



Michigan State University Extension
Land Use Series

What a Basic County (or other government) GIS Includes

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The use of Geographic Information System (GIS) computer technology is becoming common place. In county government the major users tend to be equalization and planning departments, but the potential for GIS use exists in nearly every department of county government.

Starting a county GIS has a high initial investment. Benefits are long term and can result in the ability for the same number of county employees to be more productive, efficient, and having the ability to conduct types of analysis which would not be practical without GIS.

This bulletin is to outline some of the basic data sets a county should seek to have in its initial GIS system. Many of the data sets already exist and can be obtained from other sources at low cost, or on a data sharing basis.

The county should consider becoming a “data sharing” member of Improving Michigan Access to Geographic Information Network, Inc. (IMAGIN). This allows the county to cooperate with other units of government and state agencies to share data. This means when a public agency creates or modifies GIS data on the County, then the county can acquire a copy for use in the county’s GIS. In return the County provides other IMAGIN public agencies with copies of the County’s GIS files. Many of the files/datasets listed below can be obtained without charge from various state, federal and regional agencies, making creation of a basic county GIS much less expensive.

*“Thirty seven million acres is
all the Michigan we will ever have”*
William G. Milliken

This is a fact sheet developed by experts on the topic(s) covered within MSU Extension. Its intent and use is to assist Michigan communities making public policy decisions on these issues. This work refers to university-based peer reviewed research, when available and conclusive, and based on the parameters of the law as it relates to the topic(s) in Michigan. This document is written for use in Michigan and is based only on Michigan law and statute. One should not assume the concepts and rules for zoning or other regulation by Michigan municipalities and counties apply in other states. In most cases they do not. This is not original research or a study proposing new findings or conclusions.

A basic County GIS system includes the following sets of information:

- **Base map:** Map data to show basic map information such as roads, section numbers and corners, rivers, lakes, political boundaries and so on. Data for these files can be obtained from Michigan Resource Inventory System (MiRIS) and maybe in the near future from Michigan Information Center (MIC) in conformed form (including road infrastructure, accident, address range, data). From this data set topology can be created using municipal and county boundaries (a polygon for each municipality), Public Land Survey (PLS) sections (a polygon for each PLS section), and a quarter-quarter grid (polygon for each 40 acre quarter-quarter or government lot). These polygons can also be used in the creation of the data sets listed below.
- **U.S. Census data:** Census block (equivalent to a city block in area) information on count of housing, total population, minorities (black, Indian, Asian, Hispanic) people over 18 years of age broken down by minority, and population density. Also census data at the municipality level (municipal polygons) including population for past censuses; housing count for past censuses; group quarters population; most age, minority, seasonal population, ethnic, economic, poverty, employment, commuter, and housing condition data.
- **Geology:** A set of files showing the county's quaternary (glacial) geology. This can be digitized from an interpolated map drawn from the Quaternary Geology Map of Michigan (Department of Natural Resources (DNR) Geology Division). Pre-European settlement vegetative cover can be obtained from the DNR natural features inventory/MiRIS or, in some cases, the regional planning agency for your part of the state. From the Michigan Department of Environmental Quality (DEQ), one can obtain an oil and gas well database. Geological formation point data to 50 feet and to 100 feet for identification of impermeable-like layers can be created if the county has participated in the statewide groundwater database program (see below) using Geology software from the DEQ.
- **Land use:** A 1978 area file which classifies and shows the type of land use (residential, commercial, industrial, etc.) occurring in on the land and the existing vegetative cover (forest type, fields, wetlands, etc.). This file is available from MiRIS. Updating this file to show data for more recent can be done with special equipment. It is not usually cost effective for the county to purchase the special equipment. This is best jobbed out to Grand Valley State University Groundwater Institute or to Michigan State University Center for Remote Sensing. Consistency with the 1978 data (and/or corrections made to the 1978 data) is a quality control issue.
- **Municipal:** A set of files with data for school districts; political boundaries including some census data at the municipal level; county board of commissioners districts; remonumentation corners, United States Government Land Office (GLO) original survey corners, point file; section data file for each government survey section (usually about a square mile) for a potpourri of information (e.g.

count of addresses, high, low, and average elevation, relief, actual area, perimeter). A point file of colloquial (historic) place names.

- **Parcel:** Property/parcel information. The data set shows property boundaries and can be joined with tax equalization or tax assessor databases. If registering a county's parcel lines to the MiRIS corners, use of the MiRIS quarter-quarter grid is advised. One can subset from up-to-date parcel files many different database including public land ownership.
- **Address:** A point file for each address in the county, accurately locating the structure being addressed, and having an associated database identifying what the address is to. Also an area file for MSAG (9-1-1 Dispatch Master Street Address Guide) showing telephone exchange, post office (zip code boundaries), police, fire department, EMS, DPW, and Michigan Bell 9-1-1 Emergency Service Zones.
- **Pollution:** A point file on each P.A. 307 pollution site in the county, and additional tentative contamination sites from DEQ. Fields include, the state identification number, SAMS score, parcel number, address, common name, DNR location code, and type pollution.
- **Soils:** An area file for a County Soil Association survey showing data on soil name and associated USDA soils table information (e.g. drainage; texture; geologic association; erosion potential; prime forest lands ratings; site index range for northern hardwood, oak, aspen, Jack Pine, White Pine, and Red Pine; agricultural yield (locally important farmlands); bushels per acre of corn yield; bushels per acre hay yield; ratings for ponds, embankments, irrigation, bearing capacity, shrink-swell, road foundation, septic suitability, permeability, and water holding capacity; suitability for development such as a campground, trail, and wildlife food; and source for topsoil, sand, gravel, road fill, and impermeable material. This is a complex digitizing process, and very time consuming. Quality control and application will be limited if digitized from the soil survey publication. If the soil survey has not already been digitized by the United States Department of Agriculture (USDA), it is possible to have a partnership with the USDA to provide the county with a digitized soil survey from digital ortho quads for half the actual cost.
- **Utilities:** An area file showing the service area for phone, electric, gas, water, sewer, and cable television utilities in the county. An area file showing County Drain districts; a line file showing county drains can also be created. Some counties are also creating line files to show all underground pipelines.
- **Water:** A MiRIS/DNR area file for each watershed and sub-watershed in the county. The county can enhance data to include the watershed area; USGS, DNR, identification codes; perimeter; and ratings for the watershed's critical rating for agricultural, crop, water quality, oil and gas related contamination, sedimentation, erosion issues (from USDA work done by the local Conservationist). Wetland maps (from the national wetland inventory, soils, MiRIS land use/cover) will be available from NWMiCOG in mid-year 2000.
- **Water wells:** A point file for each water well drilled after 1975 which was properly recorded with the Geology Division of the DNR and/or the District Health Department. Data includes all the information found on the well driller's log. From this dataset the following data files can be constructed using Surfer or other 3-D imaging/analysis software (it may be more cost-effective to this task to a third party). Those datasets showing the county groundwater table elevation; groundwater discharge areas, recharge areas; a point file showing groundwater vulnerability to surface contamination through lithology; and surface permeability showing groundwater vulnerability to surface contamination. If delineated, an area file showing Public Type I water well Wellhead Protection Zones for those public water supply well fields can also be created.
- **Zone:** Several area files showing a composite zoning map of each municipality in the County (including zoning overlay zones); the county Land Use Plan map designations; designated special

and unique environments. A classification of zoning districts (to group similar zoning districts together for purposes of comparison on a composite map is available from the Northwest Michigan Council of Governments in Traverse City.

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