UTILIZATION OF MOBILE COMPUTING AND GIS TO EVALUATE RECLAIMED LANDS IN MISSOURI[1]

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Abstract. Global Positioning System (GPS) integrated mobile geographic information system (GIS) technology is becoming increasingly popular in coal mining regulatory programs because of its ability to provide instant and accurate data updates and ways to verify information associated with mining and reclamation activities. Many state and federal regulatory programs have begun using or considering use of the mobile GIS in permitting, inspection, reclamation, and bond-release activities. Verification of permit boundary, identifying soil probe and water sample locations, and assessment of revegetation status on reclaimed lands are a few examples of how the mobile GIS technique can be applied. For the purpose of illustrating usefulness of mobile GIS in coal mining related field work, inspection activities on an active mine site and assessment of the postmining land uses and revegetation status on reclaimed lands conducted by the Office of Surface Mining / Mid-Continent Region (OSM/MCR) in Missouri are used as case studies in this paper.

During the spring of 2005, Alton Field Division of OSM/MCR initiated protocol of mobile inspection, which adapted the mobile GIS concept into mine inspections. *Stylistic*™ tablet computer by Fujitsu with Wide Area Surveillance Satellite (WASS) enabled *Haicom*™ GPS card along with *ArcPad*™ software by Environmental Systems Research Institute (ESRI) were used in the prototype mobile inspection. Meier and other, 2004 reported that Fujitsu *Stylistic*™ tablet computer has very good indoor and outdoor display quality and works well with *Haicom*™ GPS card and *ArcPad*™. Prior to each mine inspection, *ArcMap*™ software by ESRI was used to view and assess necessary GIS data layers (aerial photograph, quadrangle map, roads, permit boundary, mine pit boundaries, and etc.) in the office. Then the area of interest was cropped and exported as *ArcPad*™ project folder. The *ArcPad*™ project folder was later loaded into the tablet computer to be used in the field. For easier data input, *ArcPad Builder*™ software by ESRI was used to create customized data entry forms. This mobile computing technology provides more efficient ways of implementing the Surface Mining Control and Reclamation Act (SMCRA).

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During the summer of 2005, a wildlife habitat assessment was accomplished on reclaimed mine lands at Associated Electric Cooperative, Inc. (AECI) Prairie Hill Mine. Real time mobile mapping technology was used to capture the field data of the wildlife habitat seeded with fescue and the wildlife areas proposed for mitigation by AECI. Wildlife habitat suitability models were digitally created in the office using the *Layer Form Creation Wizard* in *ArcPad*™ (Fig. 1). *ArcPad*™ along with the digital layer forms were downloaded to a Hewlett Packard Handheld *iPAQ*™ Pocket Personal Computer to collect field data. The *iPAQ*^{3} supports WAAS enabled Bluetooth GPS technology, so real-time information could be collected on the mine site. Wildlife habitat models were structured to rate quality factors based on vegetative communities, spatial distribution, and favorable environmental conditions to wildlife species. More specifically, these models score certain wildlife habitat on the basis of positive attributes such as wetland hydrologic balance, plant composition and diversity, management techniques, and acreage. Additional layers for spatial reference such as the mine permit boundaries, land uses, and aerial photography were downloaded to the *iPAQ*™ to assist with field analysis.

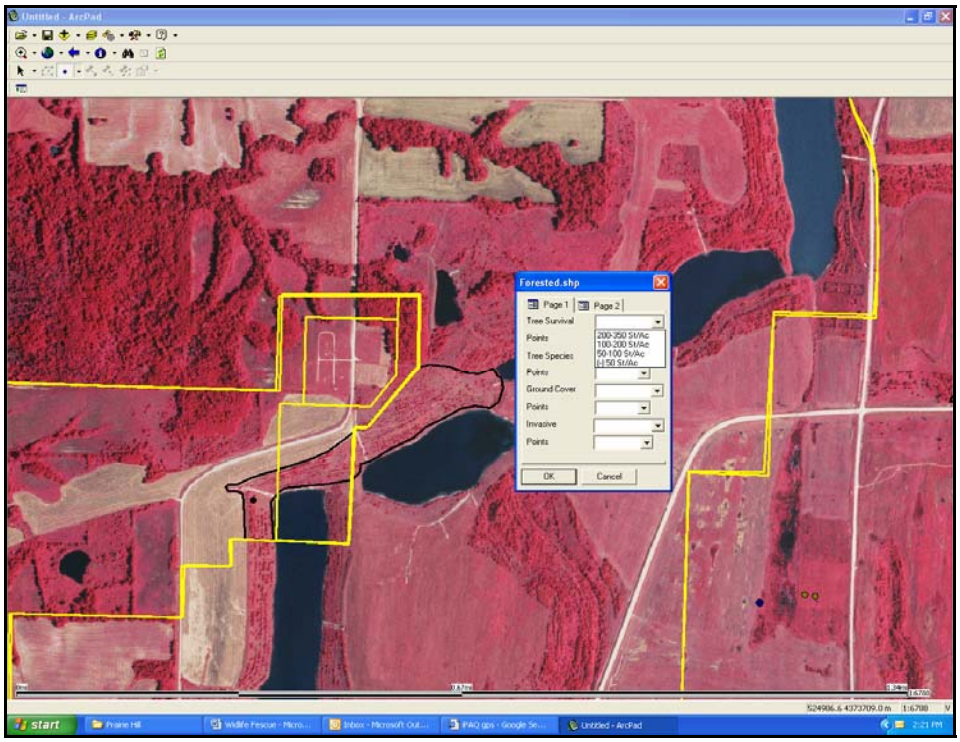

Figure 1. Screen Shot of the ArcPad Layer Form Used for Field Data Collection.

Literature Cited

Len Meier, William Joseph, and Kevin Garnett. 2004. Assessing Reclamation Features and Estimating Reclamation Costs on Abandoned, Inactive, and Permitted Mines Using Real-Time GPS and Tablet Computers p. 1278-1288. (Morgantown, WV, April 18-24, 2004). Proc. 25th West Virginia Surface Mine Drainage Task Force.