

***The National Map: An Agent for Environmental Modeling using
the World Wide Web***

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ABSTRACT: Research is underway to demonstrate the feasibility of using *The National Map* of the US (USGS, 2002) to execute web-based analytical models. We intend to derive parametric values from data extracted from *The National Map*. We also expect to define potential web-based modeling tools to develop for *The National Map*. Many natural process models rely on parameters that can be specifically extracted from the elevation component of *The National Map*, the National Elevation Dataset (Gesch and others, 2002). Slope and aspect are routinely derived from elevation data and used in models to simulate natural process such as surface water runoff. When combined with other parametric values they can be used to estimate the physical characteristics of watersheds, or simulate natural watershed processes such as runoff or erosion rates (Garbrecht and Martz, 2000; Shroder and Bishop, 2003). We are using the Agricultural Non-Point Source (AGNPS) pollution model (Young and others, 1995), which simulates watershed processes. AGNPS was developed to simulate runoff, soil erosion, and nutrient transport within agricultural watersheds following storm events. Its input parameters are extracted or derived from three geospatial data sets: land cover, soils, and elevation (Finn and others, 2002). Elevation data are used specifically to determine the extent and morphology of the watershed. Land cover and soils data are used to characterize the surface of the watershed.

We intend to demonstrate web-enabled modeling with AGNPS by simulating data extraction and model parameterization using *The National Map* in two ways: by extracting elevation and land cover parameters for the AGNPS model from *The National Map*; and by investigating the feasibility of adding modeling tools, such as a user-defined basin delineation application, to *The National Map*. Our focus is on parameter values that we can extract or derive from elevation data. Assessment of the web-enabled modeling is underway through the design and development of proof-of-concept model controller application, or controlAp, that will simulate a modeling object within *The National Map* Viewer. This controlAp will use the

Viewer's geospatial query agent to extract the appropriate data layers of *The National Map* for an area of interest (AOI) and send them to the AGNPS Data Generator program (Finn and others, 2003), which derives parametric values and provides those values to AGNPS. AGNPS then executes as designed. The controlAp will monitor the progress and report the results.

In addition, we are focusing on identifying potential modeling tools to add to *The National Map*, such as one that derives a user-defined drainage basin based on *The National Map* elevation data. This tool might enable a user to select a point along a stream or hill slope, or provide a positional value in some ground coordinate system. Similar to some conventional, non-web-enabled software packages that generate model parameters, the tool would then delimit the drainage basin that contains that point or positional value (Leavesley and others, 2002; Userly and others, 2003.) In addition, the tool could also provide parametric values for the point (elevation, slope, aspect), or characteristic measures of the basin (area, perimeter length).

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