

What is GIS?

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So...what is GIS? It is a geographic information system (a computer program) that integrates software, hardware, and data to capture, manage, analyze, and display all types of geographically referenced (i.e., "linked to a location") information. GIS is most often thought of simply as a "map," however a "map" is just one way that geographic/spatial data can be manipulated, and a "map" is only product that can be generated with a GIS.

So...what can you do with GIS? Lots! You can map where things are, allowing you to see what action needs to take place of your location of interest, by finding features (see where or what a feature is) or by finding patterns (viewing the distribution of features on the map rather than a single feature, allows you to see patterns).

You can map quantities to determine locations that best meet certain criteria and thus take action, or to see the relationship among places. You can map densities to measure the number of features using a uniform areal unit (any unit used to measure an area) to clearly see the distribution pattern of that feature. You can find what's inside or nearby, such as using GIS to find the neighbourhood with the most school age children to build a new school or sports centre. You can map change in an area to see what has changed and to anticipate future condition, and thereby deciding on a course of action.

So...what kind of information is used in a GIS? Digital information is used in GIS, and it is generated through various data creation methods. This is sometimes referred to as "data capture" and essentially is putting information into the system. A common method is using GPS (Global Positioning System) receiver to collect spatially-referenced data out in the field...GPS plays a key role in managing forest inventory systems. Imagery (satellite or photos) and tabular information are also commonly used in a GIS. For the most part, photos and/or existing hardcopy maps can be used in GIS but, first, they need to be "digitized" and "geo-referenced."

So...what is digitizing and geo-referencing? Essentially it is how paper maps and airphotos (or in some cases tabular data) are entered and then subsequently used in GIS. They both play large roles in the GIS world as they are required procedures before hardcopy information can be used in GIS. Ortho-rectified imagery - satellite imagery and orthophotos (geo-referenced airphotos) - are now generally widely available, thus "heads-up digitizing" is becoming the standard, versus the more traditional "heads-down" method.

Heads-up requires the scanning of the hardcopy product, overlaying the scanned image on existing ortho-rectified imagery or GIS data (the geo-referencing part), and tracing the desired features of the scanned hardcopy file directly into GIS. Geo-referencing is when an image is "linked" to its location, by either identifying known coordinates on both the image and the GIS, or by overlaying the image on existing geo-referenced data. Ortho-rectified is another term used for geo-referenced data. Heads-down requires a separate digitizing tablet to trace the hardcopy, and then the data needs to be transferred from the digitizing tablet to the GIS.

Map scale and projections play an extremely important role in GIS, so we need to understand them as well!