Introduction to Geography

People, Places, and Environment

Chapter 1: Introduction to Geography
Objectives: after carefully studying this chapter, students will be able to:

- Define some subfields of geography (such as physical, human, regional, and systematic),

- Explain how various entities might diffuse and move across landscapes and how such diffusion might be analyzed,

- Describe the geographic grid,

- Review challenges in designing map projections,

- Define remote sensing, GIS, & GPS.
A Definition of Geography

The study of the interaction of all physical and human phenomena at individual places and of how interactions among places form patterns and organize space.
Objective: define some subfields of geography (such as physical, human, regional, and systematic),

Physical geography

Human geography
   – Cultural geography
Human-Environment Interaction

- **Culture**: Everything about the way people live, including language, food, religion, social ceremonies
Defining some subfields of geography, continued

• Regional geography

• Topical or systematic geography

• Environmental determinism

• **Theory** – a widely accepted view that has more or less endured the test of time, and that has been widely used as a frame upon which to add newly discovered facts and patterns.
  – Example: Integrated Ecosystem Theory
Some Considerations in Area Analysis

- Site: exact location of a place
- Situation, or relative location:
  - Location of a place relative to other places
  - Accessibility
  - Constant change
  - Globalization
  - Lenses
Korea’s royal palace displayed a copy of a 13th century Chinese/Islamic map. Demonstrates increasing interconnectedness during that historical time.
The Concept of Regions

• **Formal regions**: essential uniformity in one or more physical or cultural features
  – Sometimes politically defined
  – May be bound by mountains or oceans
  – More concrete and less quick to change

• **Functional regions**: defined by interactions among places
  – E.g., trade linkages, communications, and religious structures

• **Vernacular regions**: widespread popular perception of existence ("That’s the Midwest")
Functional Regions, e.g. market region
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Vernacular Regions

POPULAR REGIONS OF NORTH AMERICA
AS INDICATED BY NAMES OF METROPOLITAN ENTERPRISES
Spatial Analysis

• Distribution
  – Density
    • E.g., Population
  – Concentration
    • A descriptive term, “Is this entity concentrated or dispersed.”
  – Pattern
    • E.g., does the entity stay close to streams, or is it ordered by streets?
Objective: explain how various entities might diffuse and move across landscapes and how such diffusion, might be analyzed

Distance
- Measurements
  - Absolute (e.g., number of miles)
  - Time (required to travel full distance)
  - Cost (e.g., car, plane, train, or boat price)
- Friction of distance

Distance decay: As distance increases, importance of the phenomenon decreases (for example, newspaper circulation)
Measuring Distance

(a) Road (27 km) and River (53 km) between an Iron ore mine and a Steel mill.

(c) Urban Street Pattern with One-Way Streets and locations A and B.

(b) Different Elevations with Route 1 (25 km) and Route 2 (41 km) between Town A and Town B.

(d) Different Elevations with A and B locations.
Diffusion

• **Hearth**: Place where an idea begins

• **Types of diffusion**:
  – **Relocation** (e.g., immigration and emigration)
  – **Contiguous**, or contagious (direct contact, “And tell a friend”)
  – **Hierarchical** (specific authorities organize [filter] and communicate)

• **Barriers to diffusion**:
  – Distance and time
  – Physical: oceans, deserts, topography
  – Cultural:
    • Political boundaries
    • Misunderstanding, competition between groups
Utility of a new technology:
- Cars
- Planes
- TVs
- Various means of diffusing
Objective: describe the geographic grid
The Geographic Grid

• Location on Earth
  – Need an accurate location on Earth to describe geographic features
  – Use Earth’s rotation axis to base location on the surface
  – North Pole and South Pole
  – Plane of the Equator—halfway between poles and perpendicular to Earth’s surface

-Graticule (grid): the network of lines of latitude and longitude upon which a map is drawn
The Geographic Grid

• Great Circles
  – Circles which bisect a sphere and pass through the sphere’s center
  – Identify the shortest distance between two points on a sphere—great circle distance
  – Circle of illumination
  – Small circles

Figure 1-10
The Geographic Grid

- **Latitudes**
  - Parallels
  - angle north or south of the equator
  - 7 important latitudes:
    - Tropic of Cancer and Capricorn
      (23.5° N and S)
    - Equator (0°)
    - Poles (90° N and S)
    - Arctic and Antarctic Circles
      (66.5° N and S)
The Geographic Grid

- **Longitudes**
  - Meridians
  - Prime Meridian ($0^\circ$ longitude) located at Greenwich, England
  - Angle east or west of the Prime Meridian
  - Converge at the poles
The Geographic Grid

(a) Lat. 0° → Lat. 35°N
(b) 90° North Pole
(c) 180° Prime Meridian
(d) 0° → 180° Longitude

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Map Making

• Cartography

• Scale
  – Fraction 1/24,000
  – Ratio 1:24,000
  – Written statement “1 inch = 1 mile”
  – Graphic scales

• Detail and area
  – Small-scale map = less detail, large denominator (1:1,000,000)
  – Large-scale map = more detail, small denominator (1:100,000)
Another type of graphic scale
Map Scales: An Example

“Small detail → small map”
Objective: review challenges in designing map projections,

Method of transferring locations on Earth’s surface to locations on a flat map

• Types of distortion
  – Size (and distance, conformal)
  – Shape (and orientation, equal-area)
Conformal and Equal-Area Projections

Conformal → size distortion, & Equal-Area → shape distortion
Tools for Cartography
Objective: define remote sensing, GIS, & GPS

• Remote Sensing

• GIS—Geographic Information Systems

• GPS—Global Positioning System
An example of remote sensing
Remote Sensing Satellites

- **Remote sensing** (picking up spatial information without touching it, usually by high-flying aircraft or satellites orbiting Earth)
Remote Sensing

- Visible light and IR scanning
  - Usually based off of visible light and IR part of electromagnetic spectrum
  - Shows “false color”
Infrared Scanning
Infrared in Search & Rescue
Human trafficking across the North Korean/Chinese Border
Infrared Remote Sensing

State of Hawaii
Satellite Data is Part of Remote Sensing & Reveals

- Weather
- History and archaeology
- Environmental impacts
- Farmland quality
- Stream flow
- Urban expansion
- Military intelligence
- Commercial information
Egypt
Remote Sensing, Active Systems

• So far, passive systems (like a person’s eye)
• Active systems (similar to bats)
  – Radar (electromagnetic waves, which include visible light)
  – Sonar (using sounds, like whales do)
  – Many others
Remote Sensing

• Radar Imagery
  – “Radio Detection and Ranging”
  – Useful for identifying atmospheric moisture

• Sonar Imagery
  – “Sound Navigation and Ranging”
  – Permits underwater imaging
Remote Sensing

• Common types include:
  – Aerial Photographs
  – Orthophoto maps (digitally remove pilot-view distortions)
  – Visible Light and Infrared (IR) Scanning
    • Scanning: using wavelengths which may or may not include visible light
    • e.g., x-rays
How to fix an oblique image
• Orthophoto maps
  – Photographic maps that are multicolored and distortion free
GIS—Geographic Information Systems

- Computer systems used to analyze and display spatial data
- Layers of data used in mapping
- Requires high powered computing to process multiple maps
Can take an aerial photo like this and make it into something like...
...this.
Digital Elevation Model
GPS—Global Positioning System

- Global navigation satellite system for determining location on Earth’s surface
- Wide Area Augmentation System (WAAS), ground-based correctional stations (approx. 1 per state), 1st for airlines, “You (satel.) are out of sink”
…24 working satellites, and 3 ‘spares’ orbiting just in case.
• Continuously Operating GPS Reference Stations (CORS), a ground-based configuration of GPS units
  – E.g., detect plate movements of less than 1 centimeter
End of Chapter 1