An Introduction to Geographic Information Systems (GIS)
Introduction

- GIS Definition
- GIS Components
- What you can do with GIS
- GIS Applications
- GIS Data Models
- GIS Data Types
What is GIS?

A geographic information system (GIS) is a computer-based tool used to map and analyze things on the earth’s surface.
Components of a GIS

A working GIS integrates five key components:

- **Hardware** – any computer & any hardware connected to it
- **Software** – ArcView is one GIS software used world wide
- **Data** – any GIS is only as good as the individuals using the system
- **People** – requires well-designed plans & rules for solid operating procedures
- **Methods** – three types of data used are Spatial, Tabular, & Images
What Can You Do With GIS?

- You can make maps
- You can easily update the maps when things change because they’re saved digitally
- You can analyze things that have a spatial component (e.g. fastest driving route between 2 points or best habitat areas for lynx)
Why do GIS?

• Almost every decision we make is influenced or dictated by geography.
• GIS is used in many areas including:
  ▪ Governments
  ▪ Natural Resource Management
  ▪ Research
GIS is used for mapping administrative boundaries
Natural Resources Management

Natural Resources
(timber harvesting)

Natural Resources
(logging cuts over time)

Why do GIS?
Research Applications

- Biodiversity assessments

Figure 6. Nunavut’s Bird Diversity Index

<table>
<thead>
<tr>
<th>Bird Diversity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>High</td>
</tr>
</tbody>
</table>

Projection: Lambert Azimuthal Equal Area
Data Sources: Marshall and Shub, 1968; USGS, 1993
Cartographer: Wayne Corden
Data Created: August 27, 2002

Inset Location
GIS Thematic Data Models

A GIS stores information about the world as a collection of thematic layers that can be linked together by geography.

Thematic Layering allows us to:

- organize
- understand natural relationships
- visually simplify complex ideas
GIS Data Types

1. **Spatial data** describes the absolute and relative location of geographic features.

2. **Attribute data** describes characteristics of the spatial features. These characteristics can be quantitative (e.g. tree age-20) and/or qualitative (e.g. tree species-white spruce) in nature. **Attribute data is often referred to as tabular data.**
Spatial Data Real Life

Thebacha Campus & Surrounding Area

Map Key
- Buildings
- Vegetated Areas
- Streets
- Trails

Scale 1:5,000
Attribute Data

Table Name

Table Records

Data Fields (contain attributes)
Satellite pictures from space or aerial photos taken from airplanes are used to create maps of the land like this image of Nunavut’s vegetation/land cover types.
Conclusion

- GIS can be used for mapping and analyzing geographic information
- GIS has many applications in different disciplines
- There are different types of GIS data