Lecture-01/02

Definition of Geography

- Most individuals define geography as a field of study that deals with maps. This definition is only partially correct. A better definition of geography may be the study of natural and human constructed phenomena relative to a spatial dimension.

- The discipline of geography has a **history that stretches over many centuries**. Over this time period, the study of geography has evolved and developed into an important form of human research.

History of Geography

Some of the first truly geographical studies occurred more than four thousand years ago. The main purpose of the early investigations was to map features and places observed as explorers traveled to new lands.

At that time, Chinese, Egyptian, and Phoenician civilizations were the pioneers to explore spaces within and outside of their homelands.

The earliest evidence of such explorations comes from the archaeological discovery of a Babylonian clay tablet map that dates back to 2300 BC.

History of Geography....cont

The early Greeks were the first civilization to practice a form of geography that was more than simple map making or **cartography**.

Greek philosophers and scientist were interested in learning about spatial nature of human and physical features found on the Earth.

One of the first Greek geographers was **Herodotus** (484 - 425 BC). Herodotus wrote a number of volumes that described the human and physical geography of the various regions of the Persian Empire.

History of Geography.....cont

The ancient Greeks were also interested in the form, size, and geometry of the Earth. **Aristotle** (384 - 322 BC) hypothesized and scientifically demonstrated that the Earth had a spherical shape.

The first individual to accurately calculate the circumference of the Earth was the Greek geographer **Eratosthenes** (276 - 194 BC). Eratosthenes calculated the equatorial circumference to be 40,233 kilometers using simple geometric relationships.

This primitive calculation was unusually accurate. Measurements of the Earth using modern satellite technology have computed the circumference to be 40,072 kilometers.

History of Geography.....cont

- Most of the Greek accomplishments in geography were passed on to the Romans. Roman military commanders and administrators used this information to guide the expansion of their Empire.

- The Romans also made several important additions to geographical knowledge. **Strabo** (64 BC - 20 AD) wrote a 17 volume series called "**Geographia**".

- Strabo claimed to have traveled widely and recorded what he had seen and experienced from a geographical perspective. In his series of books, Strabo described the cultural geographies of the various societies of people found from Britain to as far east as India, and south to Ethiopia and as far north as Iceland.

During the second century, **Ptolemy** (100 - 178 AD) made a number of important contributions to geography. Ptolemy's publication *"**Guide to Geography**"* compiled and summarized much of the Greek and Roman geographic information accumulated at that time.

Development of the concepts of geographical **latitude** and **longitude** was one of his (**Ptolemy**) important contribution.

- **Latitude & Longitude**
  - Latitude is a north-south and the Longitude is a east-west measurement of position on the Earth. They are measured in degrees, minutes, and seconds.

PRIME MERIDIAN
0°
75°
60°
45°
30°
15°
EQUATOR 0°
15°
30°
45°
60°
75°
165°
150°
135°
120°
105°
90°
45°
60°
75°
30°
15°
15°
30°
45°
60°
75°
165
150°
135°
120°
105°
90°
45°
60°
75°
30°
15°
15°
30°
45°
60°
75°
0° EQUATOR
0°

- **Latitude** (*shown as a horizontal line*) is the angular distance, in degrees, minutes, and seconds of a point north or south of the Equator. Lines of latitude are often referred to as parallels.

- **Longitude** (*shown as a vertical line*) is the angular distance, in degrees, minutes, and seconds, of a point east or west of the Prime (*Greenwich*) Meridian. Lines of longitude are often referred to as meridians.

This early map of the world was constructed using map making techniques **developed by Ptolemy**. Note that the map is organized with crisscrossing lines of **latitude** and **longitude**.

Little academic progress in geography occurred after the Roman period. For the most part, the Middle Ages (5th to 13th centuries AD) were a time of intellectual stagnation. In Europe, the Vikings of Scandinavia were the only group of people carrying out active exploration of new lands.

However, in the 8th century, Arab academics started translating the works of Greek and Roman geographers and began exploring southwestern Asia and Africa.

Some of the important intellectuals in Arab geography were Al-Idrisi, Ibn Battutah, and Ibn Khaldun.

Ibn Battutah and Ibn Khaldun are well-known for writing about their extensive travels to North Africa and the Middle East.

History of Geography……cont

During the Renaissance period (1400 to 1600 AD) various journeys of geographical exploration were commissioned by different European countries. Most of these voyages were financed because of the potential commercial returns from resource exploitation.

These voyages also added many significant contributions to geographic knowledge.

Important explorers of this period include Christopher Columbus, Vasco da Gama, Ferdinand Magellan, Jacques Cartier, Sir Martin Frobisher, Sir Francis Drake, John and Sebastian Cabot, and John Davis.

- The **Renaissance** is a cultural movement that spanned roughly the 14th to the 17th century, beginning in Florence in the Late Middle Ages and later spreading to the rest of Europe.

History of Geography.....cont

In the 17th century, Bernhardus Varenius (1622-1650) published an important geographic reference titled **General Geography**: 1650. This work continued to be a standard geographic reference for about 100 years.

During the 18th century, the German philosopher **Immanuel Kant** (1724-1804) proposed that human knowledge could be organized in three different ways:

1. ***According to the type of objects studied*** : zoology studies animals, botany examines plants, and geology involves the investigation of rocks;

History of Geography.....cont

2. The second way to study with a temporal dimension, i.e. history.

3. The last method of organizing knowledge involves understanding facts relative to spatial relationships. This field of knowledge is commonly known as geography.

Kant also divided geography into a number of sub-disciplines:

Physical, mathematical, moral, political, commercial, and theological geography.

Geographic knowledge saw strong growth in Europe and in the United States in the 1800s. In Germany, **Alexander von Humboldt**, **Carl Ritter**, and **Fredrich Ratzel** made substantial contributions to human and physical geography.

History of Geography.....cont

- Humboldt's publication **Kosmos** (1844) examines the geology and physical geography of the Earth. This work is considered by many academics to be a milestone contribution to geographic research.

- In the late 19th Century, Ratzel theorized that the distribution and culture of the Earth's various human populations was strongly influenced by the natural environment.

- The French geographer **Paul Vidal de la Blanche** opposed this revolutionary idea. Instead, he suggested that human beings were a dominant force shaping the form of the environment. The idea that humans were modifying the physical environment was also prevalent in the USA.

History of Geography.....cont

In 1847, **George Perkins Marsh** gave an address to the Agricultural Society of Rutland County, Vermont. The subject of this speech was that human activity was having a destructive impact on land, especially through **deforestation and land conversion.**

This speech also became the foundation for his book ***Man and Nature*** or ***The Earth as Modified by Human Action***, first published in 1864. In this publication, Marsh warned of the ecological consequences of the continued development of the Americans.

Starting in about 1950, geographic research experienced a shift in methodology. Geographers began adopting more scientific approach that relied on quantitative techniques.

The **quantitative revolution** was also associated with a change in the way in which geographers studied the Earth and its phenomena.

Researchers started investigating process rather than description of an event. Now a days the quantitative approach is becoming even more prevalent due to advances in computer and software technologies.

History of Geography.....cont

In 1964, William **Pattison** published an article in the ***Journal of Geography*** (1964, 63: 211-216) that suggested that modern Geography composed of the following **four academic traditions**:

- **Spatial Tradition** - the investigation of the phenomena of geography from a strictly spatial perspective. (location)
- **Area Studies Tradition** - the geographical study of an area on the Earth at either the local, regional, or global scale.
- **Human-Land Tradition** - the geographical study of human interactions with the environment.
- **Earth Science Tradition** - the study of natural phenomena from a spatial perspective. (Nature)

History of Geography.....cont

Though the academic traditions **described by Pattison** are still dominant fields of geographical investigation, the frequency and magnitude of human induced environmental problems has been on a steady increasing scale.

These increases are the result of a growing human population and the consequent increase in the consumption of natural resources.

An increasing number of researchers in geography are studying how anthropogenic activities modify the environment.

History of Geography.....cont

Similarly, a significant number of projects also develop strategies to reduce the negative impact of anthropogenic activities on nature. Some of the dominant themes in these studies include:

Environmental degradation of the **hydrosphere**, **atmosphere**, **lithosphere**, and **biosphere**;

resource use issues;

natural hazards;

environmental impact assessment; and

the effect of urbanization and land-use change on natural environments.

Definition of Geography

Considering all the above statements, the definition of geography can be suggested that:

Geography, in its simplest form, is the field of knowledge that is concerned with how phenomena are spatially organized.

As a subject, geography is concerned with 'where' and 'why' the objects and events are located in space and moreover, with the patterns of phenomena and the processes that created them.

Geography covers a very **diverse group of disciplines** and their branches in both social as well as physical sciences.

Key Concepts of Geography

- Understanding the relationship between objects that share proximity and adjacency is fundamental to geography. Like the laws of gravity, geography has a set of laws which are yet to be disproven.

- The most famous of these laws was conceived by Waldo Tobler in 1970. Tobler's first law stated "Everything is related to everything else, but near things are more related than distant things.“ (Theobald, 2005).

- Additionally, the study of Geography has a set of key concepts.

8 Key Concepts

The 8 key concepts are:

- **direction**, **distance**, **scale**, **location**, **distribution**, **localization**, **spatial interaction** and **region**

1) **Direction-** is a geometric property used to describe relative location. The true direction is measured by reference to a meridian.

Nations that touch the Equator and the Prime Meridian

2) Distance- Distance takes into account the dimension of the surface of a feature to calculate the distance traveled vertically.

- **3) Scale-** is the size of the area being studied and is related to the level of precision and generalization applied to the area of interest. Scale on a map may be represented three ways:

With a **scale bar**, **as words** " one centimeter to a kilometer“ or as a **representative fraction** (1/10,000).

4) Location- is either relative or absolute. Absolute location is restricted to a reference system similar to Euclidian distance or GPS location.

Relative location is related to other object as they are seen as important (one example: the school is adjacent to the hospital).

5) Distribution- is the spatial pattern in an area. The three patterns recognized in spatial statistics are:

Three types of spatial distribution patterns (Reeder, 2010)

7) Spatial interaction- is the movement of people, ideas, or goods between areas on the earth. The concept of spatial interaction is tied closely with human geography.

8) Region- A region is defined by the researcher to **study the likenesses and differences of areas**. Regions in GIS are represented by polygons or raster cells of the same value.

With the help of GIS we can explore the concepts of geography and demonstrate **how to analyze spatial data based on these fundamental concepts**.

5 Themes of Geography

The five themes of geography were created in 1984 by the National Council for Geographic Education and the Association of American Geographers:

1. Location
2. Place
3. Human-Environment Interaction
4. Movement, and
5. Region

Location

- Most geographic study begins with learning the location of places. Location can be absolute or relative;
- Absolute location provides a definite reference to locate a place. The reference can be latitude and longitude.

Place

- Place describes the human and physical characteristics of a location;

- Physical characteristics include a description of things, such as the mountains, rivers, beaches, topography, and animal and plant life of a place;

- Human characteristics include the human-designed cultural features of a place; from land use and architecture to forms of livelihood, transportation and communication networks.

- **Human-Environment Interaction**

  - This theme considers how humans adapt to and modify the environment;

  - Humans shape the landscape through their interaction with the land; this has both positive and negative effects on the environment.

Movement

- Humans move, a lot! This theme studies movement and migration across the planet.

Region

- Region divides the world into manageable units for geographic study;
- Regions can be formal or functional.
- Formal regions are those that are designated by official boundaries, such as cities, states, counties, and countries.

Dimensions of geographical phenomena

The **dimensions of geographical phenomena** range from **zero to four** as :

1. point (zero-dimension),
2. line (one-dimension),
3. area (two-dimensions),
4. volume (three-dimensions) and
5. space-time (four-dimensions).

As we visualize, **geographical phenomena** may either be **discrete** (buildings, trees, roads) or **continuous** (air temp, soil pH, elevation, etc.).

Elements of Geography

Geography consists of at least two different sub-fields of knowledge : **Physical geography** and **human geography**.

The **table** in the next slide also helps to make the differences between these two types of geography.

The table describes some of the phenomena or elements studied by each of these sub-fields of knowledge.

Knowing what kinds of things are studied by geographers provides us with a better understanding of the differences between physical and human geography.

Some of the phenomena studied in physical and human geography

Physical Geography	Human Geography
Rocks and Minerals	Population
Landforms	Settlements
Soils	Economic Activities
Animals	Transportation
Plants	Recreational Activities
Water	Religion
Atmosphere	Political Systems
Rivers and Other Water Bodies	Social Traditions
Environment	Human Migration
Climate and Weather	Agricultural Systems
Oceans	Urban Systems

Branches of Geography

Geography is also a discipline that integrates a wide variety of subject matter.

Physical geography's primary sub-disciplines:

study the Earth's atmosphere (**meteorology and climatology**), animal and plant life (**biogeography**), physical landscape (**geomorphology**), soils (**pedology**), and waters (**hydrology**);

The human geography includes:

human society and culture (**social and cultural geography**), behavior (**behavioral geography**), economics (**economic geography**), politics (**political geography**), and urban systems (**urban geography**).

Holistic approach

The study of geography can also involve a holistic synthesis. Holistic synthesis connects knowledge from a variety of academic fields in both human and physical geography.

For example, the study of the enhancement of the Earth's **greenhouse effect** and the resulting **global warming** requires a multidisciplinary approach for complete understanding.

The fields of **climatology and meteorology** are required to understand the **physical effects** of adding additional greenhouse gases to the atmosphere's radiation balance.

Holistic approach....

The field of **economic geography** provides information on how various forms of human economic activity contribute to the emission of greenhouse gases through fossil fuel burning and land-use change.

Combining the knowledge of both of these academic areas gives us a more comprehensive understanding of why this serious environmental problem is occurring.

Major sub-disciplines of physical and human geography

Strength and Weakness of Holistic Nature

The holistic nature of geography has both strength and weakness.

Geography's strength comes from its ability to connect functional interrelationships that are not normally noticed in narrowly defined fields of knowledge.

The most obvious weakness associated with the geographical approach is related to the fact that holistic understanding is often too simple and misses important details of cause and effect.