

PRE-CONFERENCE WORKSHOP ON GEOGRAPHIC INFORMATION SYSTEMS

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GIS is a buzzword these days at marine labs, field stations, university campuses and government agencies. The spatial or geographic perspective on data has always been important within the natural sciences, but the advent of sophisticated computer applications is changing how that perspective is applied. The design and implementation of a GIS involves the use and organization of data in ways that are familiar to library and information center staffs. Librarians should know what they are and how they can be used. Consequently, Tom Moritz as the 1991 Program Chairperson decided that GIS was an appropriate and timely topic for the Conference Pre-Conference Workshop.

The two workshop speakers were Michael Goodchild, Director of the National Center for Geographic Information and Analysis at the University of California at Santa Barbara, and Kenneth Haddad, Research Administrator and Director of Coastal and Marine Resources Assessment at the Florida Marine Research Institute in St. Petersburg, Florida. They were charged with introducing the concepts and applications of GIS.

Dr. Goodchild spent the morning presenting a succinct and informative introduction to geographic information systems. He suggested thinking of GIS as maps in computers. It treats maps as we already treat words and numbers in computer applications. This treatment has changed the importance of geographic information as it is no longer static, the information is more timely, boundaries are flexible, and multiple overlays are simple. In other words, GIS has revitalized the geographic component of data. Dr. Goodchild also covered the major technical concepts of the GIS process - database capture, data storage and management, data retrieval and analysis, and graphic output. Each concept has its own set of problems and issues that must be addressed when considering implementing a GIS or when using an existing system. Though the applications are becoming more complex, the users more sophisticated, the databases larger, the platforms faster, GIS is not 'the' answer to all problems: you cannot press a button and have the answer spew out. But GIS is a powerful tool for the integration and display of geographic information with scientific data.

Florida's aquatic applications of GIS were the focus of the afternoon session. Mr. Haddad described the role of a geographic information system in an ecosystem

approach to natural resource management. GIS can be a useful tool in the development of public policy. The State of Florida's program is one of the most advanced in the United States in terms of aquatic resource management use of GIS. Mr. Haddad also discussed the GIS implementation process from an administrator's perspective stressing the importance of a needs assessment, the need for knowledgeable people in both the natural and computer sciences, and the challenges inherent in data quality and documentation. GIS can be a useful tool but it is costly in terms of equipment and people. Any institution considering a GIS must carefully review its needs and desires before implementation.

Both speakers covered many topics during the day leaving the participants slightly beathless. I, for one, also left with a clearer understanding of the history, theory and applications of geographic information systems. The following glossary and bibliography were compiled from my notes of the workshop.

SELECTED RESOURCES ON GEOGRAPHIC INFORMATION SYSTEMS

Articles:

Cowen, D.J. 1988. GIS versus CAD versus DBMS: What are the differences? *Photogrammetric Engineering and Remote Sensing* 54(11): 1551-1555.

Davis, F.W., D.M. Stoms, J.E. Estes, J. Scepán. 1990. An Informational Systems Approach to the Preservation of Biological Diversity. *International Journal of Geographical Information Systems* 4(1): 55-78.

Kendall, R. 1991. Mapping Software: Analyzing a World of Data. *PC Magazine* 10(13): 249-299.

Michener, W.K., D.J. Cown, W.L. Shirley. 1989. Geographic Information Systems for Coastal Research. *Proceedings of the Sixth Symposium on Coastal and Ocean Management/ASCE*. pp. 4791-4805.

Parker, H.D. 1988. The Unique Qualities of a Geographic Information System: a commentary. *Photogrammetry Engineering and Remote Sensing* 54(11):1547-1549.

Books:

Aronoff, S. 1989. *Geographic Information Systems: a management perspective*. Ottawa: WDL Publications.

Burrough, P.A. 1986. *Principles of Geographic Information Systems for Land Resources Assessment*. Oxford : Clarendon. 193 pp.

Goodchild, M. and S. Gopal. 1989. *The Accuracy of Spatial Databases*. Bristol, Pa. : Taylor and Francis. 290 pp.

Goodchild, M. and K. Kemp (eds.). 1990(?) *Core Curriculum in GIS*. Santa Barbara, Ca. : NCGIA. 3 vols.

Goodchild, M., D. Maguire and Rhine. 1991. *Geographical Information Systems*. New York : Wiley. 3 vols.

Peuquet, D and D. Marble (eds.). 1990. *Introductory Readings in Geographic Information Systems*. London : New York : Taylor & Francis.

Star, J. and J. Estes. 1990. *Geographic Information Systems: an introduction.* Englewood Cliffs, N.J. : Prentice Hall.

Tomlin, C. D. 1990. *Geographic Information Systems and Cartographic Modeling.* Englewood Cliffs, N.J.: Prentice Hall.

Conference Proceedings:

American Congress of Surveying and Mapping...[et al.] 1989. *GIS/LIS '89 Proceedings.* Bethesda, Md. : American Society for Photogrammetry and Remote Sensing, American Congress on Surveying and Mapping. 836 pp.

American Congress of Surveying and Mapping...[et al.] 1990. *GIS/LIS '90 Proceedings.* Bethesda, Md. : American Society for Photogrammetry and Remote Sensing, American Congress on Surveying and Mapping. 967 pp.

Reports:

Guptill, S.C. (ed.) 1988. *A Process for Evaluating Geographic Information Systems.* U.S. Geological Survey Open-File Report 88-105. 136 pp.

Haddad, K. and W.K. Michener. 1991. *Design and Implementation of a Coastal Resource Geographic Information System: Administrative Considerations.* Belle W. Baruch Institute for Marine Biology and Coastal Research Contribution no.835. Columbia, S.C. : The Institute.

Kapetsky, J.M., L. McGregor, H. Nanne E. 1987. *A Geographical Information System and Satellite Remote Sensing to Plan for Aquaculture Development: a FAO-UNEP/GRID Cooperative Study in Costa Rica.* FAO Fisheries Technical Paper no.287. 51 p.

Meaden, G.J. and J.M. Kapetsky. 1991. *Geographical Information Systems and Remote Sensing in Inland Fisheries and Aquaculture.* FAO Fisheries Technical Paper no.318. 262 pp.

Reynolds, J. E., III and K.D. Haddad (eds.) 1990. *Report of the Workshop on Geographic Systems as an Aid to Managing Habitat for West Indian Manatees in Florida and Georgia.* Florida Marine Research Publication no.49. 57 pp.

Serials:

GIS World. Fort Collins, Co.: GIS World, Inc., 1988-. (bimonthly)

The GIS Sourcebook. Fort Collins, Co.: GIS World, Inc., 1989-. (annual).

Other:

National Center for Geographic Information and Analysis.

Department of Geography, 3510 Phelps Hall, University of California, Santa Barbara, Ca. 93106-4060. Contact Michael Goodchild or John Estes at (805)893-9224, FAX (805)893-8617, ncgia@ncgia.ucsb.edu.

The Center has a newsletter, NCGIA Update, which contains reports on activities and lists publications.

Florida Marine Research Institute.

Department of Natural Resources, 100 Eighth Avenue S.E., St. Petersburg, Florida 33701-5095. Contact Ken Haddad at (813)896-8626, D.FLAMRI (Omnet).

GIS JARGON & ACRONYMS

- DEM**..... digital elevation model (topographic data in which each cell is encoded with ground elevation information)
- DIME** digital version of United States street map
- DLG**..... digital line graph
- DTM**.....digital terrain model (topographic data in which each cell is encoded with ground elevation information)
- fuzzy creep**..... tolerance problem arises from using variety of interpretations of same geographic area
- GIS**..... geographic information system/s
- GPS**..... global positioning system
- objects**..... points, lines of area features
- overlay**..... superimposition of two coverages and computation of a new one
- polygon**..... an area or patch represented as a connected series of straight lines
- SIF**..... standard interchange format
- sliver/polygon problem**..... arises from overlay process and concerns accuracy
- raster**..... a cell; refers to way data is spatially coded; raster based maps are Remote constructed using an array of cells or rasters
- TIGER**..... 1990 United State census referenced to digitized street map
- tile**..... geographic partition of a database
- TIN**..... triangulated irregular network (network of triangles used to represent the earth's surface)
- vector**..... a straight line between two points; vector based maps are usually more accurate that raster-based ones