NATURAL RESOURCE SYSTEMS

The section on Natural Resource Systems was organized in four separate sessions. Organized with the assistance of the U.S. National Park Service, the concept of separate sessions was introduced by William Switzer from Environment Canada. He solicited several of the papers and chaired three of the sessions, Ken Dueker chaired the other.

A post conference seminar was held Friday, November 9. Its focal point was the utility of geographic information systems and computer-assisted mapping technologies for national park planning and management. Caby Smith, Chief of the Science Information Division of the National Park Service, had official responsibility for this seminar and coordinated the activities between the participating organizations. His colleagues from the Park Service who participated in the seminar were Raymond Herrmann, Chief, Air and Water Resources Division, and Christine Schonewald and Ted Dinkel from the Office of Science and Technology. Representatives from Parks Canada and Environment Canada were Joe Arbour, David Day and William Switzer. Roger Tomlinson represented the International Geographical Union. Four papers were commissioned for this seminar: "Spatial Data Handling Systems for Natural Resources", by Jack Dangermond; "Application of Remote Sensing Technology to Monitoring the Shoreline Dynamics of Seashore Park", by Barry Wellar; "Hydrologic Monitoring Systems for the National Park Service", by Vujica Yevjevich, and "Design and Production Considerations for an International Conservation Atlas", by Carl Youngmann.

Following a brief introduction by the Seminar Chairman Robert Aangeenbrug, Caby Smith identified four areas of concern in the Science Information Division. First, the general utility of geographic information systems in natural resource management and planning; second, the use of appropriate technology for monitoring spatial change; third, hydrologic monitoring in the context of spatial data systems; and finally, the design and production consideration for automated mapping of natural resources. After considerable discussion a consensus was summarized by the chair. Two basic approaches have persisted in natural resources information system development, the all-encom-

passing inventory systems, and the special purpose single problem systems. Yevjevich labelled these the inductive method, where one required all the possible data, and the deductive method, where one selects the data necessary for a specific use. Several agreed that the difficulties with large systems include data acquisition and updating expenditures, as well as the problem of data obsolescence if the collection and data entry procedures were time consuming.

Joe Arbour emphasized that experience indicated that much time and expense is saved by formulating a clear definition of the problem. A subsequent, careful plan for development and use of data stored in a geographic information system is essential. For example, a carefully designed geographic information system allows iterative selection of appropriate variables for a specific analytic use. This infers that a minimum set of variables are imbedded in such a system. Dangermond pointed out that the geo-referenced information can provide the framework for both storage, organization, retrieval and display of natural resource phenomena. He also concurred that no single system can meet the needs of the National Park Service. The diversity of the functions it performs as well as the variety of the problems it faces preclude a single system approach. Barry Wellar warned that undue attention to technological and technical detail is likely to contribute more to the failure than to the success of any specific problem. In other words, know the antecedents, define and simplify the problem and apply the appropriate technology in the context of the users of any given system. Carl Youngmann warned that the acquisition of computer graphic technology for a specific atlas project could not be cost justified. In the context of a broader set of needs to support scientific and management applications such acquisition should be planned carefully. There is no substitute for permitting the scientist to enter the map design process interactively provided one continues a focus on the problem.

The design of natural resource systems in a spatial context requires: explicit problem definition, a review of existing methodology, geographic referencing for each variable, a specific schedule for completion, definition of available resources, a sense of user capability and explicit management support.

Illustrated in Sudia and Dinkel's presentation during the plenary session, is that the context of design in the absence of reality testing often yields failure. In addition, each effort in establishing and maintaining a geographic information system depends on senior management support, not merely concurrence. Developing a sense of institutional and managerial ownership of a computer-assisted resource information system is the key to its initial success and the only hope for its survival.

For this section, specific references to each paper were omitted in this review. Each paper has an introduction which can be consulted for ease of selection and review. Each illustrates one or more aspects reviewed in the post conference seminar.