GIS in Marine Science

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Why this course

- Put your name, study area and major professor at the top.
- Then, answer the questions:
  1) What do you want from this class?
  2) What spatial data have you used?
  3) What spatial analysis will you be doing in your thesis?
  4) What spatial analysis will you be doing in five years?

Syllabus

- Course description
- Course objectives
- Course documents
- Lab
- Grading
- Tentative Schedule

What is a GIS?

Geographic Information Systems – a computer-based system to aid in collection, organization, maintenance, storage, analysis, output, and distribution of spatially-referenced information.
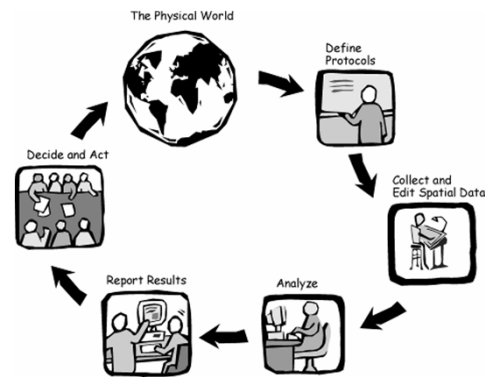
Two important components - What, and Where

We usually understand GIS to be computer-facilitated system

GIS is NOT only software/hardware

Also includes:

•Trained personnel

•Supporting Institution

•Protocols for use

Why GIS

- Identify and address environmental problems by providing crucial information on where problems occur and who are affected by them.
- Emergency service, protection from flood, disaster assessment and management, planning and developing infrastructure.
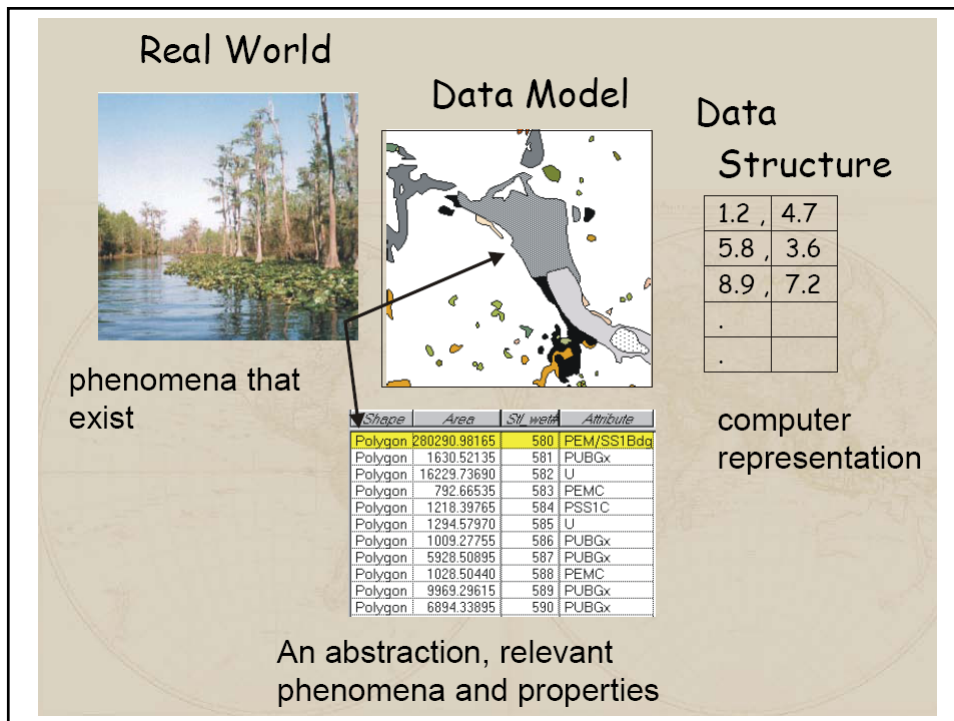
GIScience

- GIScience is the theoretical foundation on which GIS are based.
- GIScience investigates not only technical questions of interest to applied geographers, business-people, planners, public safety officers, etc, but it also directed at more basic questions: 1) How do we perceive space; 2) How might we best represent spatial concepts, given the new array of possibilities provided by our advancing technologies; 3) How do human psychology help or hinder effective spatial reasoning?

GIS software

- ArcGIS
- IDRISI
- MapInfo
- GRASS
- QGIS

Steps for Successful GIS Analysis (Goals defined, methods exist)

- Choose best data model
- Define bounds, geographic region of interest
- Identify existing spatial data
- Determine coordinate system for analyses
- Develop digital database
- Document database (origin, quality)
- Perform analyses
- Report results
- Update Database

Real World — phenomena that exist

Data Model — An abstraction, relevant phenomena and properties

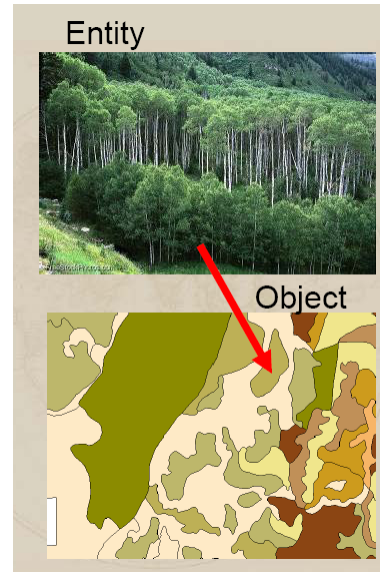Data Structure — computer representation

Representation and Data Structures

We approximate entities with objects.

This approximation is biased

Entities-"things" in the real world we represent (*Rivers, buildings, soil types, wetlands*)

Objects-our representation in a data model

Data Models

Data Model – An consistent way of defining and representing spatial objects in a database, and of representing the relationships among the objects (connectivity, adjacency, proximity, influence)
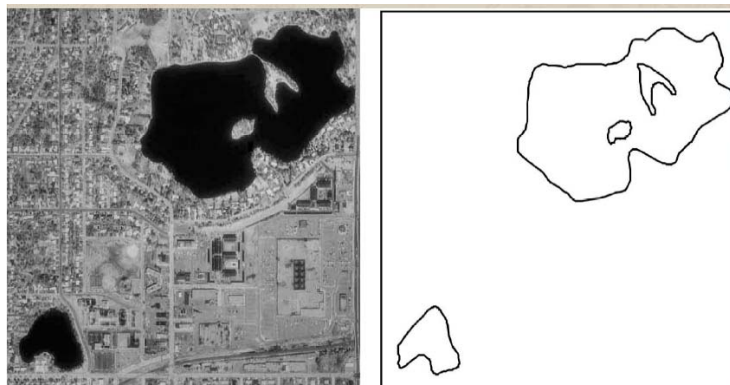
Data Models

Data model typically includes at least two parts –

Coordinate data - pairs or triplets of numbers that define location

Attribute data - text, numbers, images, or other "non-spatial" data

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REPRESENTATION AND DATA STRUCTURES
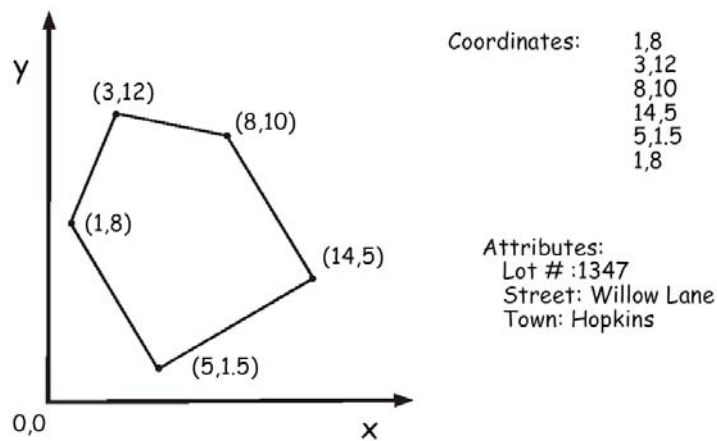Coordinates and Attributes

Figure 2-3: Coordinate and attribute data are used to represent entities.