Basic Geo-processing Operations
GIS and SedNet Training

Phil- WAVES
Verna Duque-Lacanlale and Arnan Arraza
21 April 2015
Outline of presentation

1. Learning Outcomes
2. ArcGIS and Data formats
3. Geo-processing and some of its most imp. tools
4. Summary
Leaning outcome:

1. Familiarize in the data formats in GIS
2. Define Geo-processing
3. Familiarize the geo-processing tools needed in the GIS operations
4. Be able to perform geo-processing
ArcGIS

Geographical information

Geographical Information System

Software

ArcGIS

Geo-processing tools
ArcGIS

- is a geographic information system (GIS) for working with maps and geographic information.

- It is used for:
  - creating and using maps
  - compiling geographic data
  - analyzing mapped information
  - sharing and discovering geographic information
  - using maps and geographic information in a range of applications
  - and managing geographic information in a database.
Data Formats

Raster Data

- A raster consists of a matrix of cells (or pixels) organized into rows and columns (or a grid) where each cell contains a value representing information, such as temperature.

- Rasters are digital aerial photographs, imagery from satellites, digital pictures, or even scanned maps.

Vector data

- Points (x, y) coordinates
- Lines (x1, y1 to x2, y2)
- Polygons - area or surface
Geo-processing

- a GIS operation used to manipulate spatial data.
- Sole purpose is to automate GIS tasks (mundane and redundant operations)

Geo-processing allows for definition, management, and analysis of information used to form decisions.
Geo-processing tools

Input dataset → Geoprocessing tools → New dataset

Nouns

VERBS
Important geo-processing tools:

- Project
- clipping/masking
- intersecting
- buffering
- Attribute table operation
- data manipulations
- calculations
- import/export
ArcToolbox

ArcToolbox window – tree view interface for organizing tools

Toolbox – a collection of toolsets and tools

Toolset – a collection of tools

Tool – performs a small, essential task
Important geo-processing tools:

Project (Data Management)

- Projects spatial data from one coordinate system to another.
- This allows you to specify the data's coordinate system **without** having to modify the input data.

Define Projection (Data Management)

- **Permanently** overwrites the coordinate system information (map projection and datum) stored with a dataset.
... *Important geo-processing tools*:

Clip (Analysis)

- Extracts input features that overlay the clip features
- Use this tool to cut out a piece of one feature class using one or more of the features in another feature class as a cookie cutter
Important geo-processing tools:

Clip (Data Management)

- Creates a spatial subset of a raster, including a raster dataset, mosaic dataset, or image service layer.
- This tool allows you to extract a portion of a raster dataset based on a template extent.
Important geo-processing tools:

- Extract by Mask (Spatial Analyst)
  - Extracts the cells of a raster that correspond to the areas defined by a mask.
  - Raster to raster data format

![Image of raster data processing](image.png)
Important geo-processing tools:

Intersect (Analysis)

- computes a geometric intersection of the input features. Features or portions of features which overlap in all layers and/or feature classes will be written to the output feature class.
... **Important geo-processing tools:**

**Buffer (Analysis)**

- Creates buffer polygons around input features to a specified distance.
- Need same coordinate system
Important geo-processing tools:

Attribute table

- A database or tabular file containing information about a set of geographic features, usually arranged so that each row represents a feature and each column represents one feature attribute.
Important geo-processing tools:

Raster Calculator (Spatial Analyst)

- Builds and executes a single Map Algebra expression using Python syntax in a calculator-like interface.
Important geo-processing tools:

Math Toolsets (Spatial Analyst)
- The Math toolset contains tools that perform mathematical operations on rasters

Times (Spatial Analyst)
- Multiplies the values of two rasters on a cell-by-cell basis

Divide (Spatial Analyst)
- Divides the values of two rasters on a cell-by-cell basis
Important geo-processing tools:

Importing maps and Exporting maps is best shown on the hands-on training

When in doubt???
Use the arcCatalog Search button!!!
Summary

- ArcGIS is an example of geo-information system under softwares
- Rasters and vectors are the simplest data formats in GIS
- Geo-processing is important to manipulate spatial data
- Geo-processing tool automates mundane operations in GIS