A Web-based dynamic water resources application for oil shale development

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Web-based Geographic Information Systems (GIS) applications are on the forefront of GIS and user interaction ushering in a new phase of development in the geoscience and engineering community. Web-based geospatial applications are being developed to meet the needs of niche markets for project collaboration, data dissemination, and client interaction. The development of Web 2.0 mashups with ArcGIS server allows for a dynamic level of interaction not available in previous iterations of geospatial data applications. This ongoing DOE-funded project to address water quantity and quality issues focuses on regional water resource infrastructure for Piceance Creek Basin (PCB) oil shale development. As an integral part of the project, a web-based geospatial dynamic water resources application is being developed as the culmination of extensive data collection and modeling effort for the PCB. The objective of the application is to allow the end user to run a water resource balance model through a web browser based on the user input of spatially located commercial oil shale retorting facilities. The Adobe FLEX API extension for ArcGIS Server was chosen for user input and model output visualization. ArcGIS Server will provide access to an ArcSDE spatial database and geoprocessing functions needed to execute the model. The main user interface will consist of a web mapping application with standard geospatial functionality. The interactive water resources balance model will consist of a parameter input interface and an overlay grid for oil shale retort location selection. The model relies on a water use dataset generated for each individual grid cell or retort cell from a process model developed using Powersim Studio at Idaho National Lab. The water balance model considers the required water quantity compared to the available ground and surface water resources in spatial proximity to the user defined oil shale retorting location. Output of the model will consist of visualization of the groundwater drawdown, changes in stream base flow, and location of possible reservoir storage. The end user then can evaluate any water needs for various commercial scenarios in the basin. This project represents the next step in web-based GIS development paving the way for other interactive niche applications in the geoscience and engineering field.