variation of inflow to the Daecheong dam due to construction of the Yongdam dam upstream

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The Daecheong dam was constructed in 1981, and the Yongdam dam situated in upstream was constructed in 2002. Watershed areas are 4,134 ㎢ and 930 ㎢, and total storage capacities are 1,490 M㎥ and 815 M㎥, respectively. Yearly water supply amounts were planned to 1,649 M㎥ and 650.40 M㎥, respectively. But 492.70 M㎥ (75.6%) from the Yongdam dam was planned to be supplied to the Jeonju region situated in outside of catchment.

A model for simulating water storages in the Yongdam dam daily was developed, and the DAWAST model (Noh, 1991) was selected to simulate inflows to the Daecheong dam daily. The DAWAST model's parameters were determined in periods in 1983 to 2001 in case without the Yongdam dam, and in periods in 2002 to 2004 in case with the Yongdam dam. Operation of the Yongdam dam was conditioned with a combination of downstream outflow and water supply to the region situated in outside of watershed. Downstream outflows were selected 5 ㎥/s of planned, 10 ㎥/s of operating result in 2003. And water supply amounts were selected 0.34 M㎥/d of operating result in 2003, 1.00 M㎥/d of medium value, and 1.35 M㎥/d of planned.

Daily simulated inflows were analyzed from 1983 to 2004. Yearly areal rainfalls range 694.9~1,821.8 mm which are averaged 1,214.2 mm. Yearly inflows range 200.0~1,359.9 mm in case without the Yongdam dam and range 238.2~1,691.1mm in case with the Yongdam dam. Runoff rate which is defined rate of dam inflow to areal rainfall on a yearly basis reached 57.3% in case without the Yongdam dam. In case with the Yongdam dam, runoff rate reached 62.0~68.4% in case with downstream outflow of 5 ㎥/s, and reached 64.1~68.5% in case with downstream outflow of 10 ㎥/s. Conclusively speaking, yearly inflows to the Daecheong dam in case with the Yongdam dam were increased 12.8~19.5% in water volume, and 4.7~11.2% in runoff rate compared to the case without the Yongdam dam.

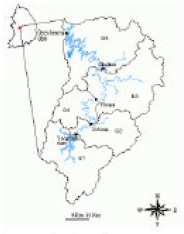

Figure 1: Study area

References

[1] Jaekyoung Noh, A conceptual watershed model for daily streamflow based on soil water storage, PhD Dissertation, Seoul National University (1991).