

12. Cartography and Map Production

Geographic Information Systems and Science

SECOND EDITION

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Outline

- Nature of maps and cartography
- Principles of map design
 - Composition
 - Symbolization
- Map series
- Applications
- Conclusions

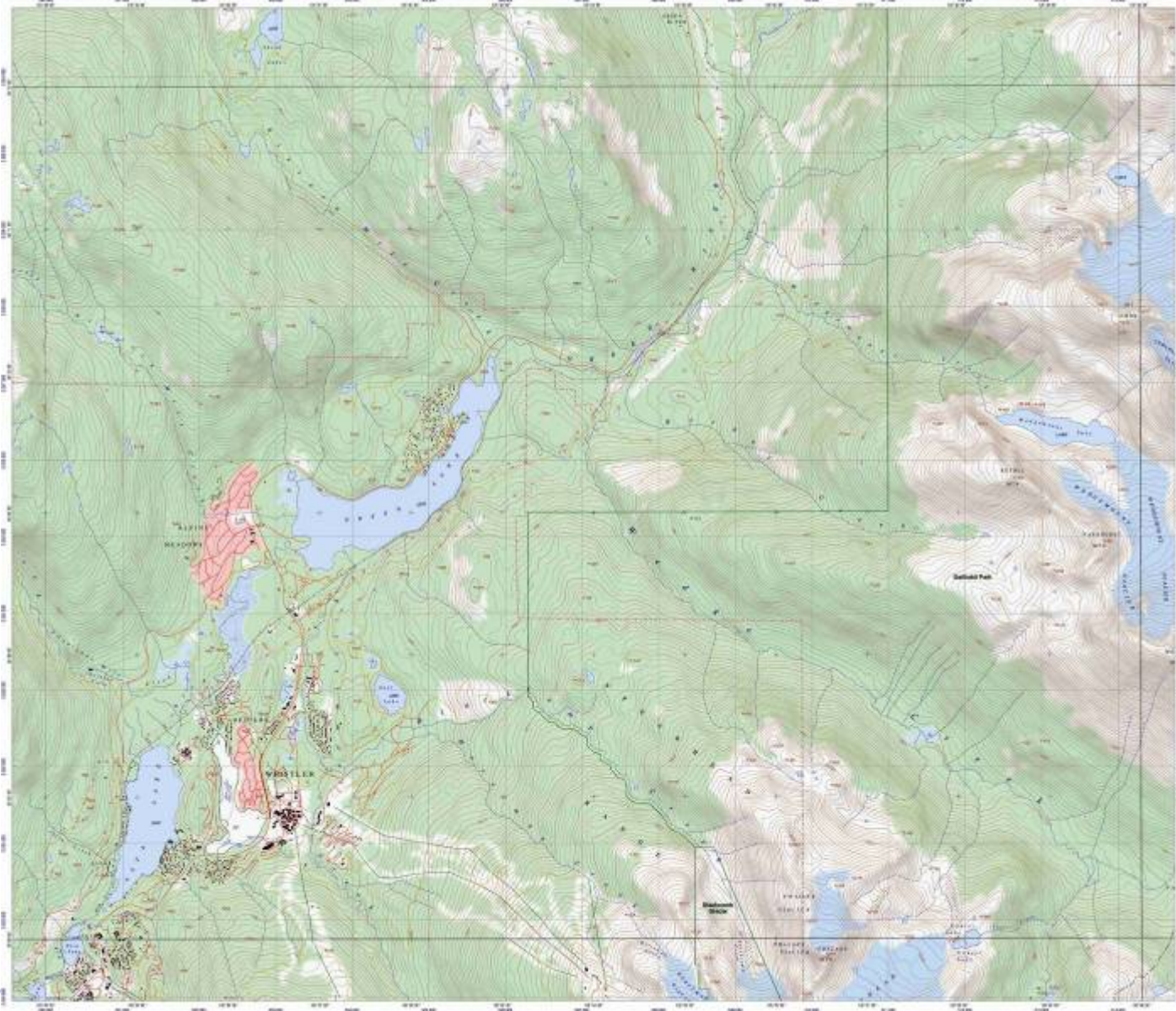


Introduction

- Output is the pinnacle of GIS projects
- Two main types of output
 - ▣ Maps
 - ▣ Visualizations
- Maps are good at summarizing and communicating
- Cartography is the art, science and techniques of making maps



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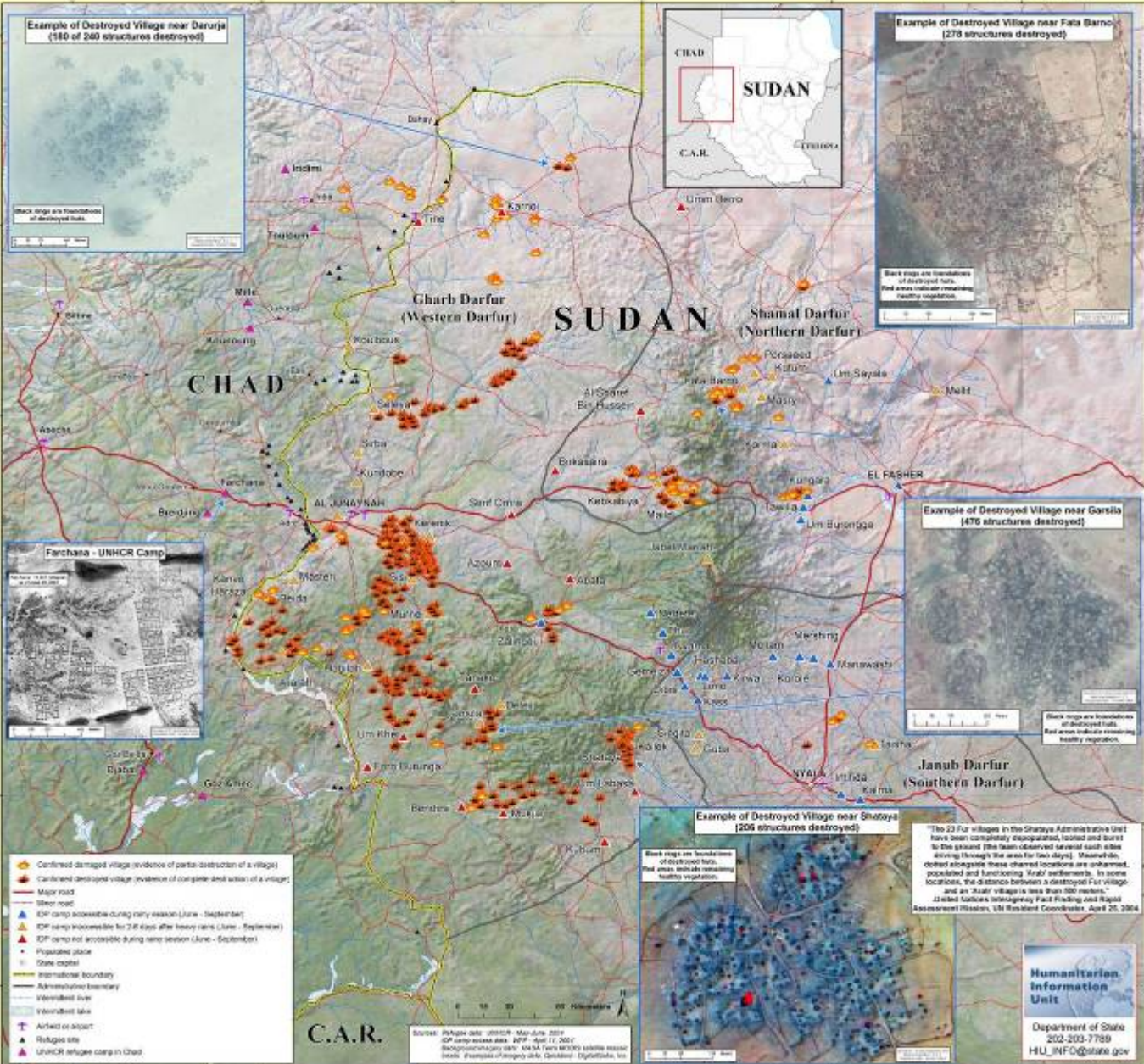
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Date: July 1, 2004

Sudan (Darfur) - Chad Border Region Confirmed Damaged and Destroyed Villages

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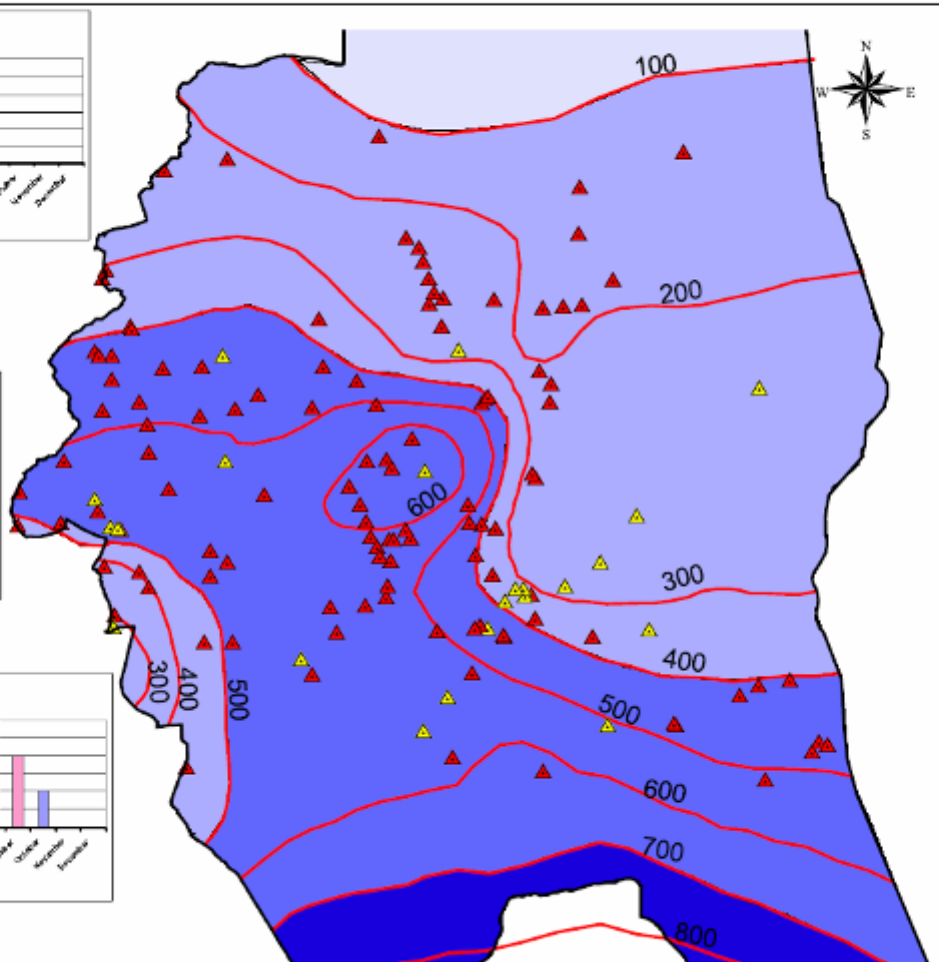
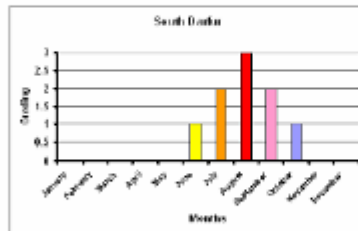
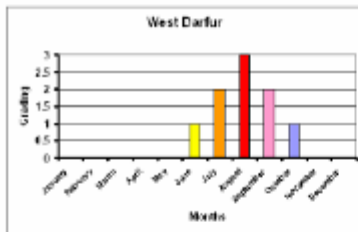
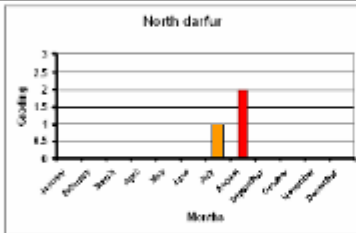
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World Health Organization

Darfur: Regional Isohyets and Malaria Vulnerability

as of 11 July 2004



Legend

- Darfur Region
- IDP's Camp
- No IDPs / No data
- Populated Camps
- Isohyets
- Malaria Vulnerability
- High Risk
- Medium Risk
- Low Risk
- No Risk

Notes

1. Isohyets were digitized from Regional Isohyets 1961 - 90 Map, National Desertification and Drought Control and Monitoring Unit (NDDCU). According to these Isohyets, Malaria Vulnerability in Darfur region was mapped.

2. For graphing the rainy season, grading criteria was formulated to show the rainfall variations as indicated in the below table:

Grading	Amount of rainfall (mm)	Months
0	Low/No rains	January, February, March, April, May, November, December
1	50 - 100 mm	June, October
2	250 - 500 mm	July, September
3	> 1000 mm	August

3. The map shows the geocoded health facilities only.

Health Facilities in Darfur

Type	Total	Geocoded
Hospitals	36	33
Health Centers	65	12
Dispensary	125	35
Dressing Units	254	48
Total Number	580	128

4. The map shows only 136 geocoded IDP Camps out of the total 137 reported camps in Darfur (Source: WFP).

IDP Camps in Darfur (as of 27 June 2004)

State	Total geocoded Camps	Populated Camps
West Darfur	25	46
South Darfur	46	35
North Darfur	37	36
Total Number	136	117

5. Source of IDPs Camps and Population : WFP.

Disclaimer: The presentation of material on the maps contained herein does not imply the expression of any opinion on the part of the World Health Organization concerning the legal status of any country, territory, city or areas or its authorities of its frontiers or boundaries.

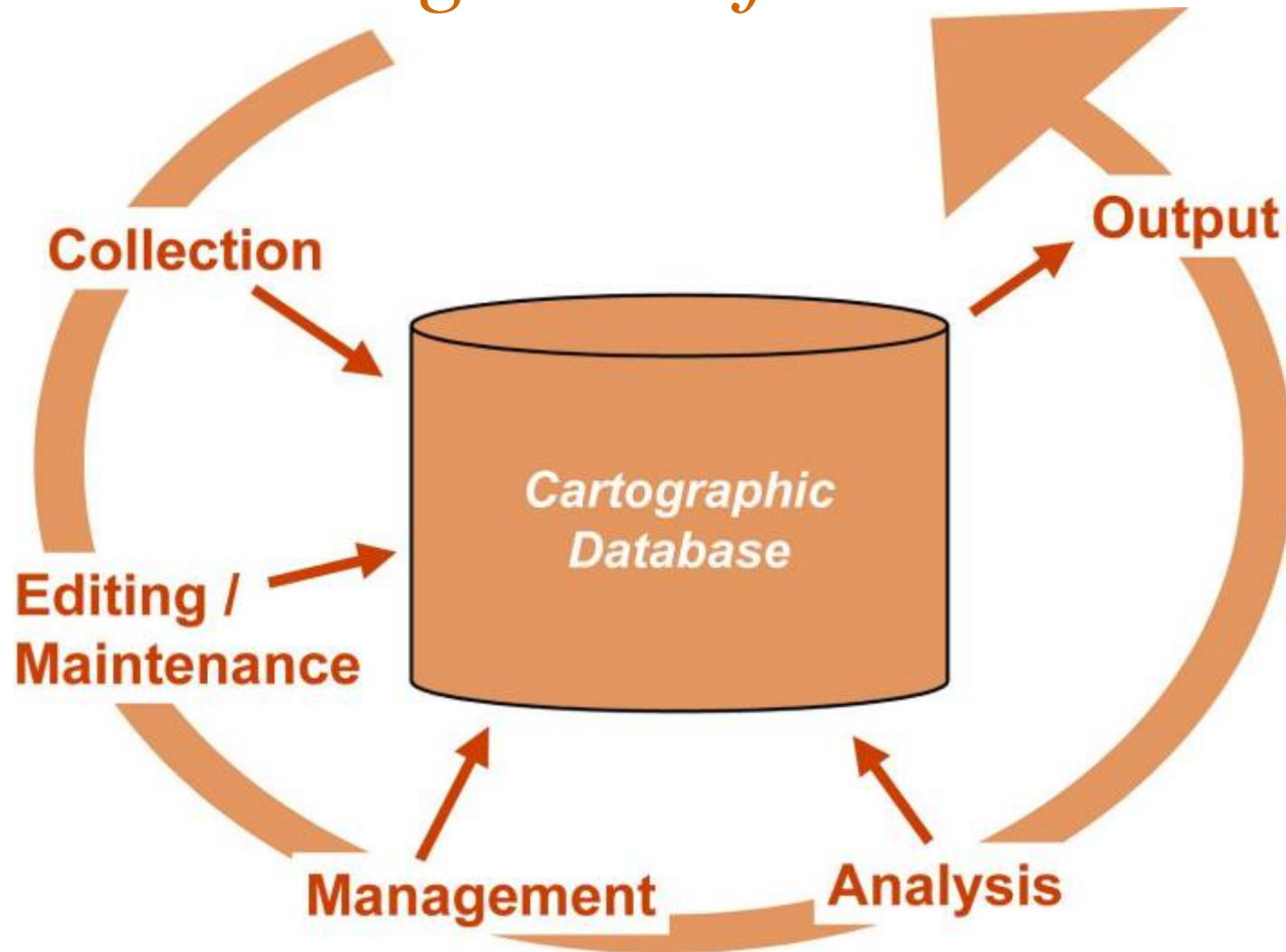


Maps and Cartography

- Map – ‘digital or analog output from a GIS showing information using well established cartographic conventions’



GIS Processing Transformations





Characteristics of Map

- Two main types
 - ❑ Topographic
 - ❑ Thematic
- Some map problems
 - ❑ Can miscommunicate
 - ❑ Each map is just one of all possible maps
 - ❑ Complex maps can be difficult to understand

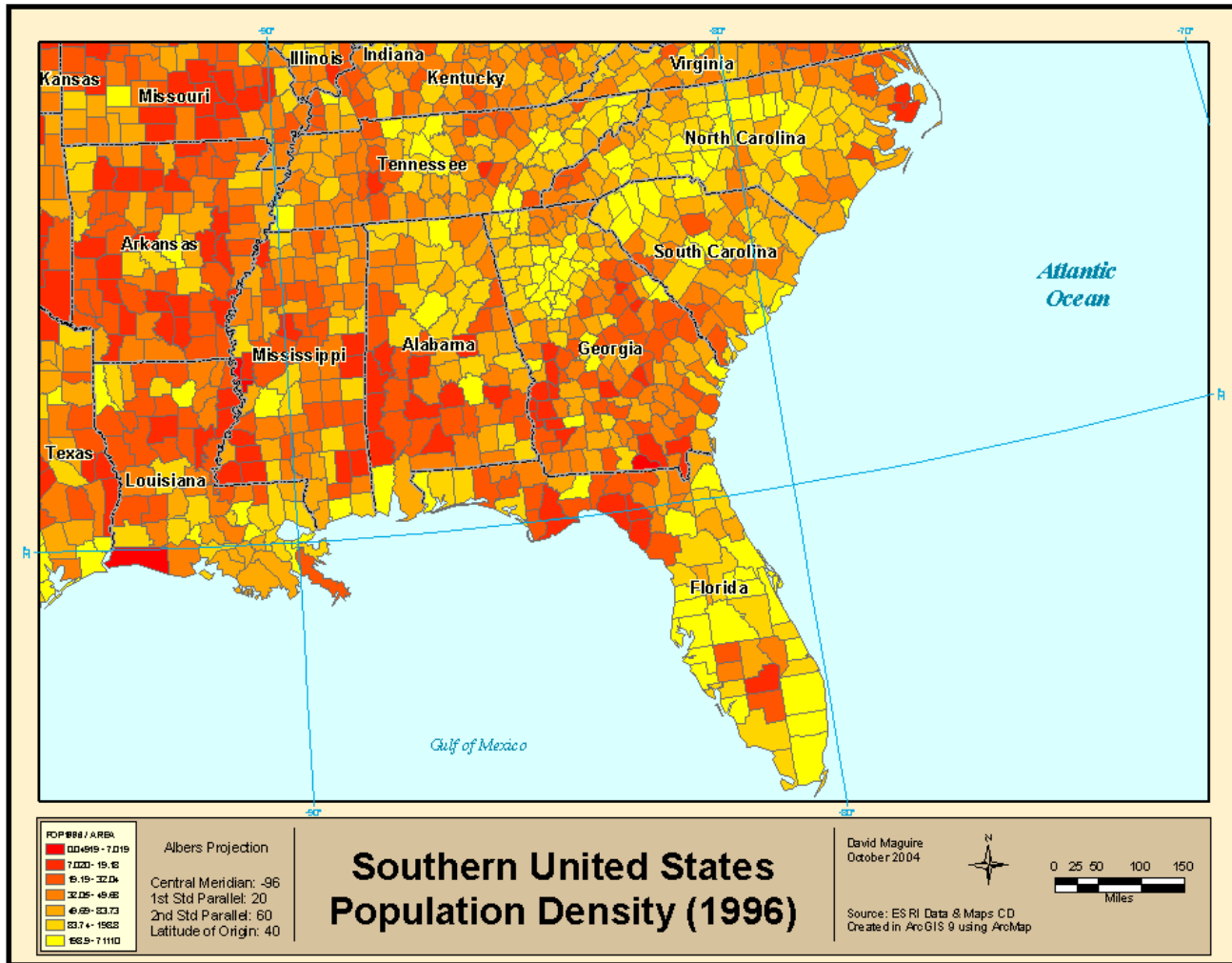


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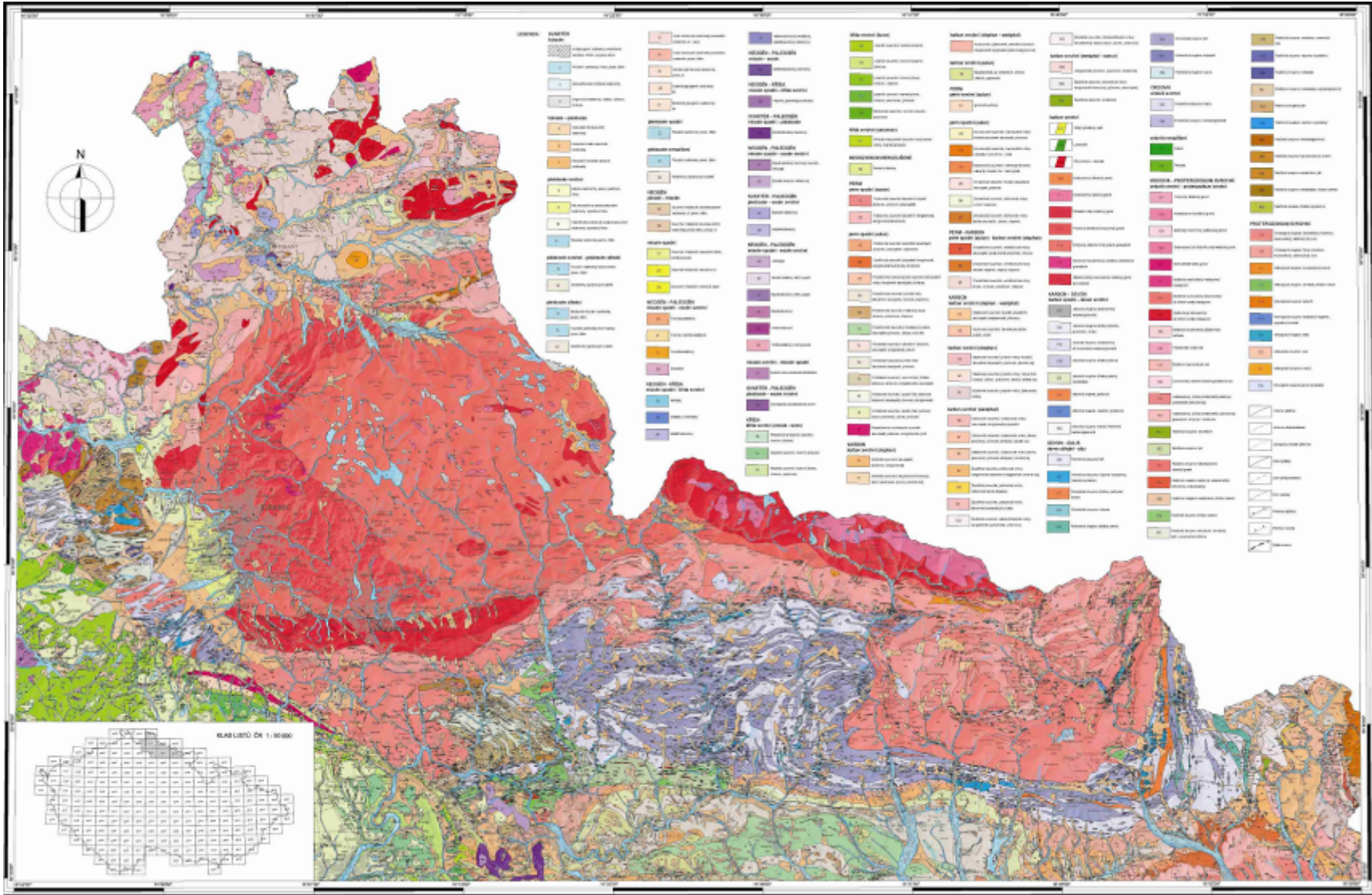


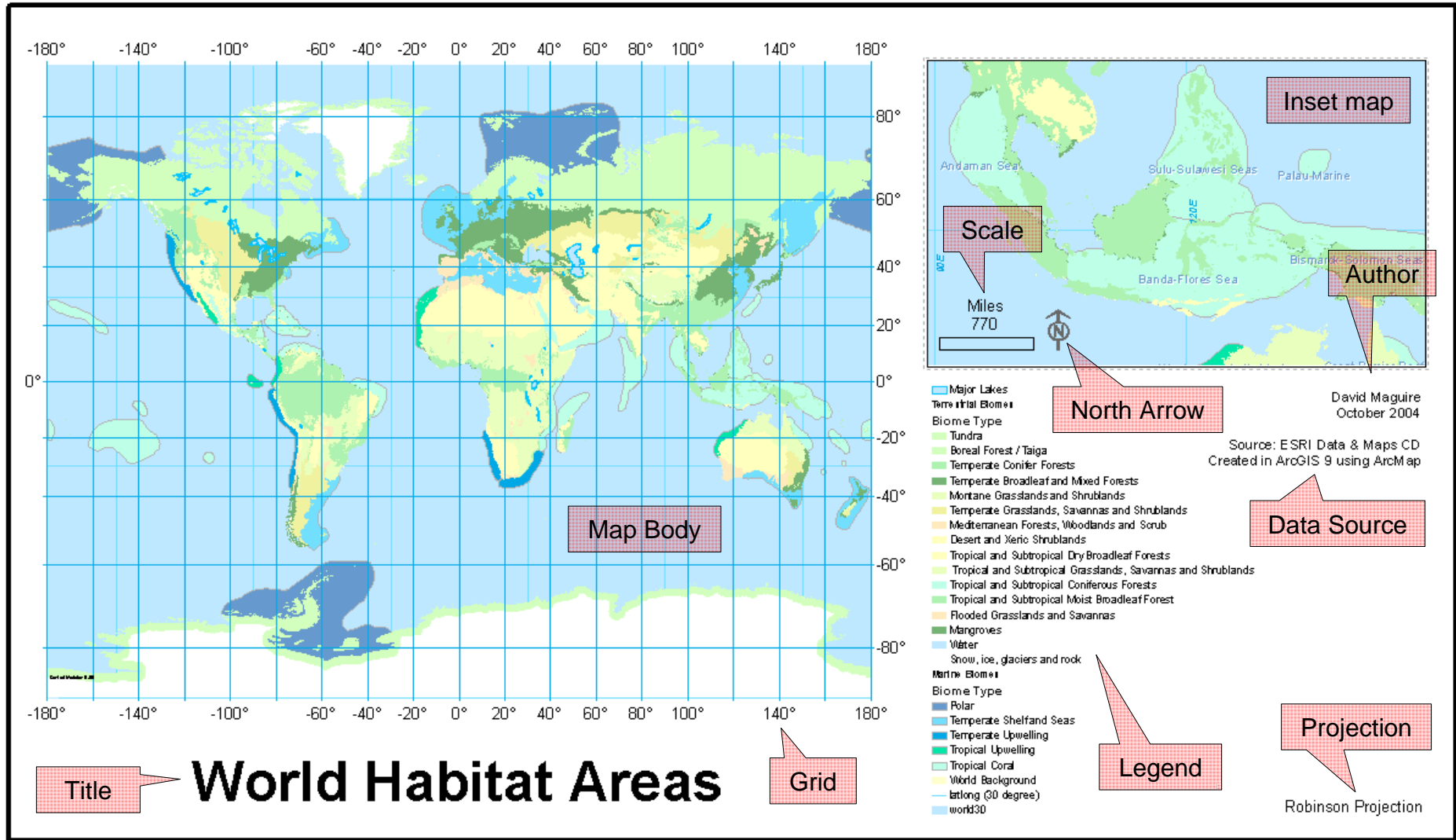
Limitations of Paper Maps

- Fixed scale
- Fixed extent
- Static view
- Flat and hence limited for 3D visualization
- Only presents 'complete' world view
- Map producer-centric



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Bertin's Graphic Primitives

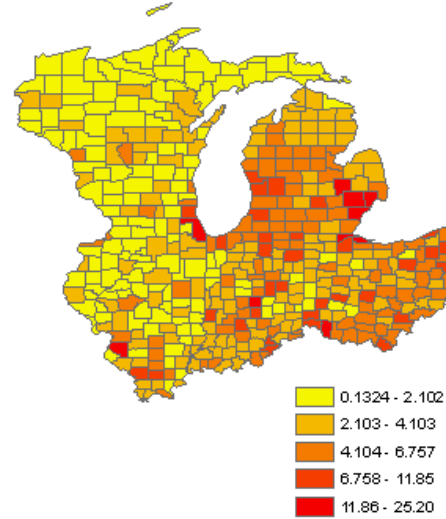
	area	line	point
size			
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arrangement			
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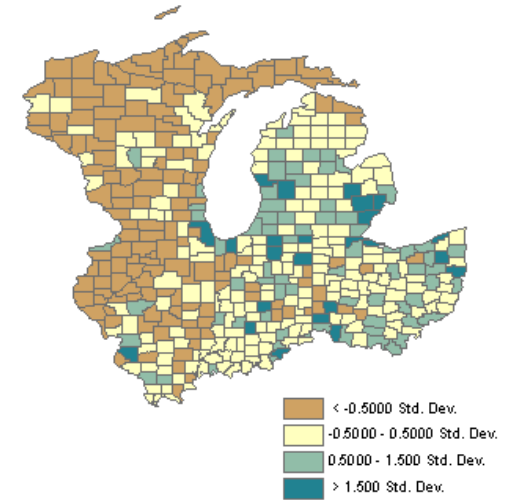
Choropleth Class Schemes

Mobile Homes Density

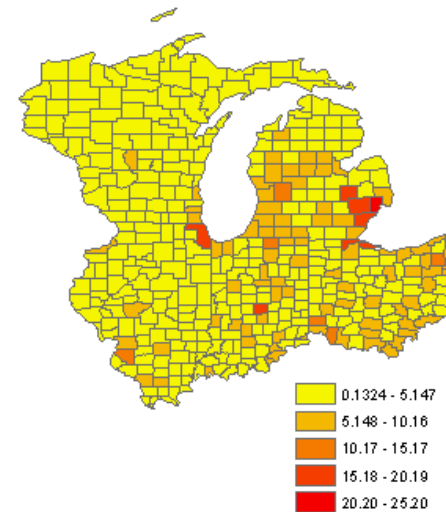
Natural Breaks



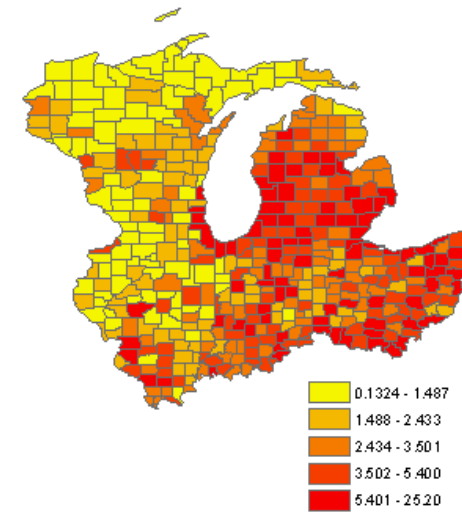
Standard Deviation



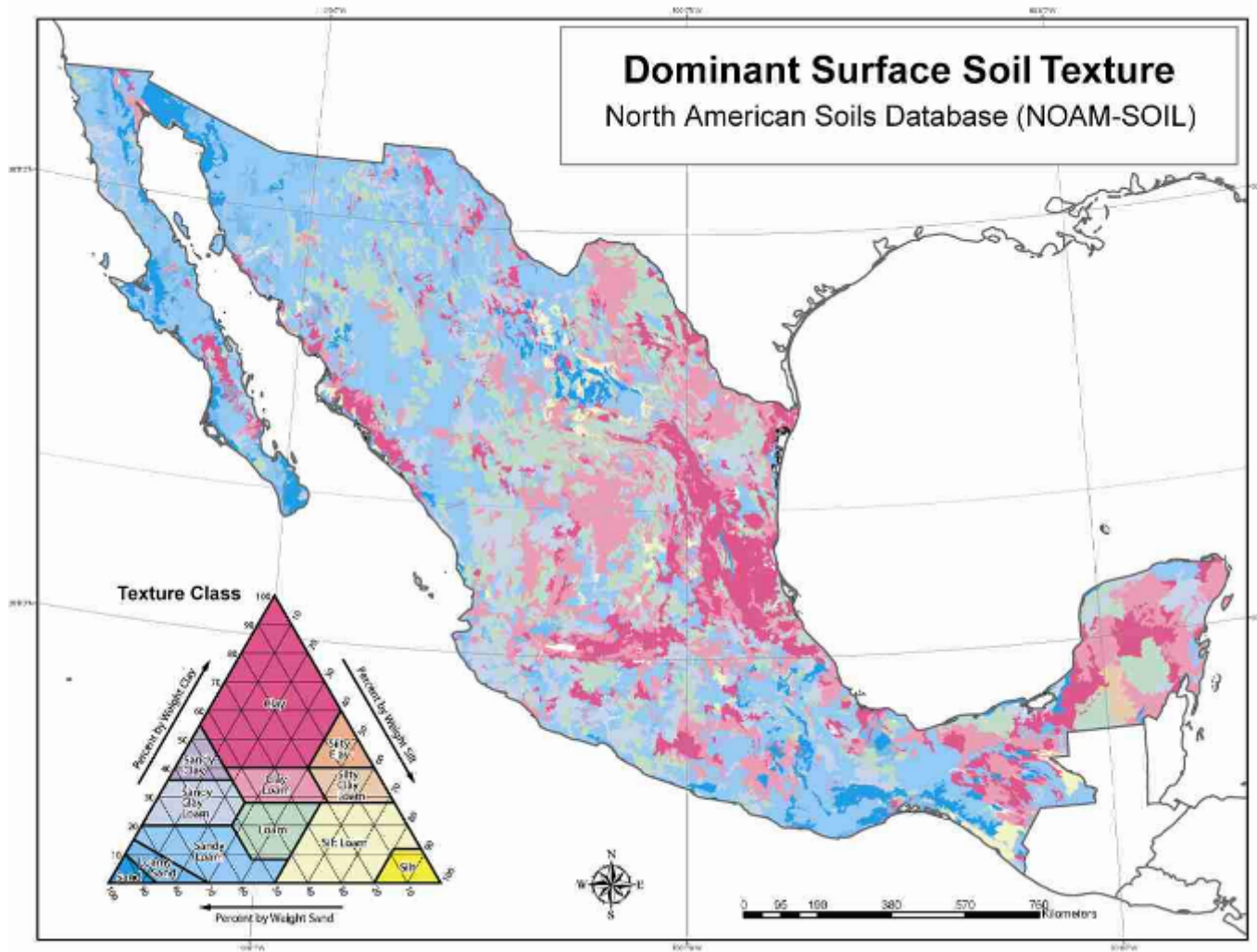
Equal Interval



Quantile



North Central USA
David Maguire Oct 2004

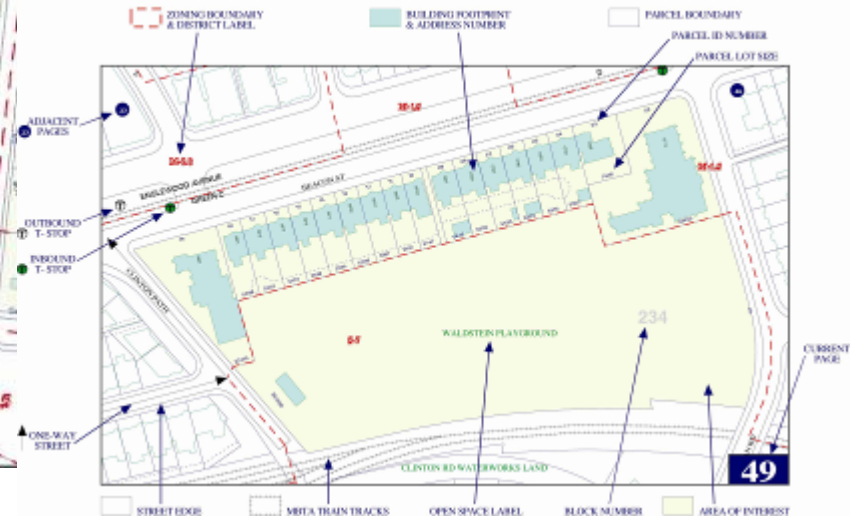




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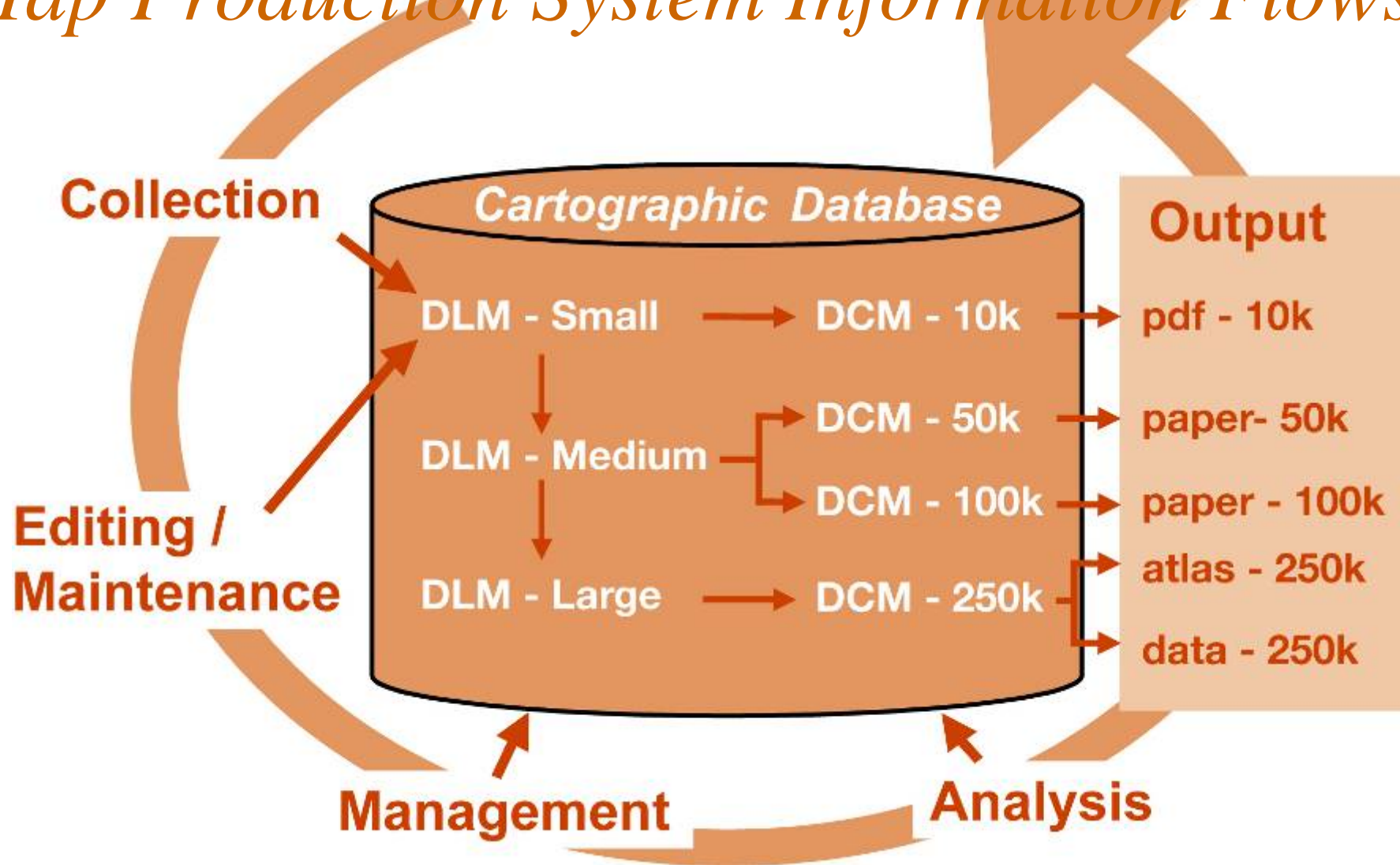
ATLAS MAP LEGEND





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Map Production System Information Flows





brazil.mxd - ArcMap - ArcInfo

File Edit View Insert Selection Tools Window Help

1:278,221

Schematic Active Diagram: ARACAIU_OSP Trace Task: Find Loop

Schematic Editor Layout Task: Hierarchical - Smart Tree

Geography

- Valves
- End Cap
- refineries
- gas_plants
- petrochem
- platforms
- pipeline_network
- pipeline_junctions
- cities
- ports
- electric
- wells
- Rivers 1
- roads
- railways
- reserves
- fields
- blocks
- basins
- Country Boundaries 2
- Water Bodies 1

Schematic ARACAIU_OSP

- ARACAIU_OSP
- pipelines_Net_Junctions (17)
- pug_PUG_gas_plants (1)
 - NAME_
 - Valves (26)
 - SUBTYPE
 - Distribution (25)
 - Emergency (1)
 - Current_Position
 - joined_pipe (53)
 - GENERAL_CONTENT
 - Gas (14)
 - Oil (39)

Schematic ARACAIU_ISP

- ARACAIU
- ISP_Valves (14)
 - TYPE
 - Main In (3)
 - Main Out (4)
 - Secondary (7)
- NUMBER
- ISP_Equipment (19)
 - TYPE

ARACAIU

Point: validated.

ARACAIU

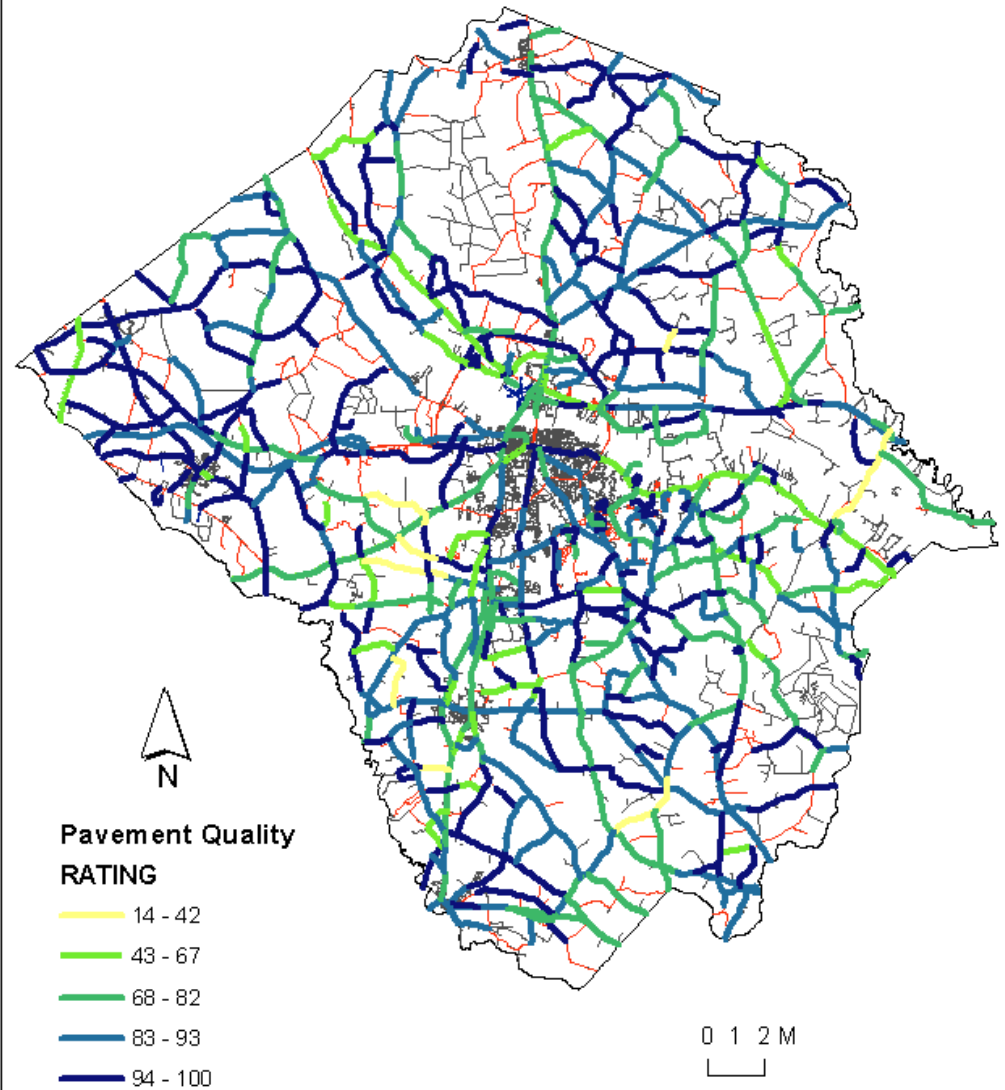
ARACAIU Gas Plant OSP

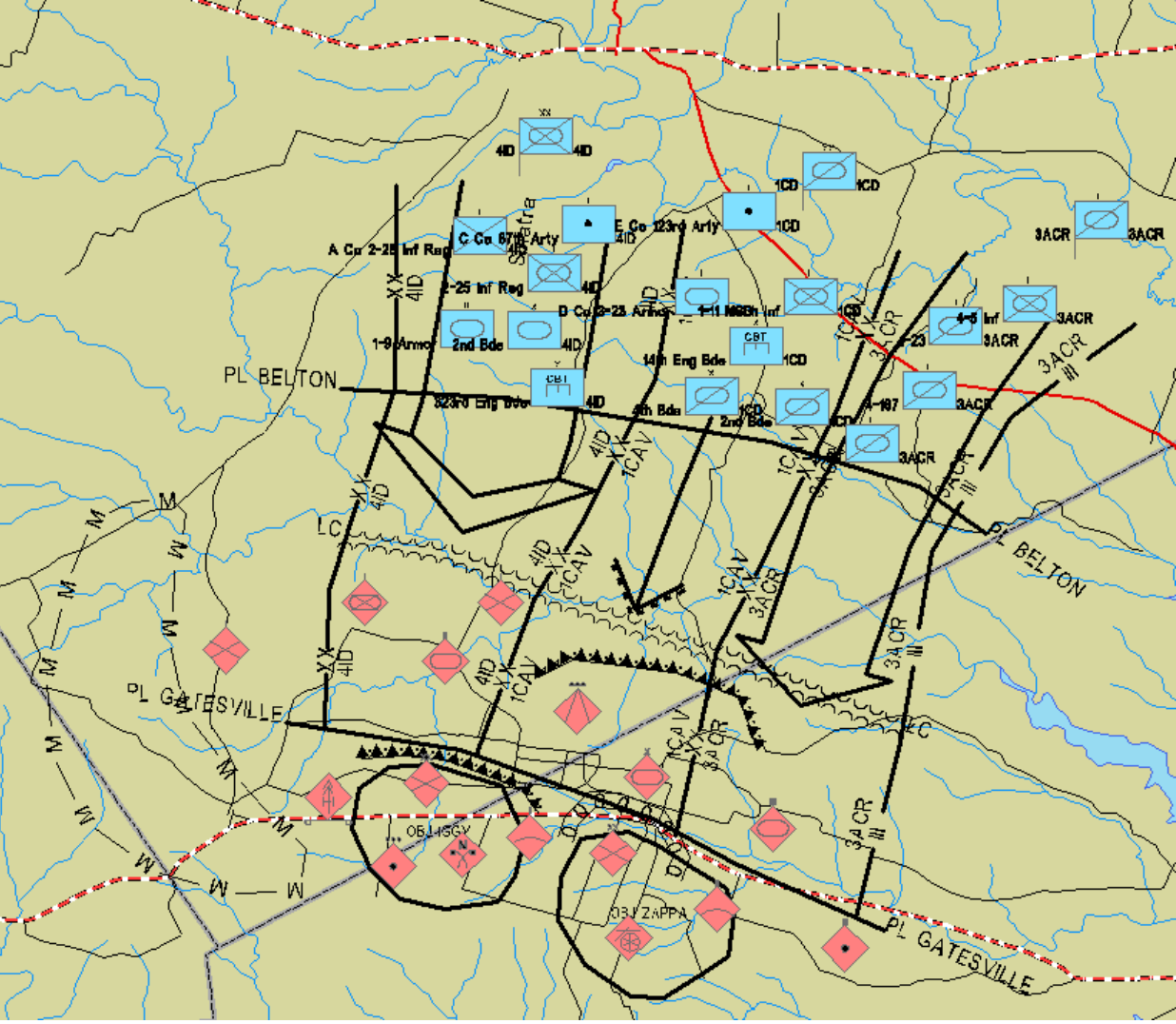
ARACAIU Gas Plant - ISP

Display Source Selection

789.96 528.24 Unknown Units 25.95 8.58 Centimeters

Pitt County, USA Road Pavement Quality







Conclusions

- Cartography is both an art and a science
- Maps are fundamental to GIS projects
- Modern advances in cartography make it easy to produce good and bad maps
- New technology and especially the Internet has change the content and techniques of GIS-based cartography