Creating a B.S. in GeoDesign at the University of Southern California

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GIS Strengths / Weaknesses

• Focus on terrestrial environments
  o Natural environments – forests, grasslands, etc.
  o Human environments & infrastructure – cities, roads, pipelines, crop and grazing lands
  o Environmental impacts – air & water pollution

• Most of the world has been ignored
  o Oceans – cover 70% of Earth’s surface
  o Buildings – people spend 85% of their lives indoors & dense urban areas have much more interior space than land area

USC – B.S. in GeoDesign

Design
Spatial Sciences
Planning

Engineering
Architectures
Economics
History
International Relations
Political Science
Policy Planning & Development
Geography

Design, Analysis & Computation
Architecture
Civil & Environmental Engineering
Film Arts & Design
History
Journalism
Policy Planning & Development
Geography

GeoDesign Studio

(6)
(36)
(28)
(4)

Geodesign Core

Design
ARCH 232 Visualizing & Experiencing the Built Environment
ARCH 332 Design Principles I – Part vs. Whole, Spatial Typologies, Formal Organization, Scale
ARCH 432 Design Principles II – Sequence, Time, Complex Morphologies, Ecology of Place

Spatial Sciences
GEOG 301 Maps & Spatial Reasoning
GEOG 382 Principles of Geographic Information Science
GEOG 401 Spatial Science Practicum

Planning
PPD 227 Urban Planning & Development
PPD 417 History of Planning & Development
PPD 435 Designing Livable Communities

Capstone
ARCH / GEOG / PPD 422 GeoDesign Studio

Cities

Role of Scale and Complexity

Process of building – site planning, conceptual design, programming and construction drawing

Spatial analysis – land use, census blocks, traffic patterns, air quality tables

Scale and Complexity

- Additional problems may arise because the strategies, processes, methods and ideas that work at one scale may not work at other scales
- Possible examples:
  - Best Management Practices (manage runoff and water quality)
  - Green Building Design (support life)
  - Transit Oriented Development (reduce congestion and vehicle emissions)
  - Smart Growth...

Scale and Complexity (3)

- Global: Cloud cover and CO2 levels control primary energy inputs to climate and weather patterns
- Meso: Prevailing weather systems control long-term mean conditions; elevation-driven lapse rates control monthly climate; and geological substrate exerts control on soil chemistry
- Tonal: Surface morphology controls catchment hydrology; slope, aspect, horizon, and topographic shading control surface insulation
- Micro: Vegetation canopy controls light, heat, and water for understory plants; vegetation structure and plant physiognomy controls nutrient use
- Nano: Soil microorganisms control nutrient recycling

(Slide courtesy of Michael Hutchinson)

Enabling Science

- Environmental / economic benefits of green cover:
  - Carbon storage & sequestration
  - Air pollution removal
  - Storm water runoff reduction
  - Energy conservation
  - Wildlife habitat protection
- An example — calculating pounds of pollutants removed and economic benefits

Geographic Knowledge Infrastructure

- Contains knowledge describing natural and human environment on Earth
- Multiple components:
  - Data
  - Data models that provide structure to the data
  - Models and analytic tools that show predictions or suitability
  - Geospatial workflows
  - Metadata, which describes the aforementioned components, and is key to sharing, discovery and access
- Web environments that make this knowledge more accessible and promote spatially integrated thinking

As an era moves from an industrial economy to an information economy, our reliance on physical infrastructure is being supplemented by reliance on a new type of infrastructure: geographic knowledge (Dangermond, ArcNews, 2010)