Research to Enhance Oil and Gas Development and Environmental Protection on Federal Lands

DE-AI26-06NT15467/Task 3: Hydrologic Modeling (2005 WO-310-1920-PC-4HK1)

Goal

The project goal is to perform research that will enhance oil and gas operations and associated environmental protection opportunities in partnership with the Bureau of Land Management (BLM). Specifically, the project performer will research and develop enhanced modeling tools to assist in streamlining the analysis of effects upon soil and water resources associated with energy development and the Application for Permit to Drill (APD) process in energy production basins in Wyoming.

Performers

Bureau of Land Management (BLM), Cheyenne, WY

Wyoming Geographic Information Science Center (WyGISC), University of Wyoming (UW), Laramie, WY

Results

WyGISC delivered Phase I and II products to BLM in August 2005. Further enhancement of these products and development of additional functionality in the toolkit is underway in this third phase of product development. A beta test of the toolkit has been completed for the Fortification Creek sub-basin (of the Powder River Basin in Wyoming) in support of the oil and gas environmental impact statement for the subject sub-basin. Outputs of the toolkit analysis will be incorporated in the associated National Environmental Policy Act (NEPA) analysis.

Benefits

Utilization of models in support of decision making provides resource managers with a defensible mechanism for resource management. Spatially distributed models that can compute and model for runoff, erosion, and water quality at these different scales can assist resource managers in addressing these spatial complexities, validating sound management decisions, and making more timely permitting decisions. Money and time will be saved by the Federal and State regulatory agencies as well as the industry, and greater effort can be allocated to preservation or conservation of the resources on these lands.

Background

Water resource issues are a special concern in the development of conventional oil and gas and coalbed natural gas (CBNG) in the Powder River Basin, Atlantic Rim, and Pinedale areas of Wyoming. To date, the APD NEPA analysis has been a very time-consuming process using the data and analysis tools available for assessing effects of energy development upon soil and water resources.

This project is the third phase of a multi-year, three-phase research and development project under an Assistance Agreement between BLM and WyGISC. Matching funding committed to this phase of the project includes $26,000 from the University of Wyoming, $14,000 from BLM, and an allocation of $46,100 from DOE. This project involves the research and development of an enhanced version of the U.S. Environmental Protection Agency's Basins 3 software package that incorporates available high-resolution, 1:24,000-scale watershed and hydrographic geospatial datasets. It incorporates a link with 1:24,00-scale soils geospatial data and associated databases (soil properties and interpretations) and the development of a standard GIS (geographic information system) protocol for use of the package in APD environmental analysis and Water Management Plan (WMP) preparation/evaluation.

Summary

Upon completion of Phase III, this project will deliver a cost-effective, multi-resource GIS analysis package equipped with the best available GIS datasets and associated navigation, query, and analysis tools. It will provide 1) a more rapid, comprehensive, and accurate analysis of water, watershed, and soils resource impacts (e.g., erosion, runoff, sedimentation); 2) a data archive platform; 3) a standard resource analysis protocol that will not only speed the environmental analysis process but will also provide a consistent, well-documented protocol that will aid BLM in more quickly evaluating WMPs required as part of APDs; and 4) a means to accumulate analysis results from the sub-watershed to sub-basin scale so that larger-scale cumulative water resource impact analysis and monitoring is possible. The enhanced Basins 3 package will be

public domain and available to land management and regulatory agencies and industry as well. This enhanced Basins 3 package will serve the same function in other areas of the State as high-resolution soils datasets become available.

Current Status (February 2007)
With a beta test of the toolkit completed for the Fortification Creek sub-basin, additional runs of the model—using different development scenarios—will allow managers the opportunity to refine the project to minimize impacts to soil and water resources.

The WyGISC project managers have prepared the available spatial and tabular data and parameterized the model for the Muddy Creek sub-basin (highest priority area in Rawlins District) of Wyoming. In addition, stream gauging data from the U.S. Geological Survey has been acquired, and UW is currently using it to calibrate the model for greater precision in analysis outputs. BLM is working on a related project to create a more precise soils dataset that can be incorporated into this toolkit for better results.

Funding
Funding was provided by DOE under an interagency agreement with BLM. The project may be terminated due to lack of DOE FY07 funding. However, Wyoming BLM is planning to obligate additional BLM funding in FY2007 to complete beta testing of the toolkit in the Rawlins area and migrate its use to the Pinedale Anticline and immediate areas for NEPA applications associated with oil and gas projects.

Project Start: November 30, 2005
Project End: December 31, 2006

DOE Contribution: $65,000
Performer Contribution: $37,000 (57 percent of total)

Contact Information
NETL – John Ford (john.ford@netl.doe.gov or 918-699-2061)
BLM – Mary Nagel (mary_nagel@blm.gov or 303-236-0837)
BLM – Rick Schuler (rick_schuler@blm.gov or 307-775-6092)