# Montana GIS News, Winter 1997

## Table of Contents



## GIS and Watershed Planning in Montana

By Cathy Maynard, NRCS

Nearly everyone in Montana is aware of the critical role water plays in our lives. Throughout the State, Montanans from many backgrounds and interests are actively translating this awareness into an understanding of the need to plan for, and effectively manage, our vital water resources. The past few years have seen the formation of numerous grass-roots organizations based on the concept of watersheds as planning units; and initiated to support and consolidate private, Federal, State and local land use planning efforts. Included among these locally based watershed planning groups are the BitterRoot Water Forum, the Blackfoot Challenge, the Kootenai River Network, the Elk Creek Watershed Council, and over fifty others.

The activities promoted by these groups reinforce the ideas expressed in a 1995 memo by Governor Racicot stating that, "Sustaining our watersheds and ecosystems will provide lasting benefits only if constructed through a collaborative, cooperative process which depends upon the active involvement, insight and support of local residents." A formal agreement by the 22 State and Federal agencies the Montana Interagency Coordinating Group has also highlighted the importance of cooperation both in planning and in the sharing of technical expertise for these watershed planning efforts to be successful. To this end, the Natural Resource Conservation Service (NRCS), Region 1 of the US Forest Service, and the Natural Resource Information System program have recently established a cooperative agreement intended to provide GIS support to local watershed planning groups.

For those involved in natural resource management, integrating the knowledge of watersheds as functional systems into the land use decision-making process comes as a much needed and welcome task. Many also recognize that the effective use of GIS will help ensure the success of these planning efforts and increase our ability to share information. The power of GIS to accurately display and evaluate the status of social, economic and natural resources within a watershed can serve as an equalizing influence- providing all interested parties with the same information; helping all participants in the planning process to identify areas of concerns and interest; and assisting in the formulation of realistic management/planning alternatives. In a proposal currently before the State legislature, the Yellowstone County Conservation District is sponsoring the development of prototype applications for the use and integration of GIS into the watershed planning process. If successful, this effort could greatly enhance the ability of other watershed planning groups to utilize GIS information and technology while reducing the burden of startup and development costs. Elsewhere, examples of GIS applications in support of watershed planning are developing nearly as rapidly as the planning groups themselves. In the Tenmile watershed, stream survey information collected using a GPS will soon be available for the local planning group as they work toward improved management. In the Teton watershed, detailed mapping of noxious weed infestations will be digitized and used to design and monitor containment efforts. From this vantage point, it appears that through the thoughtful use of GIS in the planning process, and the spirit of cooperation Montanans are famous for, a secure future for sustainable watersheds could become part of our legacy.

Return to Table of Contents
Return to GIS Homepage

## New Two-year Degree at Montana Tech College of Technology Meets Employment Demands

By Mike Frankovich, Montana Tech

A new two-year degree program at the Montana Tech College of Technology (COT) initiated last fall is helping meet the needs of
a highly specialized information gathering and processing infrastructure while holding the promise of creating jobs in the Treasure State for graduates.

The Applied Associate Degree in Geographical Information System/Global Positioning System (GIS/GPS) is unique to the northwest United States by filling the void of entry-level GIS technicians.

The idea for this program was generated from College of Technology (COT) faculty who envisioned a growing need for GIS/GPS in the technical areas. After completion of a needs survey of current GIS users, college officials prepared a proposal for presentation to the Montana University System Board of Regents. An advisory board comprised of industry leaders was assembled and the program contents were planned. The regents gave their stamp of approval and the first students enrolled last August.

Four major trends are clearly driving the growth in this field: data integration, technology integration, systems integration and the creation of a new geographic information infrastructure. The program uses Trimble GPS receivers and ESRI ArcView, GIS software. GPS classes are utilizing updated 7 1/2' Quad maps for use by rural fire departments. Instruction also incorporates Geo- Link, a software package produced by Geo-Research. Additional subjects covered include surveying, math, Cadastral Mapping and communications.

Augmenting the two-year curriculum are short courses also designed to fit the needs of industry. These may be taken as a workshop or for credit. One such program being considered covers the use of survey grade GPS tailored for advanced users who need further training. A new concept has been added to Montana Tech and the Montana Tech College of Technology. Students who now may obtain a two- year Associate of Applied Science (AAS) degree from COT, are now also afforded the flexibility of converting this into a Bachelor of Applied Science (BAS) degree. Granted by the regents last year and instituted Fall Semester '96 at Montana Tech, persons who completed the associate degree requirements can, with slightly more study, obtain the four-year bachelor's degree that meets both their educational and career needs. The BAS program, accredited by the Northwest Association of Schools and Colleges, allows the transfer of AAS credits toward the baccalaureate degree without loss of time or credit already invested and earned. Since GIS has application in so many areas, this is a program example that could easily be converted into a BAS degree. For further information contact the Montana Tech Admissions Office at 1-406-496-4178 or toll-free 1-800-445-TECH.

Return to Table of Contents
Return to GIS Homepage

## A Web-Based Tool For Data Organization And Dissemination

by Michael Sweet and Ray Ford, University of Montana

In 1996 as part of a continuing nation-wide effort to develop a National Geospatial Data Clearinghouse (NGDC), the Federal Geographic Data Committee (FGDC) funded thirty-one cooperative agreements. Under this program, Dr. Ray Ford and Mike Sweet at The University of Montana were awarded funding to develop and demonstrate software for indexing and accessing geospatial data.

The growth in the number, size and complexity of geospatial datasets is an inevitable result of an increase in the use and availability of software to display and analyze spatial data. For some organizations, the result is a large collection of spatial data. Managers of these collections are generally concerned with organizing that data in a manner that facilitates both dissemination of the datasets and the ability to easily answer questions about individual datasets. This need for ease of access extends to users both within and outside the organization. To support a user's quest for data, a data manager needs an information system that promotes access through spatial properties and other data specific
characteristics. If books were geospatial datasets, one has to wonder what a library of spatial datasets would look like. Since the early 1990's, with funding from the National Science Foundation and other Federal sources, Dr. Ray Ford has led an effort to develop an Ecosystem Information System (EIS) that allows managers to build an index to a heterogeneous collection of datasets in an intuitive fashion. Using traditional hierarchical classification principles long used in biological systems, the data manager uses EIS to build indices that formally describe the relationship between datasets. For a user, these same EIS indices provide a structure that supports browsing and querying a collection of spatial datasets.

Hierarchical classification systems offer an intuitive, descriptive framework that allows people to understand both the similarities and
differences of various entities, but often run into controversy if the classification systems are too rigid or interpreted in a too legalistic
a manner. It can be quite difficult for a manger to decide how to select the best hierarchical classification to organize and represent a particular collection of datasets, much less get a group of two or more users to agree on what is the "best" representation. Any representation of a collection of spatial datasets that excludes the possibility of alternative organization is, we think, unnecessary. Just as librarians have typically built cataloging systems with multiple indices (e.g. indexed by author, title, and subject), EIS allows users to build multiple hierarchical indices according to different views or biases. Just as multiple indices in a library do not require the duplication of books, multiple EIS indices describing the same spatial dataset collection do not require the duplication of datasets.

The EIS classification approach allows for attributing each type of data in the collection. Within this context, we can describe metadata
as a both a data type and as an attribute of a spatial data set. By defining a data type called "Metadata Standard Object" that describes the Federal Geographic Data Committee's metadata standard, this metadata data type can then be declared as an attribute of any spatial data type. In fact, within the classification hierarchy we have the option to differentiate between data sets that include and do not include metadata. This hierarchical approach to classifying data types easily extends to included operations or programs that may act on specific data types.

In conjunction with an effective indexing system, an appropriate means of access is a key component in the development of an information
system. The World-Wide-Web has rapidly emerged as a mechanism to support access to a wide range of information, including collections
of spatial datasets. To support a Web site for a large spatial data collection, the data manager must in effect become a skilled "Web author",
with the ability to present and maintain textual descriptions, imagery and links in a consistent manner. Vendor-specific tools offer only
a limited solution to the data manager faced with data drawn from an array of geographic information systems, image processing software,
or simulation models. At best the data manager must master and coordinate the use of a whole set of vendor-specific Web-page construction
tools; at worst the data manger simply builds and maintains pages manually. EIS makes use of standard Web

software and automatically
translates an EIS index into Web accessible form. Web pages are generated within EIS on-demand, so they always reflect the current state
of the collection. An automated generation of Web pages from an indexed and organized collection can significantly reduce development
and maintenance costs, while providing users with enhanced browse and search capabilities.

As part of a related effort, The University of Montana is establishing an NSDI node. Our expectation is to demonstrate the utility of the
EIS approach with spatial datasets and metadata within this collection at the University of Montana. Further details on EIS can be found
at http://www.cs.umt.edu/EIS.

Return to Table of Contents
Return to GIS Homepage

## USGS, Opportunities for Partnerships

By Lance Clampitt, US Geological Survey

As the largest producer of geospatial data products in the Nation the United States Geological Survey (USGS) has the responsibility and
commitment to produce data over America's public and private lands. Much of the National Mapping Division's accomplishments comes through cooperative efforts with state and local governments, communities, coordinating councils, corporations and other public and private organizations. To leverage funds appropriated for map and data production, the USGS encourages cooperation with a variety of partners where the participants share the cost and/or production work of preparing multipurpose standard geospatial products.

The benefits for cooperators include:

*Cost savings - Data partners can pool their resources with the USGS to generate digital, graphic, and photographic products at significant
cost reductions.

*Data Standardization - The USGS uses base cartographic data content standards and complies with Federal data transfer standards to enhance data compatibility and to allow the transfer of data files between formats.

*Data Availability - Cooperative partnerships enable expanded product inventories and accelerated product revision. This gives all
spatial data users access to increased numbers of accurate and up-to-date geospatial data products.

If you have a need for USGS data and would like to see data produced in your area of responsibility or interest please contact one of the following organizations: Montana GIS Users' Group, Montana Natural Resource Information System, Montana Technical Working Group, University of Montana, Montana State University and the Greater Yellowstone Coordinating Council. You may also contact the National Mapping Division's liaison for Montana at (303) 202-4514.

Return to Table of Contents
Return to GIS Homepage

## Montana Local Government GIS Coalition

by Jackie Magnant, Montana State University

The Montana Local Government GIS Coalition (MLGGC) was initiated by local government GIS practitioners in July 1995 to facilitate
and advance the implementation and development of GIS technology in city and county government through communication and data
sharing. MLGGC has six goals:

1. promote a bottom up approach for data acquisition beginning at the local level;
2. facilitate an exchange of ideas among local government GIS users;
3. provide information through workshops, seminars, and meetings;
4. establish a forum to identify common problems and unified solutions which benefit city, county and state entities;
5. provide non-computer users with information and technical assistance;
6. represent and advise MLGGC participants on state and regional technological issues.

Membership is open to all city and county governments. The next meeting is scheduled for February 24 at the MACO Conference in
Helena.

Return to Table of Contents
Return to GIS Homepage

## A Few Thoughts and Facts on Montana's Cadastral Mapping Project

by Stu Kirkpatrick, Cadastral Project Manager

Montana Department of Administration/Information Services Division Montana's Cadastral Mapping Project is being carried forth to the 1997 Montana State Legislature on two fronts. It is part of Information Services budget request for the 1998-1999 biennium. Additionally, funding arrangements for the project are contained within House Bill 188. HB 188 is a bill authorizing the state to issue bonds to pay for over 50 million dollars in information technology projects as part of a long term infrastructure enhancement program. In preparing materials and assembling support for this legislation I have sometimes congratulated myself on helping lead the charge for improved land information in Montana. I was quickly brought back to earth by a publication sent to me by Rick Breckenridge, GIS Manager in Flathead County. This booklet, Need for a Multipurpose Cadastre, was published by the National Research Council in 1980. It summarizes the work of the Panel on a Multipurpose Cadastre, a group of some of the most distinguished scientists involved in land related disciplines at the time. The premise of creating a private/public partnerships to build a state-wide cadastral databases was clearly laid out at least 16 years ago, on a much broader scale. Here are some recommendations from the executive summary of Need for a Multipurpose Cadastre. I think they may sound familiar.

*"We recommend that federal legislation be prepared to authorize and fund a program to support the creation of a multipurpose cadastre in all parts of the Nation."*

*"We recommend that each state authorize an Office of Land Information Systems, through legislation where necessary, to implement the
multipurpose cadastre."*

*"We recommend that each county government (or municipality where appropriate) create an Office of Land*

*Information Systems in*
*coordination with such offices as the recorder of deeds, county surveyor, assessor, planner, and county abstractor,"*

*"We recommend that local governments be the primary access point for local land information."*

And for those people who think our plans in Montana are grandiose, hear the words of Napoleon in 1807, who tasked a commission to:

*"survey ... more than 100 million parcels, to classify these parcels by the fertility of the soil, and to evaluate the productive capacity of*
*each one; ..."*

The idea of a multipurpose cadastre, or if you prefer a robust land information system, is not new at all. The real shame is that creation or capture of spatial data, geo-referenced to a common base layer, never captured the fancy of those individuals with the power to make
it happen. The members of the Panel on a Multipurpose Cadastre could not have envisioned today's hardware, GIS software and GPS
equipment. Yet they had the vision to realize that in the future, a spatial data framework, and the data as well, would be required to fuel
the processes used to manage both the cadastral parcel and the resource and environmental data associated with that parcel. Just imagine
what you could do if you really had all the data you wanted.

In my new job I have been exposed to a term called "creeping incrementalism". I'm not sure that I really understand it, but it roughly means
that despite government bureaucracy and resistance to change, if an idea truly has merit it will evolve over time into policy. Perhaps the
Cadastral Mapping Project is an example of the creep that came from the seeds planted by Napoleon, those who established the Public
Land Survey System, the Panel on a Multipurpose Cadastre, and countless other individuals. My job and your job is to turn the creep into
a walk and the walk into a run. At ISD we will be following the legislation pertaining to the Cadastral Mapping Project closely, and you
may wish to do likewise.

Now for the facts. A promotional brochure and a copy of the Cadastral Mapping Draft Project Plan are available on ISD's homepage at
http://www.mt.gov/isd/planning/index.htm (note: the pdf version of the project plan is being worked on). Agendas, minutes and
membership lists of the Cadastral Management Advisory Team (CMAT) and the Cadastral Technical Advisory Team (CTAT) can be found
online at http://www.mt.gov/isd/groups/index.htm. You can receive current information on the project and the project's working groups
at these sites. For those of you without Internet access, please call me at 406-444-9013 and I will be happy to mail any project documents
to you or simply chat about the progress of the project.

Return to Table of Contents
Return to GIS Homepage

## K-12 GIS Virtual Tool Box Underway

By Kris Larson, NRIS

In November 1996, the Montana GIS Users' Group announced a request for proposals for a $1,000 grant to develop an internet worldwide web based training prototype for GIS. The focus of the project is to research existing GIS training materials and resources on the web, particularly those focused on GIS beginning concepts for primary and secondary education. The resources will be organized in a format to assist learning about GIS and how it is applied in Montana. The goal is to provide teachers with additional tools to incorporate GIS into their curriculum.

In December, the grant was awarded to a teacher team at Corvallis High School. William W. Pereira is a member of the Title I (at-risk students) program at Corvallis High School. Pereira brings his expertise from the Corvallis Riparian Monitoring program into this project. Tom Gallagher has served as the Computer Technology Coordinator for the Corvallis School District since 1993. He oversees an innovative program which has successfully integrated technology into a wide array of curriculum areas. Russ Hendrickson is a Mathematics and Computer Science teacher at Corvallis High School. He incorporates the internet and creating web pages into his Computer Literacy curriculum. Hendrickson and Gallagher were recipients of an Achievement Television (1996) grant to author a web site for the Classroom Without Walls program.

In their proposal, the Corvallis team said, "It is our intention to make this project a collaborative effort between the team of teachers and their students. Many of our students are already creating their own web pages, and this will be a project in which they may apply and refine those skills while working towards a concrete, worthwhile goal."

The final product will have an Introduction to GIS Section, GIS Software and Data Sets, Links to Internet GIS Resources, and the Student Component of GIS. The web page will be showcased at the Montana/Idaho GIS Conference in Bozeman this April
28 - 30. The address will published in the next GIS Newsletter - watch for details!

Return to Table of Contents
Return to GIS Homepage

## 1997 Montana/Idaho GIS Conference

By Jeanette Cherry, Montana State University

The Geographic Information and Analysis Center (GIAC) at Montana State University-Bozeman will host the first-ever Montana/Idaho GIS Conference in Bozeman, April 28-30. Sponsored by the Montana GIS Users' Group, a statewide consortium of government agencies, universities and businesses, the conference will offer concurrent sessions on local government, natural resources, new technology, and Native American issues.

Conference highlights include Public Night (April 28), with poster-judging and GIS school-projects developed as part of the GIS K-12 Adopt-A-School Program; vendors' displays of GIS and GPS software, hardware and services; a no-host social and dance; and plenary addresses by Steve French, Professor and Director, City Planning Program, Georgia Institute of Technology, Georgia Tech, Eric Anderson, Chief of Conservation and Environmental Programs for the Army National Guard in Arlington, Virginia, Joe Chapman, Provost and Vice President for Academic Affairs at Montana State University-Bozeman, and Don Stueck, Mayor of Bozeman. Sixteen pre- and post-conference workshops will be offered, on a wide variety of topics, from 'GPS Basics' to 'ArcView Extensions'.

The advance conference registration fee of $95 ($45 for students) covers all conference materials, two lunches and a buffet-dinner. Up-to-date schedules can be found on the conference home page at http://sun1.giac.montana.edu/mtconf97.html. For more information, contact Jeanette Cherry, 406-994-2374 (e-

mail: jeanette@guava.giac.montana.edu), GIAC, Montana State University, 200 Traphagen Hall, Bozeman, MT 59717.

Return to Table of Contents