Hunter College - CUNY
Dept. of Geography & Environmental Science
GEOG 101 Lecture Presentation Summary
Spring 2020

***NOTE**: In the absence of face-to-face lecturing and explanation of the material presented in the lecture slides, I will summarize the content of each lecture presentation stressing the concepts and interrelationships that are essential to an introductory geography course.*

If, after viewing the lecture presentation, the imbedded short videos and hot links to articles, and after reading this summary, you have any questions, would like to contribute a comment or two, need clarification by other examples or would like additional information on the topic, please do not hesitate to email me at agrande@hunter.cuny.edu.

LECTURE 13: CLIMATE and CLIMATE CONTROLS

- The purpose of this lecture is to show how the elements of weather when combined in different ways create climate zones.

- Know the difference between the terms: "weather" and "climate."

- **Slide 5:** Climate is like a soup that has many different ingredients, varies in water content, and is created and experienced at different temperatures! Both earth-sun and earth-environment factors influence a climate's development. Climates change as these factors change, same as a soup changes when the types of ingredients and the volume of those ingredients are altered.

- Climates influence all lifeforms on earth as well as human's response to its characteristics: we call this culture. (More on this in Part III of this course.)

- **Slide 6:** Two easy ways to help us study climate location and characteristics are **climate maps** and **climographs**. Climate maps show geographic distribution of averaged data. Climographs give us a snapshot of monthly characteristics of a particular location.

- **Slides 7-10: Climate maps** show geographic distribution of averaged data. Each color grouping represents unique characteristics of temperature, precipitation and hours of sunlight. Remember that there are very few sharp boundaries in nature and climate regions tend to fade into each other. There are usually large overlapping "fuzzy" zones where the transition occurs. Compare a world climate map with a world soils map and a world natural vegetation map to see the pattern similarities and therefore the interrelationships between them.

- **Slides 8-9:** Climates are classified by **temperature** (A, C, D and E groups), **moisture deficiency** (B group) and **elevation** (H group). Review the climate chart (Table 2.1) in the textbook. Be able to differentiate the groups and be aware of the conditions that create sub-groups.

- **Slides 11-16: Climographs** give us a snapshot (generalization) of a particular location in terms of monthly averaged temperature and precipitation. Each location on earth has a distinctive pattern of monthly temperature and precipitation. Review the lecture slides and the examples in the textbook. Be able to interpret climographs.

- **Slide 17.** There are 7 natural climate controls. These are related to the elements of weather. However, here they are part of that "soup" which gives the characteristics to each climate group and their subdivisions. Be sure you are able to distinguish between them. An 8th influence is human impact which is an unnatural influence that has adversely affected world climate and has contributed to global warming and shifting atmospheric patterns.

- **Slides 18-19: Latitude.** Note the near parallel bands of color. Irregularities are caused mainly by elevation. Since the vertical rays of the sun move northward then southward throughout the year before moving northward again, zones of precipitation are created and they move with the heating zones, pushing northwardly then southwardly. This gives us seasonal rainy and dry seasons within a climate group.

- **Slides 20-21: Land vs. Water.** We discussed the heating and cooling properties of solids and liquids in weather. Since water is slower to heat up and to cool down, it is said to me a moderator of climate. On the other hand, land heats up quickly and cools off quickly giving us great extremes of temperature. These extremes are termed continentality. Continental climates experience great seasonality – large differences between maximum summer temperatures and minimum winter temperature. This appears on climographs as the large loop of the temperature line. Water-influenced (marine) climates have a smaller temperature range. Slide 21 illustrates this clearly.

- **Slide 22: Ocean Currents.** The temperature of the ocean surface and the direction of flow of its surface currents affects temperature and moisture on land. Heat is transferred from the ocean to the bottom of the atmosphere. Evaporation from the oceans adds moisture to the atmosphere. If the air moves landward, it brings these characteristics onshore. Likewise, if it flows is away from land, those characteristics will NOT be influential to the landmass.

- **Slide 23: Wind Direction.** Hand-in-hand with ocean temperatures are wind systems and their predominant directions of flow. The temperature and moisture transferred to the bottom of the atmosphere from the oceans is moved around by wind. Global and regional systems dominate. Movement is both horizontal along the surface and vertical into the upper atmosphere where conditions can be transferred to other regions. Major horizonal circulation systems in the atmosphere are called gyres (just like those of the oceans). These are visible in satellite images as circular cloud patterns. The vertical circulation is termed a cell. The Hadley, Ferrel and Polar cells move characteristics from the surface into the upper atmosphere then back down to the surface. They help to form rainy and dry areas. Wind moving over warm water will create warm/humid conditions on land. Wind moving over cold wa-

ter will be squeezed dry of moisture. It will rain over the current and create arid conditions when it reached land (cold air will warm upon reaching land, holding on to any remaining moisture and creating arid conditions, e.g. Southern California, southwestern Africa.

- **Slides 24-25: Topographic Barriers.** The orientation and height of topographic barriers (mountains and high plateaus) play a major role in climate development. Some block the flow of air and moisture; some divert air and moisture; and some trigger precipitation to create a wet side (windward wet) and a dry side (lee side dry, also called rain shadow). Note the location of some of the world's deserts and semi-deserts in relation to topographic features. **Review orographic precipitation**.

- **Slides 26-28: Elevation.** Height above sea level affects local climate. Temperature lapse rate is 3.5°F/per thousand feet; cools as you ascend and warms as you descend. Also, the higher the elevation, the greater the effect that topographic feature will have on an area, intercepting moisture on the windward side and creating a rain shadow on the lee side. Elevation creates a unique circumstance called "***vertical zonation of climate***." This means that conditions of temperature and precipitation change as you travel up the side of a large, high landform. This is evident in the sequence of natural vegetation along the side of the landform. The greatest number of zones are found in tropical areas where there are "A" climate characteristics at sea level and "E" climate characteristics at the summit. In polar areas there is only one climate zone present because the "E" characteristics start at sea level. The zones have Spanish-language names because this sequence was first identified and studied in the Andes Mountains.

- **Slide 29: Air Masses.** This climate control imparts unique characteristics of temperature and moisture to land masses. Air masses are sections of the atmosphere that are influenced by earth-sun and earth-environment influences. There are about 15 air masses which are identified by their source areas (continental or maritime or equatorial) and their characteristics (wet or dry; hot or cold). Each location is more or less permanent, but they do shift location with the seasons as well as expand and contract in size. These become the daily weather-makers associated with the climate.

- **Slide 30:** Summary of climate controls. Review the content of the link at the bottom of the slide.

- **Sides 32-34: Climate changes naturally.** Global climate change has occurred throughout earth's existence. There is evidence in the geologic record of periods of global warming and global cooling (Ice Ages). Global warming melts frozen water at the poles and at mountain tops causing sea level to rise. Global cooling store water in the form of snow and ice causing sea level to drop and exposing the shallow portions of the ocean floor. Review the videos showing potential changes in sea level due to global warming and how mountain glaciers would shrink in extent.