LAND USE MAPPING

The seminar on Land Use Mapping was held in two sessions. Chairman for the Monday afternoon session was JAMES R. WRAY, while the Wednesday session was chaired by OLAF KAYS. Both are with the U.S. Geological Survey's Land Information and Analysis Office.

At the Monday session, participants heard presentations describing the U.S. Geological Survey's land use mapping program -- its approach and products, its geo-information system (including automated cartography output), and parallel research in remote sensing technology, with its prospects for automated input of spatial data as well as automated thematic output. Abstracts of the three presentations appear in this section. Presentations at the Wednesday session were made on various aspects of land use mapping, including the employment of remote sensing, local assessors' maps, and land use data systems.

JAMES R. ANDERSON discussed "The USGS Program For National Land Use Mapping and Analysis," which provides systematic and comprehensive collection and analysis of land use and land cover data on a nationwide basis. Begun in 1975, initial coverage of the United States is planned for completion by 1980. Individual land use/land cover maps and their associated data will be released as they become available following compilation. The presentation described the classification system, land use mapping source materials, standard map products for nationwide coverage, demonstration map products for selected areas, and the geo-information system, with sample computer graphics and statistical products. User assistance and cooperative projects were described, along with supporting analytical studies and continuing research in the state of the art.

"Automated Cartographic Inputs and Outputs for National Land Use Mapping and Analysis" is the title of the paper by WILLIAM B. MITCHELL, who described a geographic information system that relates the land use data generated by the U.S. Geological Survey's land use mapping program to data from other sources. The system can provide data in graphical and/or statistical forms for a wide range of user applications. The presentation described the underlying methodology, input data sets, sample outputs generated by automated cartography, development of software, availability of data in computer format,

development and availability of software, and the prospects for application. The rising expectations for applications and/or requirements of regional, State, and local users of geographic information systems were weighed in relation to possible geographic information system designs. Experiences, opportunities, and problems in related operations and research at the U.S. Geological Survey were discussed.

Parallel thrusts supportive of the U.S. Geological Survey's nationwide land use mapping program are the analysis of land use data and the continuing research in inventory technology and its transfer. One component of this research is comparative land cover analysis and change detection using remote sensors aboard aircraft and satellites. JAMES R. WRAY, chairman of the first session, discussed "Automated Interpretation and Analysis of LANDSAT Digital Data for Land Cover Inventory and Change Detection." He stated that the LANDSAT multitemporal and multispectral data in computer compatible form make satellite observation a promising element in an evolving operational system for land cover inventory and change detection. LANDSAT's modest resolution poses opportunities, as well as limits, and helps us to anticipate what higher resolution would require of future information handling facilities. Even now its digital format is not only an aid to land cover classification but also to area measurement, statistical analysis, and automatic preparation of thematic maps. Its multitemporal coverage also allows us to consider seasonal aspects of land cover as well as more lasting changes.

The presentation illustrated the versatility and limitations of land cover classification from multispectral scanners aboard satellite platforms. It showed sample products, integration into a geo-information system, some prospective uses and users, and encouraged a continued research and development. One proposal to those interested in automated thematic cartography -- such as the detection of land cover change -- is that such information does not always have to be in map form. The predictability of the stable satellite platform and our ability to determine the location of data points may serve as a map substitute for some requirements for geographic information. This may not only hasten the availability of land cover information for making land resource management decisions, but also may hasten the automated preparation and reproduction of any thematic maps derived from spatial data in cellular mode.

ELLIOT AMIDON, of the Pacific Southwest Forest and Range Experiment Station of the Forest Service, U.S. Department of Agriculture, discussed the Wildland Resource Information System (WRIS), a computerized system for storing and manipulating data about land areas. It can edit, retrieve, update, overlay, plot, calculate, and store spatial data. WRIS digitizes land units -- termed polygons -- in each layer of mapped information by a scanning method. The U.S. Forest Service's California Region is using multistage sampling and WRIS to acquire forestry inventory data. Maps produced by WRIS for each of five national forests have three layers of data. Some 300 to 500 maps are processed in a year by a three person staff using a high-speed batch computer terminal. The paper was entitled "Land Unit Mapping with the Wildland Resource Information System."

D. R. FRASER TAYLOR, professor of geography at Carleton University, (Ottawa, Canada) examined the current role of "The Land Use Map in British Local Planning." He argued that currently the role of the map is a minimal one and discussed several reasons for this. He examined the issues involved in incorporating the map in the emerging geographic information systems being developed by local authorities in Britain. He further argued that while the potential of the digital map is great, there are substantial difficulties involved in realizing this potential.

JOHN BEHRENS of the Bureau of the Census' Governments Division looked at maps from the viewpoint of a user of such maps. In his paper, "Tax Maps and Their Land Use Implications," he described the essential and optimal features on cadastral maps used by assessors for tax purposes. In the United States, assessors' records collectively represent the most complete inventory of land parcels, even though sometimes limited to the taxable. Because they are basic and complete, they lend themselves to integration with a comprehensive land data system sensitive to the needs of officials other than assessors, and to the needs of the general public.

"Multi-Dimensional Maps Through Digital Image Processing" was the title of the paper by R. M. BATSON of the U. S. Geological Survey's Geological Division in Flagstaff, Arizona.

Image processing techniques originally developed for exploring the planets can be applied to any data set in which "brightness" values can be arranged in a television-like raster of rows and columns. Data sets may consist of actual television pictures like those taken by LANDSAT, matrices of terrain elevation, or parameters of land use, or a variety of geological and geophysical information. Color compositing, introduction of stereoscopic parallax, and "relief" shading can be used to show each data set in a distinctive way within a single composite map image.

OLAF KAYS of the U.S. Geological Survey's Resource and Land Investigation (RALI) Program, served as chairman of the second session and in his paper described a cooperative user survey to identify and close the gap between State planning data use and Federal data map products. Planners were asked to evaluate comprehensive atlases, orthophotos, and maps showing distributions. Based upon the response, it was determined that further communication between the two groups was needed. The RALI Program will institute a series of Federal/State workshops to further investigate the issues identified by the users. The paper was entitled "Evaluation of Natural Resource Data Products by State Data Users."

JOHN M. MORGAN and DONALD OUTEN of the Maryland Department of State Planning described "The Maryland Automated Geographic Information (MAGI) System," a grid-based, computer-assisted system for the storage, retrieval, manipulation, and display of geographic data. The MAGI System was implemented for the Maryland Department of State Planning by the Environmental Systems Research Institute to assist in the preparation of a generalized State land use plan. The following methods associated with the implementation of the MAGI System were discussed: the collection and digital encoding of selected geographic (physical and cultural) data, and the design and development of geographic data handling programs and procedures. Current applications and limitations of the MAGI System were also discussed.

GEORGE HALASI-KUN of Columbia University (New York) prepared a supplemental paper on the New Jersey Land Oriented Water Resources Data System (LORDS). He described the conditions

of the State from the viewpoint of interdisciplinary data gathering concentrated in water interaction on the natural environment. The system not only combines general information on water resources and climatic conditions, but also includes demographic, geologic, land use and sanitation data, together with reference listings, map descriptions and lists of State-owned lands and historical sites. A detailed description of a ninety square kilometer area was given from the data bank and included maps and descriptive materials. The advantages and disadvantages of storing data by computer, microfilm, and MTST (magnetic tape/selectric typewriter) were also discussed.