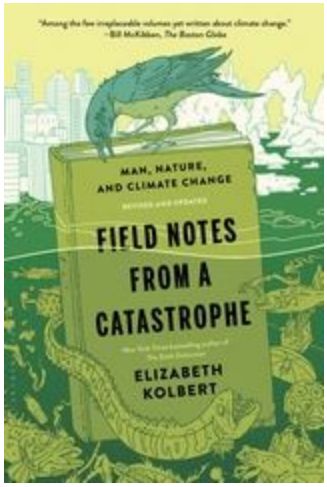
ASSIGNED Summer READING: "Field Notes From A Catastrophe", by Elizabeth Kolbert:
2015 edition- Paperback or Kindle version



https://www.amazon.com/Field-Notes-Catastrophe-Nature-Climate-ebook/dp/B00R9D5SE4/ref=dp_kinw_strp_1

First and Foremost: READ the Book, the **whole** book.
"Content without Context is unusable knowledge!"- K. Bradley
This assignment is due the first day of school regardless of whether you have this class first or second semester!

The questions I'm going to ask you to answer are relevant to the curriculum and/ or to your understanding of why she has written this book.

Your answers should be as complete as possible. Be detailed, if your answer is too vague it will be marked wrong.

Follow this format when completing your assignment:

- Put all of your work in a single subject **notebook (preferably a composition notebook)**.
- **Title** each chapter ("introduction")
- **Number and write** down each question (you can tape them into your notebook).
- Fully **answer** each question.
- At the end of each Chapter **use one whole page** in your notebook to **draw** something that represents what the chapter was mainly about. Label your drawing as needed so I

know the point you are trying to make. (Food chains and biogeochemical cycles are examples)

The questions to be answered will be attached to this google doc and posted on my blog by :June 14th, 2017 (the last day of this school year for teachers)
http://kbradleyscienceclass.blogspot.com/

I'm attaching the questions as I go through each chapter-I'm out of town for professional development in a location with NO WiFi so I can only upload material when I have a chance to drive into town.

Remember all answers are to be handwritten and the questions for each chapter should be taped or written in your notebook ahead of your answers.

Your answers should ONLY come from this book unless otherwise directed. Trust me- it will actually be easier (and quicker) to just read the book and answer as you go.

Chapter 1

1. When did the first major study on climate change occur and what was the conclusion?
2. What was concluded about the glaciers in Glacier National Park?
3. How does the author describe permafrost and how deep is the permafrost in Siberia?
4. What are thermokarsts and how are they managed?
5. Why does the melting permafrost matter to everyone (not just the people living in Alaska)?
6. How are the temperature levels within the permafrost an indicator of how the climate is changing and why are they a better indicator than air temperatures?
7. Explain the process of cryoturbation.
8. How can you tell the difference between seasonal ice and perennial ice? Explain how this is possible.
9. Explain what "Albedo" is, describe how the albedo level can change and why it's important.

Caution - Independent research-NOT FOUND IN BOOK

10. Describe a positive and a negative feedback loop. (She's discussing one in this chapter but she doesn't actually explain what these loops are so you'll have to research this answer online).

Chapter 2

1. Describe the Irish physicist John Tyndall and his contribution(s) to science.
2. Describe how the greenhouse effect works.
3. What was Arrhenius' research focused on, what did he predict would happen and when did he make this prediction?
4. What is the Keeling Curve?
5. Explain why the line looks like teeth on a saw and not just a smooth line.
6. What is the current CO2 level?

Caution -Independent research-NOT FOUND IN BOOK

7. What is 350.org and why is it called that?
https://350.org/about/

Chapter 3

1. What is the "equilibrium line"
2. How much of the Earth's fresh water comes from Greenland?
3. How is snow in Greenland considered "a relic of the climate that first formed it"?
4. Why does melting sea ice NOT affect sea level?
5. Why does the ice sheet actually RISE in the summer?
6. Explain the positive feedback loop discussed in this chapter.
7. What is the energy engine for the world's climate and how does it work?
8. What are the 8 Arctic nations and what did their "executive summary say about the climate?

Caution - Independent research-NOT FOUND IN BOOK

9. What is silt?

Chapter 4

1. List and Describe the two main types of butterflies.
2. What evidence was used by scientists in the 1800's to infer that species relocated in response to climatic changes?
3. What is the insect version of hibernation called and what determines when it occurs in the species of insect being studied?
4. What two things in this chapter can lead to an animal changing its routine?
5. What is it called when genes change as a result of environmental pressures?

6. How long did it take for the golden toad to go from abundant to extinct?
7. Explain how climate is multivariate.
8. What organisms will have an evolutionary advantage in this hotter world?
9. How have humans "diminished" the planet?

Caution - Independent research-NOT FOUND IN BOOK

10. – 15. Chris Thomas states he is concerned about whether or not current ecosystem services will continue since we have changed so many of Earth's current biological systems. What are some ecosystem services currently being provided by organisms? (there are many so list and explain a few)

Chapter 5

1. What societies are theorized to have collapsed from natural climate variations and what evidence is there to support the theory?
2. What did James Hansen discover about Venus' atmosphere?
3. What two types of equations go into a climate model?
4. Why does Hansen's team run climate models on past climates?
5. A third of the rise in global temperatures is related to greenhouse gases, what are the other "indirect" effects that contribute the rise in temperature?
6. How is water availability measured?
7. What did Rind's model predict would happen if the CO_2 levels were doubled?
8. How can scientists tell what the temperature of the Ocean was a given time in history?
9. Changes in Earth's orbit can lead to climate changes, but how long does that take?
10. How can less vegetation lead to less rain?
11. What seems to be a precondition to the development of culture and society?

Look up (or google) and Define these terms:

12. Anthropogenic
13. Evapotranspiration

Chapter 6

1. Explain why the public service campaign called " The Netherlands lives with water" was needed.
2. Explain the multiple causes of flooding that result from global warming.
3. What does DAI stand for and list the examples given?
4. What significant findings resulted from the analysis of the Vostok core?
5. What structures have been developed to replace RV homes along the river?

Chapter7

1. What does BAU refer to?
2. How much CO_2 is produced from each of the fuel types listed in this chapter?
3. What will ultimately determine the rate at which China ends up producing CO_2 in the future?
4. What is the CO_2 level estimated to be by 2100?
5. What are a few of the "wedges" discussed in the chapter?
6. What has happened to the fuel efficiency of cars since the 1980's?
7. How can CCS be accomplished?
8. What other gas did we successfully limit by imposing a cost on companies for emitting it and why did we (government) do this?
9. Where do Hoffert and Socolow disagree? (explain the concept)

Chapter 8

1. Who are the Annex I nations?
2. What gases were to be regulated under the Kyoto protocol (treaty)?
3. What is the Byrd- Hagel resolution?
4. What was the goal of the "Global Climate Coalition" and who funded it?
5. How do Americans compare to other nationalities when it comes to per capita greenhouse gas emissions?
6. What did the Montreal Protocol accomplish?
7. How does the concept of measuring "greenhouse gas intensity" differ from the measurements of general greenhouse gas emissions?
8. What is the view of the "Greening Earth Society" and who runs this group?
9. What did Oreskes determine about the scientific consensus on anthropogenic causes of climate change?
10. Why is it so important the America, more than any other country, support global movements to reduce greenhouse gas emissions?

11. Throughout this chapter the author informs us of things that happened behind the scenes that were meant to confuse and/ or mislead the American public. Discuss one of these and tell me your opinion of the event.

Chapter 9

1. What are a few things that the community of Burlington is doing to reduce its energy consumption?

2. How are Mayors around the country making a difference when it comes to greenhouse gas emissions?

3. Why is it so important to make sure that China handles their growth better than we did and what sorts of things should they be doing?

4. What practical reason is there for America to lead the way in terms of clean energy and sustainability even if our government doesn't mandate it?

Chapter 10

1. What epoch do scientists feel we are currently in and how can it be considered a new epoch?

2. What leads to the destruction of stratospheric ozone and how exactly does it do this?

3. The author discusses a lag time between our release of greenhouse gases and the effects of this release. What does she say will happen even if we stop emitting these gases now?

4. How do "feedbacks" factor into the problems with climate change?

Chapter 11

1. What will be the long-term effects of the "irreversible retreat" of the Antarctic Ice Sheet?

2. List out 4 of the unavoidable signs of climate change the author discusses.

3. Why are so many Americans still in doubt about whether or not climate change is a human caused event?

4. Why is ocean acidification a bad thing? (support this answer with several explanations from the chapter)

5. What are tar sands, where are they located and how are they harvested?

6. Why is it highly unlikely that we will be able to keep C02 levels from going over 2 degrees Celsius?

Chapter 12

1. What did Fabry notice about her Pteropods when she kept too many of them together in a confined area?

2. Since the industrial revolution humans have been emitting CO2 at ever increasing levels, what is the expected CO2 concentration in 2050 and what problems will this cause?

3. How much of our CO2 emissions has been absorbed by the ocean and what does it turn into?

4. Why is a .1 drop in pH a significant amount?

5. When we burn wood or fossil fuels we create heat. In the process of burning these carbon-based fuels we release carbon that will in -turn absorb or trap heat. Every molecule of CO2 released absorbs _____times more heat than it emitted when burned.

6. Sea water is naturally alkaline, adding CO2 reduces alkalinity. How is this a problem for organisms that need to build shells to stay alive?

7. Explain Caldeira's findings and tell what he suggests we should do about CO2 emissions.

8. Why did the Biosphere (1) project fail?

9. Explain the structure and physiology of corals and how they are connected to the reef and each other.

10. Why can't corals migrate in response to climate change?(there are multiple reasons)

11. Give some examples of calcifying organisms.

12. What are the two most important factors for organisms that live on land versus organisms that live in water?

13. How do Paleooceanographers know anything about the history of the oceans?

14. How does temperature tend to affect the evolution of organisms?

15. Why won't the seas' natural buffering capacity be as effective now as it was during the PETM?

Chapter 13

1. How much money is being invested into the Fort McMurray area to further develop the area for tar sands extraction?

2. What is this monster truck used for? (Caterpillar 797B)

3. What do they call the material that is moved so that they can access the tar sands and what does it contain?

4. How much Bitumen is found in each truck load of the tar sands?

5. What happens to the water used during the separation process and what does it contain?

6. Explain the process of In-situ extraction and tell how much energy it takes to do this.

7. Describe some of the destructive events that have occurred as a result of oil extraction.

8. Explain the concept of "externalities". If you were to estimate these costs along with the cost of obtaining fossil fuels (of any kind) does using fossil fuels still seem economically feasible?

9. What is special about the ecosystem bordering the Fort McMurray area and how is the tar sands extraction affecting this area?

Chapter 14

1. What was the island of Samso capable of creating?

2. Where does all of the CO_2 in the atmosphere actually go?

3. How is China dealing with its increased energy needs?

4. What two things lead to the islanders changing their energy sources?

5. How were the turbines financed?

6. What's the difference between burning biomass and burning fossil fuel in terms of CO_2 emissions?

7. What is the 2000 Watt society?

8. How is the Eawag center heated what makes it possible?

9. What's cool about the toilets in the Eawag center?

10. What society uses the most Watts per person and what society uses the least Watts per person?

11. How is technology both a problem and a solution when it comes to energy consumption?

12. Write the quote from Sheikh Yamani.

13. What was the most important thing to cut when trying to maintain a 2000 Watt life?

14. What percent of GDP would be needed to make the infrastructure changes required to reduces CO_2 levels and how does that percent relate to our current spending on efforts to obtain and transport Oil?

15. When did James Hansen first inform us of the threats associated with climbing CO_2 levels?