

## The impact and societal benefits of using earth observation for ground water policies in the agricultural sector

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Assessment of the impact and societal benefit of Earth Observation (EO) is a multidisciplinary task that involves the social, economic and environmental knowledge to formulate indicators and methods. The value of information (VOI) of EO is based on case studies that document the value in use of the information in a specific decision. A case study is an empirical inquiry investigating a phenomenon. It emphasizes detailed contextual analysis of a limited number of events or conditions and their relationships. Quantitative estimates of the benefits and costs of the geospatial information derived from EO data document and demonstrate its economic value. A case study was completed to examine some of the technical perspectives of adapting and coupling satellite imagery and in situ water quality measurements to forecast changes in groundwater quality in the agricultural sector in Iowa. The analysis was conducted to identify the ability of EO to assist in improving agricultural land management and regulation of balancing production and groundwater contamination. The Iowa case study described the application of Landsat data in a land adaptation strategy to maintain agricultural production and groundwater water quality. Results demonstrated that Landsat information facilitates spatiotemporal analysis of the impact of nitrates (fertilizer application) on groundwater resources and that crop production could be retained while groundwater quality is maintained.

To transition to the operational use of the geospatial information, the Landsat data should be applied in a use case where Interaction of various stakeholders within a decision process are addressed. The objective is to design implementation experiments of a system from the user's and contributor's perspective, and to communicate system behavior in their terms. A use case requires communication of system requirements, how the system operates and may be used, the roles that all participants play and what value the user will receive from the system. The use case must be broader than simply a technical demonstration of capability and involves scientific experts, farmers and their representatives, and the Government. Decisions will ultimately need to take into account some level of uncertainty in the scientific "measurement". The data also have statistical variability which affects the confidence in the value of information. These issues are concerns when implementing remote sensing technology and must be examined from an end user perspective and their impact discussed and understood. The study team held meetings with subject experts from Iowa State University and the Iowa Farm Bureau to explore the next steps in developing the use case. A meeting between the study team and the Iowa Farm Bureau centered on the need for efficient regulation of land use and regulation of agrochemical application in the Midwest.

This presentation will describe the results of the case study and the ongoing investigation into directions into the broader application of the use case and the application of economic indicators that have applications across fields of interest.