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 18: Earth Resources

- **The focus of Lecture 18 is the earth's natural resources.** It also looks at environmental pollution which is a result of both the waste products converting earth resources to tangible items and the discarding of these items after they are no longer useful.

- **Slide 5:** Here we are introduced to some basic concepts of earth resources and usage. As defined, a **natural resource** exists in the physical environment and its value is determined by people. A tangible resource is one that can be touched and moved; they can be returned to nature. An intangible resource is more of an abstraction, as the value placed on sunlight, air, scenery or a quiet place. Actual value depends on its scarcity and need (supply and demand). It is important to realize that world resources are unevenly distributed naturally and thus lending itself to become a player in geoeconomic and geopolitical scenarios. A **potential resource** has limited or no value at present but may be valuable in the future. For example, rare earth minerals and today's electronics or early 1900s natural gas (considered a nuisance at oil wells) now a most valuable resource for its clean energy. **Resource management** is the way a resource is viewed and assessed with the goal of determining its viability in the future.

- **Slides 6-8:** Hand-in-hand with resource use is (a) studying what happens to them after they have been utilized by people and then discarded and (b) studying the biproducts of the processes that transformed them. The photos show water and air pollution. (Steam may be considered air pollution because of its high temperature and any material suspended within it.) The graphs on these slides look at waste generation and disposal of major sources of waste over the years. Notice that the amount sent to landfills has decreased (except for plastics and food wastes) and the greatest gains is in the recovery of paper products. Dumping food waste is not as bad as dumping plastics because food decomposes over time and may become the source of methane extraction for energy production.

- **Slide 9:** Here we define **pollution.** Note that extremes of heat and cold added to the environment may be considered to pollute that environment; this is especially for waste water discharged back to nature from processing and energy production activities. Landfills are considered to be sources of pollution when not properly con-

structed and maintained. Types of pollution include land surface (soil), surface and underground water, visual (not scenic), and olfactory (smell).

- **Slide 10:** This is a link to a *NY Times* article (10/10/2019) discussing emissions from fuel-burning vehicles. The map plots CO_2 emissions but looks like a map of urbanization. (Sign up for free NYT access using your HC email address or enter via HC Library.)

- **Slides 11-12:** Based on the mantra of waste management efficiency as displayed in the upside-down pyramid (slide 11), here are illustrations of how waste may be used to create energy. *View the 2 min video of the Fresh Kills landfill on Staten Island.*

- **Slides 13-19 focus on natural resources.** They can be divided into 3 groups: renewable, non-renewable and land/biological.

- **Slide 13:** In the **renewable category,** we can look at 2 groups: **(a) perpetual** – those whose supply appear endless and work without human intervention, as solar, wind, tides, waves and geothermal; and **(b) potential** – those whose supply to produce energy seems endless if properly utilized but need people to do something to make them work as soil, wood, biomass and water. The top photos show wind and solar energy production. The bottom diagrams illustrate using moving water to produce electricity (hydroelectric power) and types of biomass available. *View the 2-minute video on **tidal** energy.* In the **non-renewable or geologic category,** we have the items produced by nature over a period spanning hundreds-of-millions of years and are deemed valuable by people. The subgroups are the fossil fuels, metallic ores, minerals, and precious and semi-precious stones. The maps on **slides 14 and 15** show the uneven distribution of certain commodities. *(Remember that industrialized countries need either to mine the commodities locally or be able to procure them. Many third world countries have neither ability. During the colonial era, powerful and rich countries were able to secure the material they needed by force or money (geoeconomics/geopolitics. This is still true in the 21st century).*

- **Slide 16** continues the topic of uneven distribution and also brings back the theme of "potential resource" but not for energy: in the early 1900s who knew anything about sophisticated electronics and the great need for rare earth minerals in the early 2000s (2000-present).

- **Slide 17 talks about hydraulic fracturing or "fracking."** New technologies in mining have created techniques to get to and extract natural gas and petroleum from areas once deemed depleted. Once a very promising and highly touted method, it is now banned in many locations due to serious environmental issues. *View the 5-minute video on the technique and its problems*.

- **Slides 18-19** address **land and biological resources** which includes food production. Land resources form the basis of terrestrial biomes and their flora and fauna. The last two (natural vegetation and natural wildlife) are our ancestral food supplies. The top map is an assessment of world soil quality and the bottom map locates the forests of the world. The effect of global climate change on our food resources is important as are the types of food resources available at a location and the develop-

ment of human cultural groups. *Domestication of wild plants and animals (our original food resources) by people was an important event in the human timeline and human cultural development.*

- **Slides 20-21** return to the theme of "resource management" - defined as the conscious evaluation and consumption of an earth resource for present and future usage. **Sustainable development** takes this one step further. It is defined as seeking a balance between the needs of people and protecting nature: *Take what you need, use it wisely, do not waste it and nature will have more of it when you need it again.* The ***"tragedy of the commons"*** refers to an attitude that one person's contribution (use of an item/polluting action) will not matter. But yet as we have seen over history and especially in the last 100 years, many people with this attitude create a problem: creating various types of pollution, diverting too much water, killing too any wild animals, urban expansion, etc. In response to this "tragedy" we seek to right the situation by promoting strategies that ask us to **reuse, replace and conserve** items that use natural resources and in doing so, to protect our environment.

- **Slides 22-27: Water resources.** Water issues (volume/quality/distribution/dependability) are something that affects most of the world's people – rich or poor, rural or urban, tropical or subarctic. The map and pie graph (Slide 22) show uneven distribution of water availability and also how fresh water is used. *View the video on the desalinization process (2 min).*

- **Slide 23:** Here we are looking at a **generalized diagram of groundwater**. Know the terms listed. The level of the water table is a variable of precipitation received, surface water seepage and extraction by people. Where the water intersects the surface a lake, marsh or spring may form. Well-pumping creates a *cone of depression* in the water table as shown in the upper right diagram and on slides 26-27.

- **Slides 24-25: Long Island Groundwater.** Nassau County and Suffolk County on Long Island has the largest population in the US that is totally dependent on groundwater for residential and commercial water supply. Western Long Island (Brooklyn and Queens) in the early 1900s depended on groundwater too, but soon the population was so large that the NYC water supply distribution system (that taps water from the Catskills) had to be extended into Brooklyn and Queens. However, there is not enough water in the Catskill to satisfy the needs of Nassau and Suffolk counties. Therefore, Nassau and Suffolk counties must use water from aquifers **(slide 24)** to provide freshwater to its residents.

  The major problem and concern for Long Island is that it is surrounded by salt water. When too much freshwater is withdrawn, it gets replaced by salt water naturally. Remember in nature nothing exists in a vacuum, so when fresh water is removed (lower pressure) it will be replaced by surrounding salt water (higher pressure). The **saltwater interface (slide 25)** moves back and forth with the amount of water pumped out of the ground and the amount of rainfall received or treated water put back into the ground (water replacement is called "recharge"). *View the 1.5-min. California example of dealing with the saltwater interface.*

- **Slide 26** shows how groundwater is lowered when pumping is at a faster rate than recharge and also shows cones of depression forming around well bottoms. When the water table sinks below the well bottom the well is “dry.” Once pumping is slowed or stopped, the cone will fill up with water and the water table rises. Dry well become wet wells again.

- **Slide 27** shows four examples of how groundwater can be contaminated by waste water. Follow the arrows in each diagram. *When buying property in rural areas always be aware of what is uphill of you! You don’t want be drink your neighbor’s waste water or water passing through a landfill site or cemetery.*