The use of remote sensing to recover lost data records and estimate lake water balances

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. In arid and semi-arid regions, closed lakes are threatened by high water consumption in their basin. This is also the case for the Bakhtegan lake, the second largest lake in Iran, where intensive upstream irrigation and river modifications has led to reduced inflow and sever lake desiccation. Due to many social, environmental and economical impacts, lake restoration has become a main water management goal in the region. A shortcoming in the water resources planning has been lack of reliable historical inflow data. Also, the closest gauge has lack of flow data between the years 1984 and 1997 when most of the irrigation areas were developed. The aim of this study is to estimate the missing flow data by combining water balance simulation and remote sensing techniques. By using remotely sensed images of Bakhtegan during 1998-2000 and considering effective components in the lake water balance (include lake inflow, rainfall and evaporation), the area-volume depth curve of the lake was developed. The water balance simulation was validated for the period (2001-2003) using the developed area-volume depth curve, the results of satellite image processing and accurate hydrological and climate data. Finally, the gap in data for the lake inflow was filled by the validated water balance simulation, remote sensing analysis and climate data. The developed method provide a useful way to estimate hydrology in a region with little or poor data quality.