Geographic Information Systems (GIS) in Planning and Resource Management

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Here be Dragons
“hic sunt dracones”

GIS - Undiscovered Country?

“Maps embody a perspective of that which is known and a perception of that which may be worth knowing.”

John Noble Wilford
Simple Definitions:

**A GIS is a computer system capable of**: assembling, storing, manipulating and displaying geographically referenced information.

**Definition Categories:**
- GIS as Toolkit
- GIS as Information System
- GIS as Method of Inquiry

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The Value of Location:

The addition of geo-referenced data to an IS provides the potential for exponential increases by deriving new data and revealing new spatial relationships.

* Data includes both attribute and geo-referenced information for objects. Key concept is Location - X,Y,Z

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Geo-referenced Data:

The concept of location in a GIS is used in both relative and absolute terms.

**Absolute**

Is described using Cartesian Coordinates (e.g., Lat/Long or UTM grid System)

**Relative**

Is described in terms of its position in relation to other objects (uses topology).

Allows measures of:

- Proximity, Density, Connectivity, Accessibility
Representing Space:

GIS uses two (2) types of spatial data models to visualize and represent space.

1) Raster
2) Vector

Spatial Data: Information about the location, shape and relationship among geographic features.

* Assumes a cartographic reality.

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How a GIS works:

A GIS represents space as a collection of map layers that are linked together by a common geography. This creates a powerful and versatile analytical framework.

Reductionist Approach
Components of a GIS:

Although a misnomer, the popular definition of GIS is as a “tool box”. But proper application requires an appreciation for software, hardware, research method, organizational context and sometimes external implementation environments.
Contributors:

GIS is a convergence of traditional disciplines and evolving fields. They include:

• Geography
• Cartography
• Computer Science
• Mathematics
• Photogrammetry
• Remote Sensing
• Surveying/Global Positioning

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Question Driven - Process Oriented:

Study Design
Data Collection
Analysis
Evaluation
Decision Making
*Action*

Multi-Disciplinary Approach:

Planning - (policy, goals, objectives)
Conserv. Biology - (theoretical framework)
Statistics, GIS - (quantitative - qualitative)
Engagement - (Derived Carto. Products)
Adaptive Management - (implementation)
Application: (examples)

Private Industry
Retail & Marketing
Facilities Management
Navigation/Mobility

Civic
Personal Navigation
NGO Research
Recreation

Information Technology

Government
Res. Management
Emergency Services
Physical Planning
Education

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Summary:

Consolidated definition:

Geographic Information Systems – An organized activity by which people measure and represent geographic phenomena then transform these representations into other forms of information while interacting with social structures

- Chrisman 2002.
Why is GIS Relevant:

- GIS integrates spatial and attribute data in a single framework;
- Allows insight into spatial relationships;
- Creates interest and is an effective engagement medium;
- Adds efficiency, precision and malleability to spatial data products;
- Prolific approach to decision support that is expanding in all sectors of society.

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A New family Name:

“Geomatics is a key discipline for the 21st century.”

“The ability to acquire, represent, use and disseminate spatially referenced data will transform most sectors of the emerging information economy.”

GEOIDE (Updated Strategic Plan)

surveying & mapping;
remote sensing;
geographic information systems (GIS); and,
global positioning system (GPS)

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Time for New Thinking:

“The world we have created today, as a result of our thinking thus far, has problems which cannot be solved by thinking the way we thought when we created them.”
- Albert Einstein

...Solutions to the major problems of our time … require a radical shift in our perceptions, our thinking, our values…. a change of paradigms as radical as the Copernican revolution...
- Fritjof Capra
The Web of Life

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