REMOTE SENSING AND GIS IN INFLOW ESTIMATION: THE MAGAT RESERVOIR, PHILIPPINES EXPERIENCE

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ABSTRACT:

In managing a multipurpose dam, knowledge of inflow is essential in planning and scheduling discharges for optimal power production and irrigation supply, and flood control. Utilization of satellite imagery improves inflow estimates provided by digital spatial data instead of those from calculations on drawn maps; the former yields measurements over an area instead of extrapolations from point measurements. Using remote sensing data, GIS techniques, and programming in Java®, an Inflow Monitoring from Basin Assessment Calculations (IMBAC) system was developed to estimate inflow in the Magat watershed; its dam is one of the largest multipurpose dams in Southeast Asia. Magat's 117-km2 reservoir stores water to irrigate roughly 850 km2 of farmland and its 360-MW hydro-power plant contributes electricity for Luzon, the Philippines' largest island. The reservoir and dam facilities are jointly managed by the National Irrigation Administration and the SN Aboitiz Power Incorporated; but authorization of discharges during extreme weather conditions is with the country's meteorological agency, the PAGASA. With the complex nature of Magat Dam's multi-stakeholder management involving public and private entities with different discharge motivations, a vital decision support system that concerns inflow estimation is paramount. This paper presents the results of the developed methodology, IMBAC, to estimate inflow using remote sensing data as an alternative to the water-level approach that is currently being used. IMBAC simulations achieved results which capture the behavior of the Magat watershed response. With more field information to further calibrate the approach, it can be used to build scenarios and simulate inflow estimates under varying watershed conditions.