Inexpensive mapping and data compilation tools



West Virginia Water Resources Training Workshops

Presented by the Interstate Commission on the Potomac River Basin

Sponsored by the West Virginia Department of Environmental Protection

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irginia department of environmental protectio

Outline

- Spatial assessment tools
 - MapWindow
 - BASINS
 - GoogleEarth
- Tabular assessment tools
 - Excel
 - Access
 - Open Office





Spatial analysis - concepts

- Geographic Information Systems (GIS)
 - Tool to store, manipulate, and display spatial information
 - Includes location information (x,y coordinates) and attribute data



Spatial analysis tools - MapWindow

- ESRI's ArcGIS: commonly used, extensive analytical capabilities, but expensive
 - Free alternative: MapWindow
- Open source GIS software
- Download as stand alone or in BASINS <u>http://www.mapwindow.org/</u>
- MapWindow capabilities
 - Analysis
 - Mapping





Spatial analysis tools - MapWindow (cont'd)

Layer: the visual representation of a geographic dataset in a digital map environment; more or less equivalent to a legend item on a paper map.



Shapefile: a data storage format for storing the location, shape, and attributes of geographic features.



Spatial analysis tools - MapWindow (cont'd)

• GIS Analysis Examples



Figure 19a. Shaded-relief map and contour lines generated from the digital elevation model in the study area.



Figure 19b. Map showing the steepness of slopes in the study area, created by GIS from the digital elevation model.



Figure 19c. Distances to streams as measured by three 200-meter buffers derived from a digital map of hydrography.



Figure 19d. Map indicating various land uses in the study area.



Figure 19e. A soils map stored in a GIS database. Numbers indicate the type of soil.



Figure 19f. The wetlands in the study area ranked according to their vulnerability to pollution on the basis of combination of factors evaluated by GIS.



http://egsc.usgs.gov/isb/pubs/gis_poster/

Spatial analysis tools - BASINS

- Better Assessment Science Integrating point and Non-point Sources (BASINS) is a multi-purpose environmental analysis system that integrates GIS, watershed data, and assessment and modeling tools
- FREE Download (<u>http://www.epa.gov/waterscience/basins/</u>)
- Support available (<u>http://www.epa.gov/waterscience/basins/</u>)
 - Moderated listserves
 - Online documentation (case studies, tutorials, manuals)
 - Free trainings
 - Next training August 9-13, 2010 at the University of Minnesota, St. Paul campus
 - http://www.aquaterra.com/resources/workshops/index.php



Spatial analysis tools - BASINS (cont'd)



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Source: AQUA TERRA Consultants, EPA BASINS Training Workshop, Atlanta, GA, October 2007

Spatial analysis tools - BASINS (cont'd)



Spatial analysis tools - BASINS (cont'd)

Automatic Watershed Delineation	×
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BASINS da	ta download tool

BASINS watershed delineation tool

Spatial analysis tools - GoogleEarth

- Free download (<u>http://earth.google.com/download-earth.html</u>)
- Historic imagery; 3D landscapes; watershed tours
- Import shapefiles with free utilities







Spatial analysis tools - Google Earth

Example watershed tour





Spatial analysis tools - Google Earth



Tabular analysis tools - Microsoft Office

- Microsoft Office
 - Excel, Access, PowerPoint, Outlook, Word
 - http://office.microsoft.com/en-us/
 - Free Office 2010 beta testing
- Excel
 - Included in standard Microsoft Office package (\$399.95)
 - Spreadsheet capable of handling over 1 million rows of data
 - Use of formulas and scripts
 - Graphing





Example - USGS 2005 WV water use

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3	WV	54	003	54003	93.394	40.097	26.824	66.921	4.95	0.00			
4	WV	54	005	54005	25.703	2.105	12.817	14.922	0.02	0.00			
5	WV	54	007	54007	14.851	0.000	8.026	8.026	0.00	0.00			
6	WV	54	009	54009	24.515	10.159	12.468	22.627	1.84	0.00			
7	WV	54	011	54011	94.031	0.000	86.867	86.867	0.00	0.00			
8	WV	54	013	54013	7.387	0.000	3.163	3.163	0.00	0.00			
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14	WV	54	025	54025	35.027	10.661	11.482	22.143	2.00	0.00			
15	WV	54	027	54027	22.025	2.700	6.495	9.195	0.16	0.00			
16	WV	54	029	54029	31.350	13.037	15.925	28.962	0.92	0.00			
17	WV	54	031	54031	13.287	0.806	5.123	5.929	0.10	0.00			
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Tabular analysis tools - Microsoft Office

- Access is a relational database that includes
 - Tables, Queries, Forms, Reports, Macros
- Included in Microsoft Office Professional (\$499.95, \$100 upgrade from standard)





Tabular analysis tools

- When to use Access or Excel:
 - Access for long term data storage
 - Access for relational data
 - Excel for development of charts and graphs

- Easy to import/export between:
 - Access and Excel
 - Excel and GoogleEarth



Open Office

• Open source, free productivity software <u>www.openoffice.org</u>





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- Inexpensive tools are available for water resources assessment and planning including (but not limited to!):
 - BASINS/MapWindow
 - GoogleEarth
 - Excel
 - Access
 - Open Office



References

- Gergel, S.E. and M.G. Turner. 2002. Learning landscape ecology: a practical guide to concepts and techniques. Springer. New York. 315p.
- Prague, C.N. and M.R. Irwin. 1999. Microsoft Access 2000 Bible. Wiley Publishing, Inc. New York. 1221p.

