Integrating Spatial Perspectives into Undergraduate Social Science Education

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Spatial Analysis in the Undergraduate Curriculum, Enhancing Undergraduate Learning, UCSB, July/August 2006

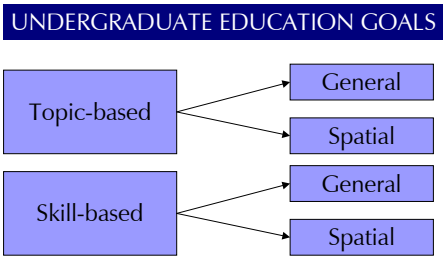
Overview

- Education History
- Spatial Thinking in Undergraduate Education
- Examples:
  - GEOG 20: Geography of Surfing
  - GEOG 20H: Field Studies in Surfing
  - GEOG 108E: Urban Economic Geography
  - GEOG 172: Introductory Spatial Analysis
  - GEOG 5: Human Geography

Educational History

- Undergraduate
  - UC San Diego, BA, Urban Studies & Planning (1990)
  - USP coursework: Political Science, Sociology, Env. Science, History
- Graduate
  - UNC Chapel Hill, Ph.D., City & Regional Planning (1999)
  - Economics (labor, urban, public, econometrics), Demography (biostat), Sociology
- Professional
  - UCSB Geography, CSISS, QMSS, SPACE, PopSci&GIS

Spatial Thinking in Undergraduate Education



Topic-based Goals

GENERAL	SPATIAL
Overview of big ideas, known 'facts', and surprising results	Spatial invariance (scale, frame, place, dynamics)
Historical lineage of modern ideas and theories	Place-dependence (Chicago school, Austrian school, …)
Theoretical paradigms - Methods of inquiry - Logical structure of theories	Spatially-explicit? How is space/place operational-ized?
Applied Theory (policy)	Place-dependence and connectivity

Skill-based Goals

GENERAL	SPATIAL
Written, visual, and oral communication	Leverage local or "home" town knowledge, student interests
Problem solving, mathematical/statistical reasoning - Mathematical formulation of theory - Interpreting statistical graphics and tables - Data/statistics/graphs/maps to support/refute theory	Spatially-explicit; spatial invariance; interpretation and use of maps; ESDA; spatial statistics.
Scientific creativity	Place-based journals

Examples:

- GEOG 20: Geography of Surfing (~270 students)
  - Spatial concepts wrapped in local interest.
- GEOG 20H: Field Studies in Surfing (~20 students)
  - Field journal, GPS>GIS project.
- GEOG 108E: Urban Economic Geography (~40 students)
  - Low tech GIS, ESDA, as lecture aid.
- GEOG 172: Introductory Spatial Analysis (~25 students)
  - Methods focus; student interests & ability to theorize.
- GEOG 5: Human Geography (~100 students)
  - GIS as lecture aid

Geography of Surfing

- Large lecture class (~270) with diverse audience.
- Smaller "honors" section (~20) associated with class
- Goals:
  - Introduce aspect of spatial thinking to broad cross-section of undergraduates.
  - Appeal to local activity/culture as hook.

Geography of Surfing (cont.)

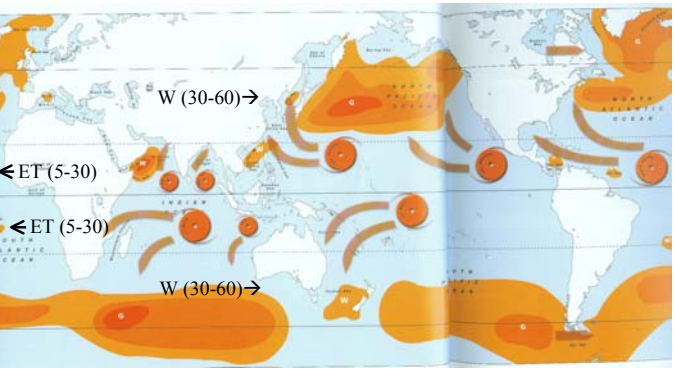
SPATIAL SCALE & CROSS-SCALE INTERACTIONS

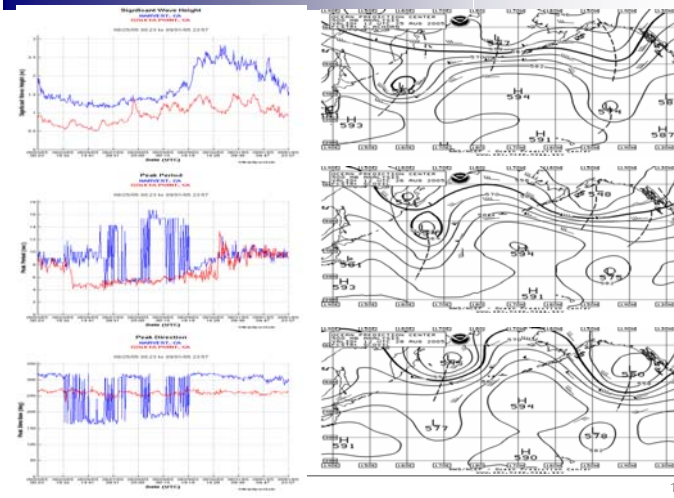
- Concept: Global-to-local scale interactions
- Skills: Maps, graphs, simple physical laws
- Application:
  - Global climate circulation
  - Ocean wave generation
  - Wave refraction, shadowing, and shoaling
  - …your local surf break

Overview

- Ocean regions
- Global Circulation Patterns
- Characterizing and describing ocean waves
- Wave theory, propagation, and dispersion
- Refraction, shadowing, and bathymetry
- Wind and wave measurement
- Forecasting

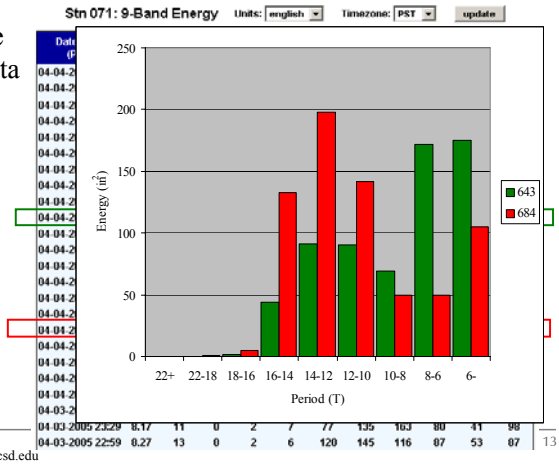
cean Regions





aracterizing and describing waves

- Wave field data



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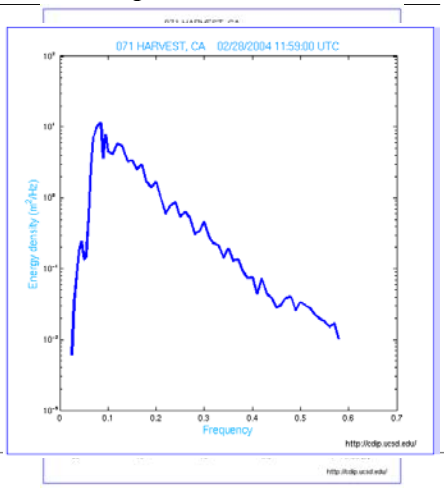
Characterizing and describing waves

- Wave fields (by day)



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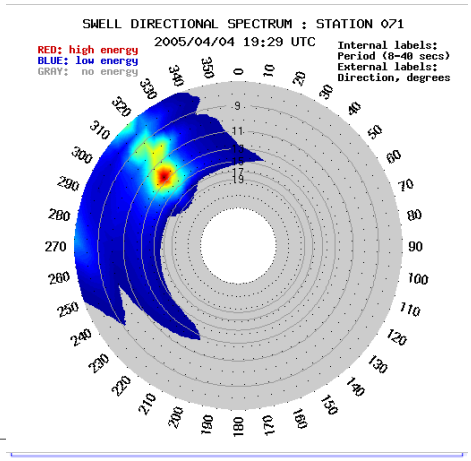
aracterizing and describing waves

- Directional spectrum and wave field



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Example 1: GEOG20/20H

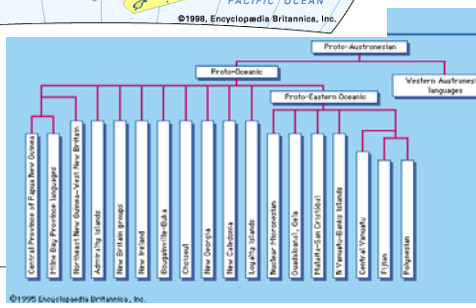
Geography of Surfing (cont.)

PLACE-DEPENDENCE & SPATIAL DIFFUSION

- Concept: Spatial diffusion as a process of spatial cultural development.
- Skills: Maps, timelines, taxonomy
- Application:
  - Ancient oceania to dawn of surfing (H/E interaction)
  - Terminology of cultural anthropology
  - Diffusion: Duke Kahanamoku (timeline)
  - Place-dependence of historical path (Australia vs. California)

verview

- Motivation: Why study surf culture and history
- What is culture?
- Cultural geography
- Spatial diffusion of culture
- Cultural geography of surfing



IC

. epicus, a. Gr. {elenis}{pi}{iota}{kappa}{goacu}{fsigma}, f. acu}{pi}{omicron}{fsigma} word, narrative, song. Cf. Fr. épique.]

di.

ertaining to that species of poetical composition (see EPOS), ented typically by the Iliad and Odyssey, which celebrates in the form ntinuous narrative the achievements of one or more heroic personages ory or tradition.

dialect: that form of the Greek language in which the epic poems were .

PUTTENHAM Arte Eng. Poet. (Arb.) 176 Harding a Poet Epick or call. 1644 MILTON Educ. (1738) 139 Teaches what the Laws are of a true oem. 1666 DRYDEN Ann. Mirab., Let. Sir R. Howard, The same images equally for the Epique Poesie, and for the Historique and Panegyrique. 1710 LE Tatler No. 106 {page}1 Three and twenty Descriptions of the Sun-rising ght be of great Use to an Epick Poet. 1752 JOHNSON Rambler No. 202 6 To be poor, in the epick language, is only not to command the wealth of s. 1819 BYRON Juan I. cc, My poem's Epic, and is meant to be Divided in books. 1841-4 EMERSON Ess. Poet Wks. (Bohn) I. 165 The epic must drink water out of a wooden bowl. 1879 B. TAYLOR Stud. Germ. Lit. nyson has endeavored to imitate the old epic simplicity.

l. a1637 B. JONSON Discoveries (1641) 132 The best masters of the Epick, and Virgil.

Such as is described in epic poetry; epic theatre, a play or plays cterized by realism and an absence of theatrical devices.

A. HILL Advice to Poets 35 Then, might our great, Third Edward's awful Pale, from his Tomb, in Epic Strides, advance. 1847 TENNYSON Princ. 19 Some great Princess, six feet high, Grand, epic, homicidal. 1935 Life & To-day Sept. 74 This method of theatrical presentation was dubbed by the 'epic' as opposed to the 'dramatic' style. 1957 R. HOGGART Auden ome of their techniques for presenting social problems and for obtaining a f urgent participation from the audience they seemed to have learned ning from the early 'epic theatre' of the German Communist playwright Brecht.

B. n.

{dag}1. An epic poet. Obs.

a1637 B. JONSON Horace's Art Poet (1640) 5 Now to like of this, lay that aside, the Epic's office is.

2. a. An epic poem.

1706 A. BEDFORD Temple Mus. ii. 33 One of them was the Goddess of Elegies..and another of Epicks. 1789 J. CAMPBELL Eccl. & Lit. Hist. Irel. 170 (T.) He [Mr. M'Pherson] brought forward his counterfeit epicks (the alleged poems of Ossian). 1833 COLERIDGE Table-t. 23 Oct., The Homeric epic, in which all is purely external and objective, and the poet is a mere voice. 1876 GREEN Short Hist. viii. 583 The most popular of all English poems has been the Puritan epic of the 'Paradise Lost'.

b. transf. A composition comparable to an epic poem.

The typical epics, the Homeric poems, the Nibelungenlied, etc., have often been regarded as embodying a nation's conception of its own past history, or of the events in that history which it finds most worthy of remembrance. Hence by some writers the phrase national epic has been applied to any imaginative work (whatever its form) which is considered to fulfil this function.

1840 CARLYLE Heroes (1858) 267 Schlegel has a remark on his Historical Plays, Henry Fifth and the others, which is worth remembering. He calls them a kind of National Epic. 1869 FREEMAN Norm. Conq. (1876) III. xiv. 328 To turn from the glowing strains of the Norwegian prose epic. 1916 A. HUXLEY Let. 19 Mar. (1969) 95, I want very much to see the Birth of a Nation, which is said to be a really great film, an epic in pictures. 1940 M. GORELIK New Theatres for Old ix. 412 An 'epic' is a large-scale film in which the events, usually historical, take precedence over the 'love interest'. 1957 N. FRYE Anat. of Crit. IV. 314 Ulysses, then, is a complete prose epic. 1965 Movie Spring 36/1 The budget was supposed to have guaranteed an action-packed epic.

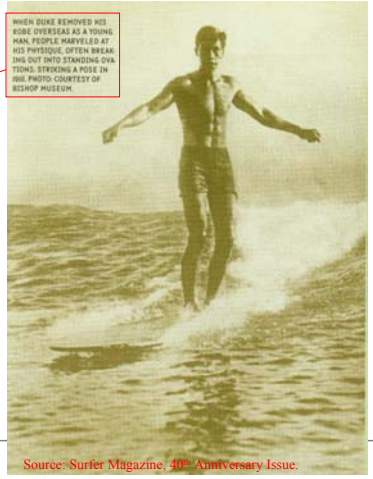
3. fig. A story, or series of events, worthy to form the subject of an epic.

1831 LYTTON Godolph. lxiii, This starry and weird incident in the epic of life's common career. 1866 MOTLEY Dutch Rep. VI. vii. 898 That life was a noble Christian epic.

History of surfing – rebirth and growth

"When Duke removed his robe overseas as a young man, people marveled at his physique, often breaking out into standing ovations."

Source: Surfer Magazine, 40th Anniversary Issue



Source: Surfer Magazine, 40th Anniversary Issue.

Source:

History of surfing – emergence of 'modern' artifacts

- Surfboards
  1. Koa / Wiliwili – solid wood
  2. Redwood / Pine – solid wood
  3. Tom Blake (Detroit -> Waikiki) – hollow board (192 later developed first keel/fin (1935), California locus innovations
  4. Hot-Curl boards (1934) "going 'slide ass'", tapered t v-bottom.
  5. Bob Simmons (late 1940s) fiberglass technology and board shapes, 'hydrodynamic planning hulls', sandwi boards, balsa boards.

ple 2: GEOG108E

Urban Economic Geography

- Medium lecture class (~40) of advanced undergraduates; mostly geog and econ majors.
- Lectures, Assignments (algebra, problem solving), Exams, Term Paper
- Local guest speakers: Theory→Application
- Goals:
  - Overview of urban economic theory with in-depth treatment of selected mathematical models
  - Application of theory to local planning problems
  - Term paper: student-centered exploration

Example 2: GEOG108E

Urban Economic Geography (cont.)

LOW-TECH GIS AS LECTURE AID / PLACE-BASED

- Topic: Urban Social Ecology & Residential Sorting
- Lecture sequencing:
  - Bid-rent theory earlier in quarter
  - Activity is used to motivate student engagement in notion of residential sorting
  - Subsequent lectures focus on theories of residential sorting (Tiebout, etc.)
- Low-Tech GIS
  - Transparency of San Francisco Census Tracts with road network
  - Select student to draw concentrations of race/ethnicity, poverty, crime…using colored pens
  - Overlay transparencies, discuss process.

Urban Economic Geography (cont.)

ESDA AS LECTURE AID

- Topic: Urban Social Ecology & Residential Sorting
- Lecture sequencing:
  - Students already received lectures on theory of residential sorting (Tiebout, etc.) and notion of hedonic models
  - Used as in-class example of ideas to Santa Barbara region.
- ESDA
  - GeoDA, SB real estate application
  - White, NW hispanic segregation shown
  - Impact of school, proximity to roads, % hispanic on sales prices.
  - Discussion: process of social ecology giving rise to observed pattern in data; support or refute theory?

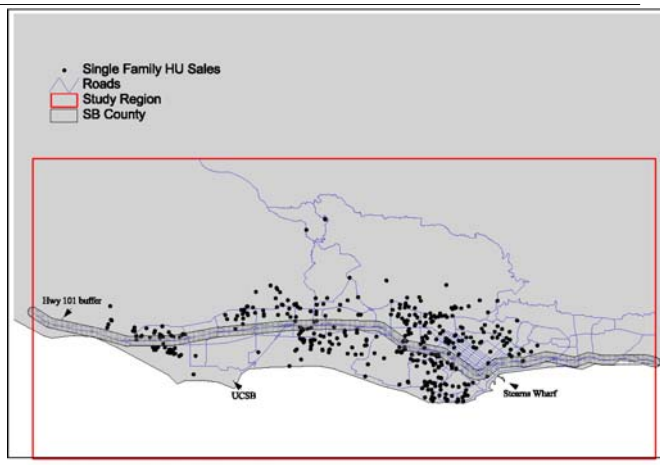


Figure 2: South Coast single family home sales

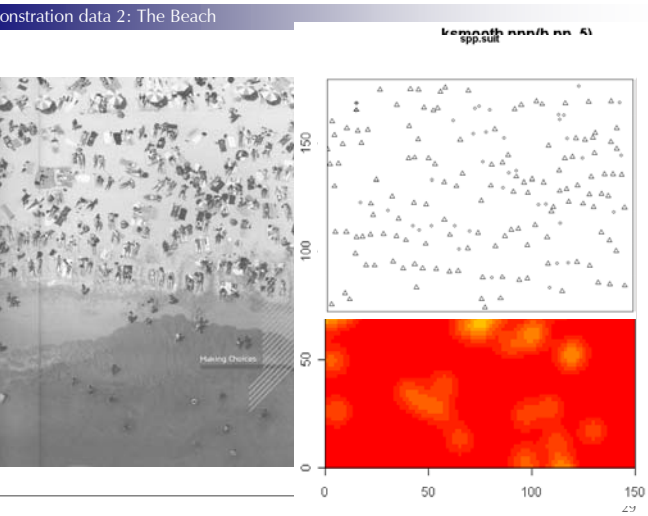
Introductory Spatial Analysis

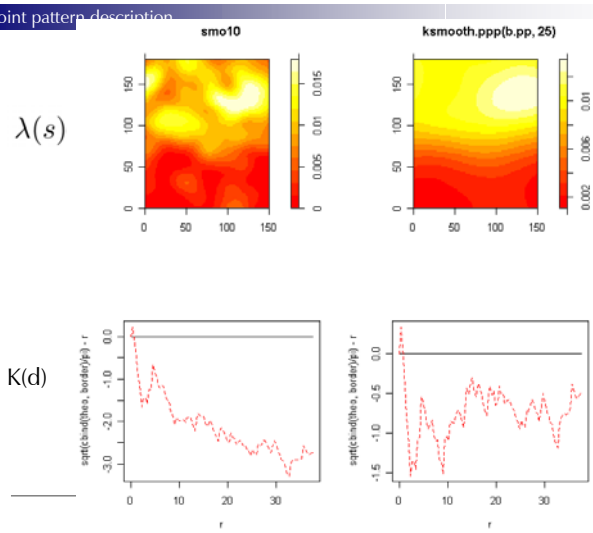
- Small lecture class (~25) of advanced undergraduates; mostly physical geog majors.
- Lectures, Assignments (algebra, problem solving), Exams, Computer lab assignments (Geoda, R)
- Goals:
  - Review of descriptive/inferential statistics and main areas of application in spatial analysis
  - Retain student interest – examples and application.

Introductory Spatial Analysis (cont.)

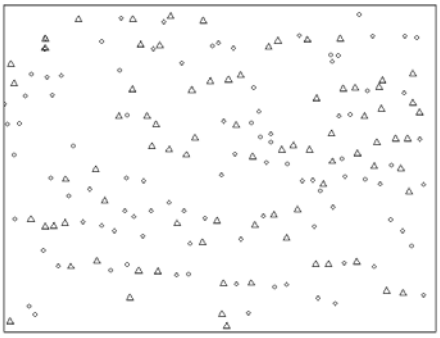
PROCESS GENERATES PATTERN

- Topic: Point Pattern Analysis
- Goals:
  - Provide students opportunity to reinforce point pattern theories with computer application
  - Use student-centered topic with easy opportunity to theorize about process underlying pattern generation.
- Labs
  - Use ArcGIS to geo-code location of "events" and attributes
  - Use R to analyze point patterns
  - Students asked to speculate about theories of attraction/repulsion and test those theories.





Marked point pattern: Males / Females



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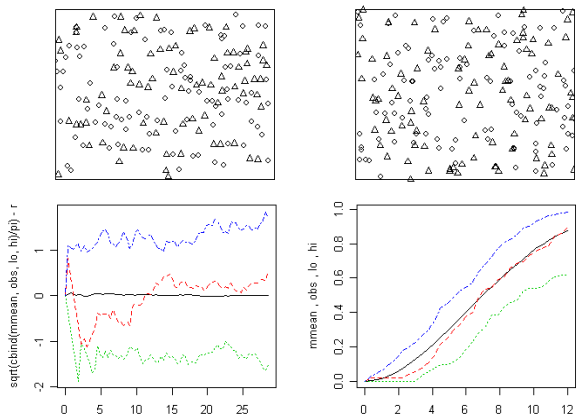


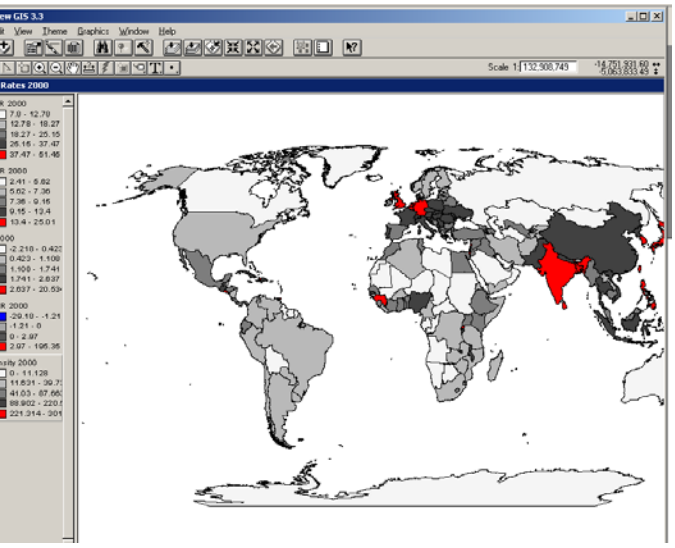
Human Geography

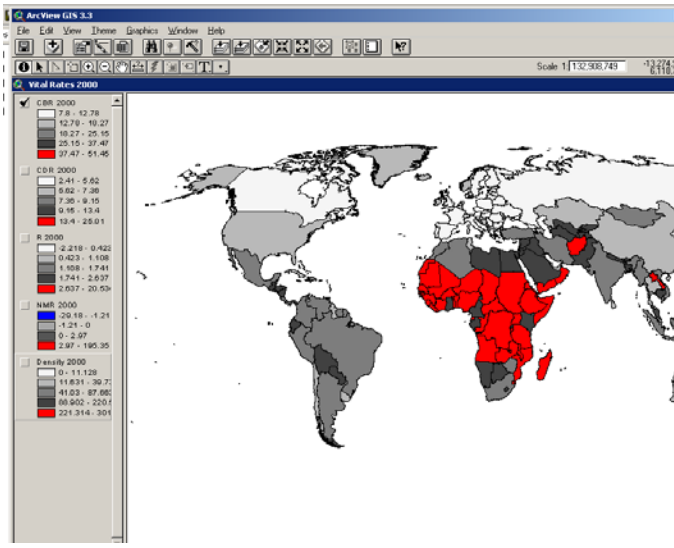
- Large lecture class (~100) of undergraduates; diverse set of major (satisfies GE).
- Lectures, multiple-choice exams, some short-essay.
- Goals:
  - Overview of theories and approaches to human geography (PUDE)
  - Familiarize with core concepts of spatial thinking.
  - Provide structure to encyclopedic scope of course.

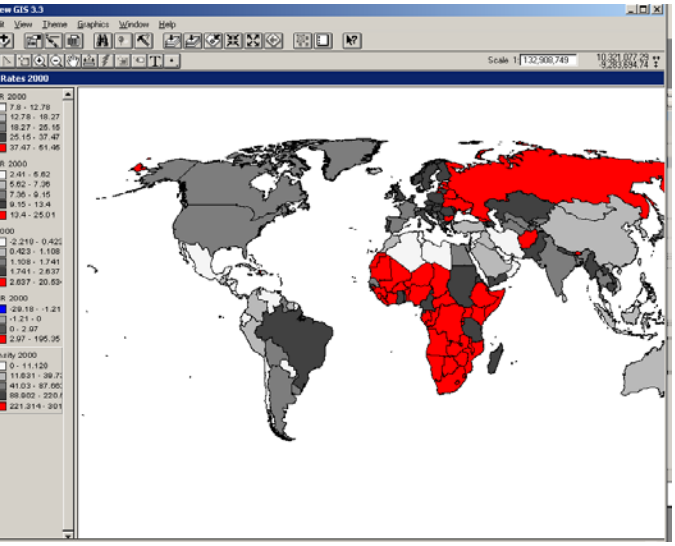
Human Geography (cont.)

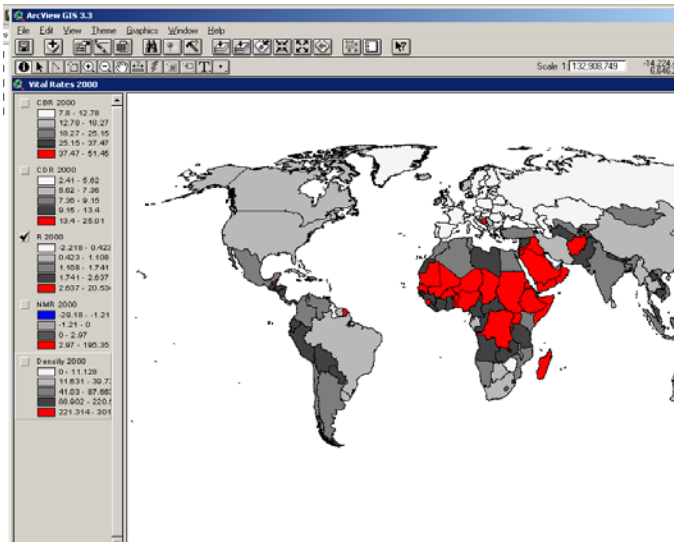
GIS AS LECTURE AID

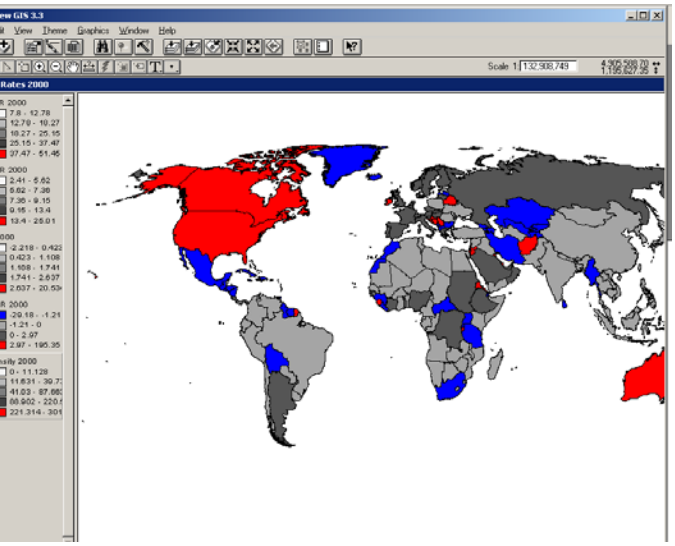
- Topic: Spatial Population / Development
- Skills:
  - Ability to identify primary areas of highs / lows of demographic rates and development indicators
  - Ability to associate social science processes that would give rise to the maps.
- GIS
  - Occurs after several lectures on spatial demography
  - Use GIS as live demo with lecture and questions at the same time











Review

- Blend of concepts and techniques in classroom
- Audience dependent
- Many ways to integrate spatial perspectives