Utilities Spark Remote Sensing Demand

by Harold J. Hough

Harold Hough has a degree in economics from Anderson University. He writes on technical issues, including satellites and remote sensing. His book, Satellite Surveillance, was named an "Outstanding Book of 1993" by the American Library Association's Choice magazine. Prior to becoming a full time writer, Hough was a U.S. Naval officer, and worked for several defense companies.

It was a battle royal between the electric power company, local conservationists, and the utility commission, with the consumers the ultimate loser. A five-year study backed by the utility concluded construction must begin on a 115kv transmission line. The utility commission, under prodding of conservationists, however, denied the request and asked for a new study showing how the 115kv line could be saved through active conservation measures. Unfortunately, the company didn't have that much time to waste. The study showed that if construction didn't begin within a year, residents would face brownouts.

The utility had two problems: developing a study quickly and making their arguments persuasive to the commission. The solution was a Geographic Information System (GIS) built around high-resolution SPOT satellite imagery. Unlike the previous study which took five years to complete, this one took only two months to develop, and although it showed some savings from conservation, the evidence was so conclusive that four months later the commission approved construction of a transmission line.

Utilities aren't only facing the uncertainties of cost and long-term planning, they are also finding every business decision reviewed by often unfriendly utility commissions. Anxious to please conservationists and environmentalists, commissions are questioning new construction, disagreeing with projections, and encouraging conservation. Unfortunately, these new demands take time to study and utilities are often forced to delay projects, cope with customer dissatisfaction, or find a new way to gather information quickly.

There is a tool that hundreds of utilities are using that's fast, inexpensive and capable of convincing critics. Satellite imagery combined with GIS is giving the electric power industry the tool to project future electrical demand, choose power corridors, develop land and monitor the environment. In the communications industry, satellites and GIS are helping a new utility, cellular communications, establish itself. And, unlike traditional methods such as aerial photography, it's considerably cheaper. According to Lee Willis of ABB, "Satellite imagery gives us an order of magnitude less costly than other methods."

Predicting the Future

One of the most exciting applications, according to Willis, is predicting electrical power demand in a region using satellite imagery. He estimates that 70 percent of electrical power costs come from transmission and distribution, and having the equipment in the right place is just as important as having the equipment. In addition to giving the utility the information it needs, satellite-based

This 500-mile high satellite view of San Francisco was used to generate a land use map for cellular system planning. ©1993 CNES, provided by SPOT Image Corporation.

GIS also provides the concrete evidence that the companies need to persuade the public and utility commissions. "Most utilities are as nervous as a long-tailed cat in a room of rocking chairs when it comes to proving their business plans to commissions, courts and the public," Willis notes with a touch of Carolina charm.

One example of a utility using satellite imagery to project future demand is Central Power and Light in southern Texas. According to Chris Greenwell, manager of marketing, most of their power generating equipment is in the northern part of their region while the greatest growth is near the border of Mexico. They are using satellite imagery to predict future growth, identify end uses (air conditioners, motors, appliances, etc.), and determine if additional equipment is needed in the southern part of their area. The study will also allow them to identify effective conservation measures.

Predicting future demand depends on identifying land use through computer models. "We know a petrochemical plant has certain end uses," notes Greenwell. Other factors considered are rail lines which engender industrial growth, major road intersections which are ideal for shopping malls, and super dense highway intersections which lead to high-rise buildings. This type of analysis is "consistently the most accurate planning tool," says Willis.

Much of the analysis is based on the pioneering work of Americo Lazzari of Arizona Public Service Co. in the late 1950s. At that time, forecasting was based on costly, time-consuming aerial photographs and massive computers. However, the satellite and computer revolutions have made these predictions faster and more accurate. First, satellite imagery is digital and therefore can be entered into a computer to act as a base for a GIS. Second, satellites can acquire an image of a whole utility territory in one overhead pass instead of taking months as with traditional aerial photography. Finally, the satellite revisits the site every couple of weeks, allowing frequent updates. Since each satellite scene covers as much territory as thousands of aerial photographs, the high-resolution SPOT imagery is ideal for these type of studies and persuading difficult utility commissions. "We had to wait until SPOT came along with its higher resolution before we could use satellite imagery for utility studies," notes Willis.

Satellite imagery is also ideal for creating GISs of undeveloped areas. According to Willis, most utilities use their customer base to develop information systems. If the database doesn't cover an area because of sparse demand, any projections based on that information could be wrong. With satellite information, a utility has an information source for any area, no matter how uninhabited, that gives accurate information on roads, buildings and population. Consequently, the utility's information base will be better equipped to forecast demand in outlying areas.

In addition to satellite information and their own databases, some utilities use other sources for expanding their information systems. For instance, Baltimore Gas and Electric merged state employment records

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