**Chapter 1 – Reading Questions**

1. What is the importance of studying *systems* in environmental science? Why can’t we just study isolated events or isolated individuals?
2. Tool use and social cooperation have allowed humans to alter their environment enormously. How would these traits help *Homo Sapiens* in these scenarios:
   1. Hunting in 10,000 BC?
   2. Surviving in very cold climates today?
   3. Responding to the discovery a huge asteroid that will crash in to the Earth in a few years?
3. So far in history, technological development has led to both increased human well-being and increased environmental disruption. Why has this been the case?
4. For each of the following environmental indicators, explain which direction it is trending and why it important to measure that indicator:
   1. Biodiversity
   2. Food Production
   3. Global Surface Temp & Atmospheric CO2 concentration
   4. Human Population
   5. Resource Depletion
5. List what you think are the 3 BIGGEST ways in which humanity has transformed nature, and evaluate what you think their benefits to us and their impacts on the environment have been.

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|  | **Benefits** | **Impacts** |
| **a.** |  |  |
| **b.** |  |  |
| **c.** |  |  |

* 1. *Agriculture (40% of land area! Role in so much… land conversion, biodiv loss, Pollution)*
  2. *Cities/urbanization/industrialization (progressive concentration of resources/energy)*
  3. *Mining (resource extraction incl FF & lumber; discovery/recovery of wealth in nature)*
  4. *Biodiversity Loss (even early humans! And accelerating)*
  5. *Climate Change (just beginning, but potentially enormous long-term impacts)*
  6. *Many more, but hard to argue they’re bigger than these ^*

1. There are at least 2 million species on Earth, and species have been naturally evolving and going extinct for billions of years (in fact, over 99% of all species that ever existed are now extinct!). Given these facts, why do we care if human activity is driving other species extinct as we grow?
   1. *Sudden changes can undermine large systems; disruption to Ecoservices; ethical responsibility to life; “we are all better off when we are all better off”*
2. Humanity’s ecological footprint is already overburdening the Earth, but, approximately 1/3 of the world population lives on less than $2 per day. What are some possible solutions to providing sufficient resources for everyone without causing ecological collapse?
   1. *Slow pop growth; reduce consumption; Renewable Energy; Sustainable farming; Zero-Waste; Carbon Capture; General tech development; shifts in consumer behavior; Govt Policy Shifts; Conservation; Remediation; awareness; global mindset; public & consumer pressure!*
3. Why are both natural AND controlled experiments necessary to increasing scientific understanding, and how do their roles in the scientific process differ?
   1. *Controlled to test specific ideas under specific conditions; more certainty; fine-tuning*
   2. *Natural to do what cannot be simulated; unexpected results & black swans; observation*
4. Environmental Science is interdisciplinary, in that it includes life sciences, natural sciences, and social sciences to study the interactions of living, nonliving and uniquely human systems to understand the world. How does this blending present both challenges and opportunities to environmental scientists?
   1. *Many lenses, many stakeholders, many options, many impacts… the ultimate complex system! Building a full picture; synthesizing from disparate insights; account for human needs*
5. What are the goals of the environmental justice movement, and why are they relevant to sustainability?

**Chapter 1 Vocabulary List**

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| Environment | The sum of all the conditions surrounding us that influence life. |
| Environmental Science | The field of study that looks at interactions among human systems and those found in nature. |
| System | Any set of interacting components that influence one another by exchanging energy or materials. |
| Ecosystem | A particular location on Earth distinguished by its mix of interacting biotic and abiotic components. |
| Biotic | Living. |
| Abiotic | Nonliving. |
| Environmentalist | A person who participates in environmentalism, a movement that seeks to protect the environment through lobbying, activism, and education. |
| Environmental Studies | The field of study that includes environmental science, environmental policy, economics, literature, and ethics, among others. |
| Ecosystem Services | The process by which natural environments provide life-supporting resources. |
| Environmental Indicators | An indicator that describes the current state of an environmental system. |
| Sustainability | Living on Earth in a way that allows humans to use its resources without depriving future generations of those resources. |
| Biodiversity | The diversity of life forms in an environment. |
| Speciation | The evolution of new species. |
| Background Extinction Rate | The average rate at which species become extinct over the long term. |
| Greenhouse Gases | A gas in Earth’s atmosphere that traps heat near the surface. |
| Anthropogenic | Derived from human activities |
| Development | Improvement in human well-being through economic advancement. |
| Sustainable Development | Development that balances current human well-being and economic advancement with resource management for the benefit of future generations. |
| Biophilia | An appreciation for life. |
| Ecological Footprint | A measure of how much an individual consumes, expressed in area of land. |
| Scientific Method | An objective method to explore the natural world, draw inferences from it, and predict the outcome of certain events, processes, or changes. |
| Hypothesis | A testable theory or supposition about how something works. |
| Null Hypothesis | A statement or idea that can be falsified, or proved wrong. |
| Replication | The data collection procedure of taking repeated measurements |
| Sample Size | The number of times a measurement is replicated in the data collection process. |
| Accuracy | How close a measured value is to the actual or true value. |
| Precision | How close the repeated measurements of a sample are to one another. |
| Uncertainty | The sum of all the conditions surrounding us that influence life. |
| Inductive Reasoning | The field of study that looks at interactions among human systems and those found in nature. |
| Deductive Reasoning | Any set of interacting components that influence one another by exchanging energy or materials. |
| Critical Thinking | A particular location on Earth distinguished by its mix of interacting biotic and abiotic components. |
| Theory | Living. |
| Natural Law | Nonliving. |
| Control Group | A person who participates in environmentalism, a social movement that seeks to protect the environment through lobbying, activism, and education. |
| Natural Experiment | The field of study that includes environmental science, environmental policy, economics, literature, and ethics, among others. |
| Environmental Justice | The process by which natural environments provide life-supporting resources. |