INTEGRATED WATER MANAGEMENT DECISION SUPPORT SYSTEM FOR THE SEBERANG PERAK PADDY ESTATE

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A study was carried out to develop an integrated water management decision support system for the Seberang Perak paddy estate. The decision support system incorporated results from a database management system, a model base management system and a rule based knowledge base system.

The domain experts' knowledge on integrated water management were collected together with other secondary historical data that were used in the modeling approach to generate more knowledge on different combinations of possible scenarios. The modeling approaches used in the knowledge generation was evapotranspiration modeling, a flow routing modeling, a water balance modeling and a crop growth and a yield modeling. A GIS was used in the output model to make the decision support system outputs more effective in their presentation.

The evapotranspiration modeling tested the suitability of a few methods to predict evapotranspiration in the project area using 45 years of weather data. The results suggested applying the Penman-Monteith, the Pan or the Blaney-Criddle models for

the project area seems to be the best. Because of its worldwide applicability, the Penman-Monteith model was utilized in the study.

The flow routing routine performed showed good agreement with measured data. Evapotranspiration estimates, flow routing and water balance applied to each of the field plots for all possible scenarios, suggested alternative decisions for the better performance of the paddy estate. All these results were coded to rules and kept in knowledge bases that will be posted as outputs for user queries.

Major problem identified in the Seberang Perak paddy estate was the land preparation water management. Land preparation needs to be completed within 16 days so that the targeted 250% cropping intensity could be achieved. This is only possible when canals are flowing full and a part of the total water requirements is supplemented with rainfall. The modeling approach suggested many possible alternate scenarios and decision alternatives, which were gathered in the knowledge bases.

The knowledge generated through modeling approach was always verified with domain experts from the sub-estates concerned. The acceptable knowledge were then coded to pseudocodes and translated to rules of the knowledge bases. All the added rules to the knowledge bases were verified and validated for the proper functioning of the decision support system components. All the knowledge-based modules (menu module, crop schedule, land preparation water management, second supply water management, supply after fertilizer application, yield modeling and

drainage management) were linked under a same platform. The outputs and results of these components are linked with a GIS and other relevant information.