Pakorn Ungchaiyapong 2007: Monitoring the Dynamics of Irrigation Water Requirements in the Greater Mae Klong Irrigation Project Using MODIS Data and WEAP Model. Master of Engineering (Irrigation Engineering), Major Field: Irrigation Engineering, Department of Irrigation Engineering. Thesis Advisor: Assistant Professor Ekasit Kositsakulchai, Dipl. Docteur. 198 pages.

This research presented the application of WEAP model and remote sensing techniques in monitoring the dynamics of irrigation water requirements in the Greater Mae Klong Irrigation Project (GMKIP). Land use and cropping pattern were identified using 15-day composite images of NDVI and NDWI, which derived from MODIS data from 2001 to 2006. In order to reduce dimensions of the time-series images, the principal component analysis (PCA) method was applied. The ISODATA algorithm, an unsupervised classification, was used to identify land use types. Interpretations of the processed images yielded 4 main groups of cropping area: rice, sugarcane, upland crop/vegetation, and orchard/perennial tree. Furthermore, it was possible to distinguish 4 types of cropping pattern for rice cultivation. From the recorded data of irrigation diversion (1993 - 2005), it was found that annual volume was in the order of 4,890 million m3 and an increasing trend was observed after 2001. The increased water uses were due to the extension of irrigation service area in the Bang Len project and the transformation of water use activities from cropping into aquaculture (fish/shrimp). The Water Evaluation And Planning system (WEAP) model was selected for estimating the net irrigation requirements of the GMKIP. The simulation included 3 case studies: (1) using area and cropping patterns from RID data, (2) using area and cropping patterns from satellite data, and (3) using area from satellite data but cropping patterns from RID data. The results revealed that the average volumes of net irrigation requirements in all cases were lower than those of recorded irrigation diversion. Their annual volumes varied between 3,370 and 4,380 million m3. On the contrary, irrigation requirements in dry season estimated from satellite data were higher than the recorded data. The higher requirements resulted from the larger cropping area taken into an account, especially in the lower part of the GMKIP. In conclusion, this study demonstrated the advantage of time-series satellite images in providing simulation model with up-to-date information for monitoring the dynamics of water requirements in large irrigation scheme.

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