Maps on the Mind

By Kim Sundeen (Ness) - GIS Specialist

What is GIS?

For those who forgot to study up, GIS stands for Geographic Information Systems. This is a technology—a tool—that manages, analyzes, and displays information linked to real-world locations. GIS is used mainly to manage the data and information to display on maps such as stream locations, land parcel ownership, utility lines, forest stands, and burial sites. Those who *use* GIS include:

- **Anyone** using Bing, Google Maps, MapQuest…etc to search for locations online or request driving directions;
- **Tribal Members** viewing public aerial imagery on Google Earth for historical changes of a landscape or for selecting ideal hunting areas;
- **Health Care Providers** and **Air Quality Specialists** plotting air quality risks (like mercury or particulate matter) to alert the public to health alerts;
- **Emergency Managers** assessing natural disaster potential by searching for data on the internet and providing on maps for flood potential, snow warnings, fire hazards;
- **Land Surveyors** or **Realty Staff** using Global Positional System (GPS) and GIS tools to create legal descriptions and plot lease boundaries;
- **Roads Managers** marking locations of center lines and noting needed improvements for particular road sections;
- **Utility Workers** and **Engineers,** like those in the Indian Health Services, marking utility poles or water lines and determining which houses are connected to the grid;
- **Well Inspectors** recording locations and conditions of culverts and well locations to check for updates;
- **Wildlife Biologists** tracking movements of wolves, deer, and other animals to map out territories and estimate populations sizes;
- **Cultural Anthropologists**, **Archaeologists**, and **Tribal Preservation Historic Officers** using Ground-Penetrating Radar (GPR) to determine whether unmarked burials are present near streambeds or in existing cemeteries, which can be mapped with GIS to show tribal members;
- **Hydrologists** and **Water Resource Experts** monitoring water quality in streams and lakes to model where certain pollutants flow downstream to assess where tribal wild rice harvest areas might be affected;
- **Foresters** inventorying locations of tree species or harvest status, or use aerial imagery to classify land cover types and acreage available for harvest;
- **Business Managers** searching for areas to site the next casino that serve a specified population range and need maps for grant applications;
- **Tribal Planners** locating parcels or make new building recommendations that are closest to utilities, existing roads and communities, and avoid impacts to water resources.

Why Use GIS for the Bad River?

The bullets list above still only touches some main GIS applications for tribal governments and Bad River in particular. One main obstacle to gaining tribal-wide support for GIS is to show how GIS and GPS is a CRITICAL part to tribal government. Maintaining GIS support consistently for each department is critical because tribal government for three reasons.

1. **GIS Software is FREE.** Thanks to the Enterprise License Agreement between the Bureau of Indians Affairs and a huge mapping software company (ESRI), all federally-recognized tribes in

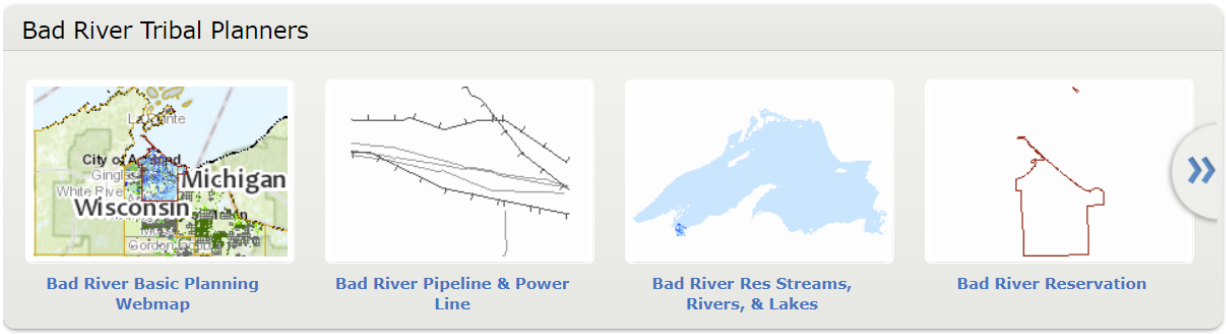
the US receive GIS Software for FREE. For a private company, the same GIS software might cost upwards of $50,000 per year! But remember, GIS personnel are not free. Trained staff are an asset for each department that want to use GIS and maps.

2. **GIS SAVES MONEY.** Consider how much time, money, and effort goes into researching and proposing a new development for a building or house. Surveyors, planners, utility works, engineers, and natural resource managers are all involved at different stages in a planning project to make decisions. Each stakeholder develops their own plan, map, or report to present to the Tribal Council for approval. Now consider if all these same stakeholders in the same room viewing a map with information on all the cultural, economic, and natural resources available. This interactive planning tool has the potential to save the Bad River Tribe hours, weeks, or even months of lost planning effort by answering questions about resources interactively with a map resource created using GIS.
3. **GIS Software is a Database Management Solution for the ENTIRE Tribe:** Other tribes actually use this same software as the tribe's central database. Each department could theoretically manage all their data in one central location that allows each department to map out certain datasets.
4. **GIS is a Communication Tool.** Maps are excellent presentation and communication tools that may emphasize a problem to a larger audience better than a extremely well-written report (tat's a bit lengthy); the map in turn may garner more support for a cause. Consider a map illustrating the proximity of wetlands in the Bad River Watershed to the proposed GTAC Mine, which highlights the potential threat to water quality.

Explore Bad River Maps Online!

With new services, planners, managers, and approved staff or tribal members can access an online webmap that uses the tools of GIS to map out the natural, cultural, and economic resources on the Bad River Reservation. Many tools are available for searching, printing, toggling on and off information about Bad River, measuring distance, viewing information on a selected dataset, and saving your own online map to view later. You might wonder why these online resources are not available publically (viewable by anyone). The answer is that some of the data we display on these webmaps are sensitive and only approved individuals are allowed to view all the details. The great news is that all you need to do to request access is contact Natural Resources to and give us information about why you want access to this webmap.

For the public webmap, visit the GIS/Map Services webpage to access online maps:



For those technologically-inclined, you can access these same webmaps on your mobile device like your smart phone (iphones, ipad, android phone or tablet). Download the free mobile app here: http://www.esri.com/software/arcgis/smartphones/arcgis-app or through the mobile app store.

If you fall into any of the bulleted categories below, then there's no reason not to request webmap access! You will have a suite of resources at your fingertips to learn about, search for, and teach others about the cultural, natural, and economic resources in the Bad River Reservation and Bad River Watershed. There are many ***flavors*** of the webmaps available currently including maps for:

- **Tribal Planners**
- **Natural Resource Managers**
- **THPO-related Managers**
- **Tribal Members**
- **Tribal Staff**
- **Approved non-tribal member or staff individuals**

As an example, on the **Tribal Planning Webmap**, the following "layers" or information sources are available to view on the webmap for **Tribal Planners:**

- 2012-updated ownership layers for county parcels and trust percent ownership.
- 2012-updated lease boundaries (in progress) with linked lease information
- Utility boundaries provided by the Indian Health Services
- Boundaries of the Integrated Resource Management Plan's Resource Management Areas)
- Plat Maps from these years:
  - 2009
  - 1917
  - 1905
- Developable Areas (areas highlighted in green represent areas better for development that are closer to existing roads and communities, and prevent impacts to historic sites and water resources
- US Geological Survey Topographic Maps
- National Land Cover Dataset (from 2006)
- Generalized Natural Resource Conservation Service (NRCS) Web Soil Survey

- Federal Land boundaries (including the Bad River Reservation)

Continuing with the Tribal Planning Webmap, the Figure 1 displays the webmap centered on the Old Odanah community. In addition to clicking on locations and having "pop-ups" appear of information, there are many other tools available to tribal planners using this webmap. At the top of the screen, reading from right to left, you have options to add data, change the "basemap" (background picture), save your map, print your map, measure distances, zoom to the extent of the Reservation, Watershed, or any community, and finally, search for addresses. You may also toggle on and off (turn on and off the check boxes) any "layers" (or information) on the left side of the screen.

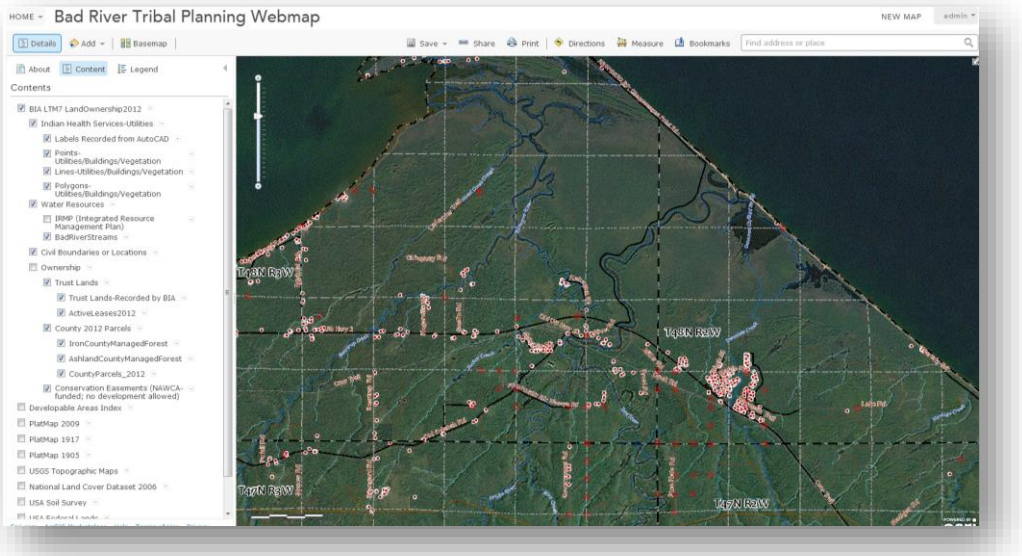


Figure 1. A screen shot of the Tribal Planning Webmap centered on the Old Odanah community.

When you zoom in or out of the webmap, more detail is displayed in aerial imagery, utilities (water lines, electric poles, or gas lines), building locations, or the percent of Trust interests owned by the Bad River Band. For example, notice in Figure 2 on this zoomed-in map of the same location in New Odanah, labels appeared of utility lines and building names.

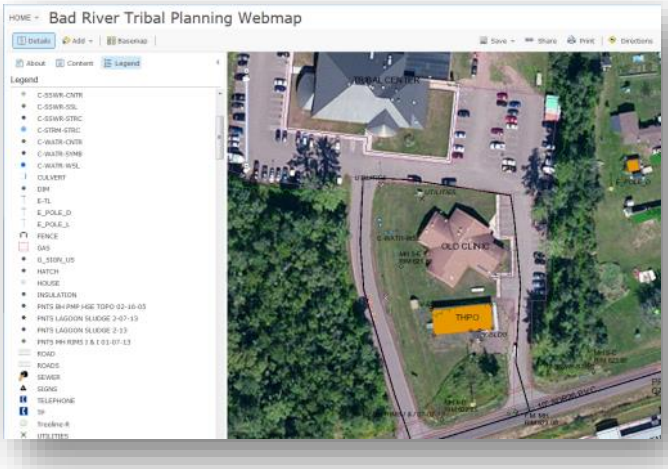


Figure 2. Screen shot of a zoomed-in view of the New Odanah area as displayed on the Tribal Planning Webmap.

One Last Remark on Collecting Your Own GPS/GIS Data

The resources and online Tribal Planning Webmap example still only gloss over the full capabilities of GIS as a tool for tribal government management. It can be tempting to jump full speed ahead and collect GPS points of everything you have. However, you should consider several questions when you've spent an immense amount of time, money, and effort collecting the data: **Who will manage your data once you collect it and how are your data documented so others know how to understand it?**

If your answer is "I don't know," "IT" or "contractors", then the data will unfortunately NOT be incorporated in anything that GIS/Map Services Natural Resources Program uses or manages. You will need to physically share your data with Natural Resources to ensure consistent and updated data. Contractors are not required to give you digital data UNLESS YOU REQUEST IT. The IT Department is an excellent source for managing the internet and network security, but GIS is not their expertise. Finally, if you do not have a plan for how to manage the data you plan to collect, just ask for help! the GIS/Map Services Program in Natural Resources is developing standards for data-sharing, documentation, management, and collection.

*If you have questions or comments, please contact Kim Sundeen (Ness) at gspec@badriver-nsn.gov or (715) 682-7123