

Societal Drivers for Geologic Mapping and the Value of 3-D Mapping

Lyttle, P.T., Program Coordinator

National Cooperative Geologic Mapping Program USGS, 908 National Center, Reston, VA 20192; E-mail: plyttle@usgs.gov

Most geologic mapping carried out by the geological surveys of this Nation and others, both state and federal, have historically been for resource evaluation and exploitation. In the early history of geological surveys, the resources under consideration were generally mineral and energy related. While it is clear that both of these societal needs are still immense, the commodities emphasized within the minerals and energy fields has changed dramatically. More dramatic still is the growing need for geologic mapping to characterize aquifer architecture and ground water flow through fractured bedrock. During the last five years the proposals for geologic mapping received by all three components of the National Cooperative Geologic Mapping Program—federal, state, and university—show interesting trends. More and more geologic mapping is in direct response to regulatory concerns about protecting water supplies (e.g., well-head protection, karst delineation, agricultural runoff and stream health, and salt water intrusion). Clearly it is necessary to understand the extent and interconnectedness of our aquifer systems in order to protect them. Even in communities where geologic mapping is being conducted to address concerns about seismic or landslide hazards, ground water concerns usually takes precedence. Every land manager is facing decisions that pit one type of land-use against another. Ground water issues directly impact every other type of decision—housing development, permitting for sand and gravel operations, siting of critical facilities, grazing, forest health, surface water rights, and sustainable growth to name a few. The interconnectedness of the decision-making process for every land manager makes it vital that our geologic maps are created for multiple uses. The clever derivative products that I suspect many will talk about today can only be produced if the original geologic map database is a very robust one.

It is also clear that if our map database is to be three dimensional in a meaningful way that the information collected at the surface is augmented by other techniques such as geophysics and other forms of remote sensing and drilling. Our database must also contain data collected by others for other purposes, such as well logs and engineering reports. The challenge that lies ahead for geologic mappers is to present the information that we gather in a manner that can be easily visualized by the manager making the land-use decision. The uncertainties in our geologic map information must also be presented in a visually compelling manner as well. In other words these representations must allow the non-geologist to walk around in the earth and to examine the nature and quality of the information.