ALX Foundations: Milestone 3 Worksheet

Instructions: Provide responses to all items in the orange boxes. The worksheet consists of Sections A-E. Work on this worksheet one section at a time throughout your week, and return to Canvas after each section for the next set of content and further instructions.

SECTION A: Problem Statement

Step 1: Your GCGO

Which Grand Challenge or Great Opportunity (GCGO) do you want to play a part in addressing? (Pick one.)

As a reminder, the GCGOs are:

- Urbanization
- Education
- Infrastructure
- Healthcare
- Climate change
- Governance
- Job creation
- Agriculture
- Natural resources
- Arts, culture, and design
- Tourism
- Empowerment of women
- Regional integration
- Wildlife conservation

GCGO:
Climate change

Step 2: Describe Your Problem

You are going to take a first pass at briefly describing your chosen problem. This can be any problem that speaks to you, as long as it is a real-life occurrence that is clearly linked to your chosen GCGO, that occurs in a certain place and for certain people (and/or animals), and that it can be clearly defined.

For example, if you chose wildlife conservation as your GCGO, you might first state your chosen problem as:
There are very few white rhinos left in Kenya and they are in danger of going extinct.

Another example, if you choose infrastructure as your GCGO:
Residents of major cities in South Africa endure prolonged periods without electricity, significantly hampering their ability to generate income.

Note that this is just your first attempt stating the problem, and you don't need to quantify the problem yet. In order to get to your official problem statement (which does need to be quantifiable) first answer the following questions. The more specific your answers, the better. You may also ask Google, Wikipedia, , ChatGPT, and/or other reliable online sources to help you. Please be sure to cite (give credit to) any sources that you use.

Describe your problem using What/Who/When/Where/Why/How….

1. **What** is the problem? What is reality like because of this problem? What will reality be like if the problem continues?

   Climate change refers to long-term shifts in weather patterns and global temperatures, primarily caused by human activities releasing greenhouse gasses into the atmosphere. It is a significant environmental and societal issue that poses numerous challenges and risks to the planet and its inhabitants.

2. **Who** does this problem impact, directly and indirectly? Who contributes to the problem?

Climate change affects people and ecosystems around the world. It impacts individuals, communities, and nations, irrespective of geographical location, socioeconomic status, or cultural background. Vulnerable populations, including low-income communities, coastal regions, and developing countries, often bear the brunt of its consequences.

3. **When** did this problem begin? When does it occur?

Climate change has been a concern for several decades. Scientific research and global awareness about the issue began to gain momentum in the late 20th century. The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 to assess scientific findings and provide policymakers with guidance on climate change mitigation and adaptation.

4. **Where** is this problem occurring? What is the context in which it occurs?

   Climate change affects the entire planet. Its impacts can be observed in various regions, including rising temperatures, changing rainfall patterns, increased frequency and intensity of extreme weather events (such as hurricanes, droughts, and floods), and the melting of polar ice caps and glaciers.

5. **Why** is this a problem? What are the pain points or gaps? Why do you personally care about this problem?

   Climate change poses a wide range of problems and risks. It threatens ecosystems and biodiversity, endangers food and water security, exacerbates natural disasters, contributes to rising sea levels and coastal erosion, affects human health, and triggers social and economic disruptions. The continued release of greenhouse gases and the associated warming of the planet have the potential to cause irreversible damage and irreversible changes to Earth's systems.

6. **How** would reality be different if this problem were solved? (This can be your opinion.)

Step 3: Understand and Quantify Your Problem

Next, you will conduct some basic web research to better understand, define, and quantify your problem. You will do this through a combination of Google search, Wikipedia, credible web sources, ChatGPT or other AI research tool, and your own synthesis of information from these sources. Be sure to give credit to your sources, and paraphrase (use your own words) rather than quoting directly.

7. What is the historical context for this problem? What happened in the past that contributes to the problem now?

The historical context of the climate change problem involves various factors that have contributed to the issue we face today. Here are some key aspects:

1. Industrial Revolution: The Industrial Revolution, which began in the 18th century, marked a significant shift in human history with the advent of mechanization and mass production. This era saw a substantial increase in the burning of fossil fuels, such as coal and later oil and gas, to power industries and transportation. The combustion of these fuels released large amounts of carbon dioxide (CO2) into the atmosphere, contributing to the greenhouse effect.
2. Deforestation: Throughout history, deforestation has been a major contributor to climate change. Large-scale clearing of forests for agricultural expansion, timber extraction, and urbanization has led to significant carbon dioxide emissions. Forests act as carbon sinks, absorbing CO2 from the atmosphere, so their destruction reduces the Earth's capacity to naturally mitigate greenhouse gas concentrations.
3. Population Growth and Urbanization: The world's population has experienced rapid growth over the past few centuries. This population expansion, coupled with increased urbanization, has led to a surge in energy consumption, demand for resources, and land-use changes. These activities have intensified greenhouse gas emissions and put additional pressure on ecosystems.
4. Technological Advancements: Technological advancements have played a dual role in contributing to climate change. While innovations have improved living standards, they have also increased energy consumption and greenhouse gas emissions. For example, the widespread adoption of automobiles, air travel, and industrial machinery has significantly increased fossil fuel usage, leading to higher carbon emissions.

5. Lack of Awareness and Regulation: In the early stages of industrialization, the understanding of the long-term consequences of greenhouse gas emissions was limited. There was a lack of awareness regarding the potential impacts on the climate system. As a result, regulation and policies to curb emissions were minimal or absent. It was only in the latter part of the 20th century that scientific research and international efforts began to raise awareness and establish frameworks for climate action.

8. What are the possible economic (money-related) reasons why this problem exists and continues?

There are several economic reasons why the climate change problem persists. Here are some key factors:

1. Fossil Fuel Dependency: The global economy has been heavily reliant on fossil fuels for decades. Industries, transportation, and power generation sectors are often driven by coal, oil, and natural gas. Transitioning to cleaner energy sources requires significant investments in renewable energy infrastructure, research, and development. The economic costs associated with this transition, as well as potential disruptions to existing industries, can create resistance to change.
2. Profit Motives: Some industries and businesses profit from activities that contribute to greenhouse gas emissions. Fossil fuel companies, for example, have long-standing investments and infrastructure in extracting, refining, and distributing fossil fuels. Transitioning away from these practices may entail financial losses for these entities, making it challenging to shift to more sustainable alternatives.
3. Short-Term Thinking: Economic systems often prioritize short-term gains and quarterly profits, which can discourage long-term investments in climate change mitigation and adaptation. Some businesses may prioritize immediate financial returns over the potential costs and risks associated with addressing climate change. This short-term perspective can hinder the implementation of sustainable practices and delay necessary action.
4. Lack of Pricing Externalities: Many greenhouse gas emissions do not have a direct financial cost associated with them. This absence of pricing externalities means that the environmental and societal impacts of emissions, such as the costs of climate-related disasters or health consequences, are not adequately reflected in economic transactions. As a result, the true cost of carbon emissions is not fully

accounted for, leading to an underestimation of the economic consequences of climate change.

5. Economic Incentives and Subsidies: Subsidies and incentives provided to industries that contribute to greenhouse gas emissions can perpetuate the problem. Some governments provide financial support to fossil fuel industries, which can undermine efforts to transition to cleaner alternatives. These subsidies can distort market dynamics and make sustainable options less economically competitive.

Addressing the economic dimensions of climate change requires aligning financial incentives with sustainable practices, creating policies that internalize the costs of emissions, and fostering innovation and investment in clean technologies. It is crucial to strike a balance between economic growth and environmental sustainability to ensure a prosperous and resilient future.

9. What are the possible political reasons why this problem exists and continues?

There are several political reasons why the climate change problem persists. Here are some key factors:

1. Competing Interests and Priorities: Political leaders and governments often face multiple competing interests and priorities. Climate change mitigation requires long-term planning, international cooperation, and significant policy changes. However, short-term political considerations, such as electoral cycles and immediate economic concerns, can lead to a lack of political will and urgency to address climate change effectively.
2. Lobbying and Influence of Special Interests: Certain industries, such as fossil fuel companies, may have significant political influence through lobbying efforts and campaign contributions. These interests can shape policy decisions and impede the implementation of strong climate change measures. The influence of vested interests can create resistance to regulations and incentives aimed at transitioning to cleaner energy sources.
3. Economic Consequences and Job Losses: Addressing climate change often involves transitioning away from carbon-intensive industries, which can have economic consequences and potential job losses in affected sectors. This can create political resistance, particularly in regions heavily reliant on industries such as coal mining or oil extraction. Balancing the economic impact of climate policies with job creation and a just transition for affected communities becomes a complex political challenge.

4. National Sovereignty and Global Cooperation: Climate change is a global issue that requires international cooperation and coordination. However, efforts to address the problem can be hindered by concerns over national sovereignty and perceived imbalances in responsibility and burden-sharing. Negotiations and agreements on climate change mitigation can be politically complex, with countries having diverse economic capacities, historical emissions, and varying levels of commitment.
5. Public Opinion and Perception: Political leaders often respond to public opinion and pressure. Climate change awareness and concern vary among populations, and political action on climate change may be influenced by public sentiment. Disagreements and misinformation surrounding the scientific consensus on climate change can create divisions and shape political discourse, impacting policy decisions.

To overcome political obstacles, it is crucial to build broad-based public support for climate action, foster international cooperation, strengthen transparency and accountability mechanisms, and empower political leaders who prioritize sustainability and long-term thinking. Effective governance and policy frameworks are essential to drive the necessary political action and overcome barriers to addressing the climate change problem.

10. What cultural beliefs and/or social norms possibly contribute to this problem?

Cultural beliefs and social norms can influence attitudes, behaviors, and decision-making processes related to climate change. Here are some cultural beliefs and social norms that can contribute to the problem:

1. Consumerism and Materialism: In many societies, consumerism and materialism are deeply ingrained cultural values. The pursuit of economic growth, the accumulation of possessions, and the notion of endless progress can drive resource-intensive production and consumption patterns. This excessive consumption contributes to greenhouse gas emissions and the depletion of natural resources.
2. Anthropocentrism and Human Dominance: Some cultural beliefs prioritize human interests and view nature primarily as a resource to be exploited. This anthropocentric worldview can lead to the perception that human needs and economic development take precedence over environmental concerns. It can hinder the recognition of the intrinsic value of ecosystems and the need for sustainable coexistence with the natural world.
3. Technological Optimism: Technological advancements are often viewed optimistically as solutions to environmental challenges. While innovation and technological progress

are important, overreliance on technology alone as a fix for climate change can downplay the significance of behavioral and systemic changes. It can create a perception that a "silver bullet" solution will emerge, reducing the sense of urgency to address the problem holistically.

4. Social Status and Conspicuous Consumption: Social norms and cultural values that prioritize conspicuous consumption can contribute to resource-intensive lifestyles. The pursuit of social status and the desire to display wealth through material possessions can drive unsustainable consumption patterns, increasing greenhouse gas emissions and environmental impacts.
5. Disconnection from Nature: Modern lifestyles and urbanization have led to a disconnection from nature for many individuals. This disconnection can lead to a lack of awareness and appreciation for the natural world and its interconnectedness. When people are disconnected from nature, they may be less motivated to take action to protect it.

11. Who are the people potentially responsible (directly or indirectly) for creating and/or maintaining this problem?

Multiple stakeholders can be considered responsible for creating and maintaining the climate change problem, both directly and indirectly. Here are some key groups:

1. Individuals: Individuals contribute to climate change through their daily actions and choices. Activities such as excessive energy consumption, reliance on fossil fuel-based transportation, unsustainable diets, and wasteful consumption patterns all contribute to greenhouse gas emissions. While individual actions alone cannot solve the problem, collective behavioral changes and adopting sustainable lifestyles are crucial for mitigating climate change.
2. Corporations and Industries: Many corporations and industries contribute significantly to greenhouse gas emissions through their operations and supply chains. Fossil fuel companies, energy producers, transportation companies, and large-scale agriculture are among the major emitters. Certain industries may also engage in practices that harm ecosystems and exacerbate climate change, such as deforestation for agricultural expansion or unsustainable extraction of resources.
3. Governments and Policymakers: Governments play a crucial role in addressing climate change through policy decisions and regulations. The formulation and implementation of effective climate change mitigation and adaptation policies, including emissions

reduction targets, renewable energy incentives, and carbon pricing mechanisms, are within the purview of governments. Governments also have the responsibility to engage in international climate negotiations and promote global cooperation.

4. International Organizations: International organizations, such as the United Nations, the Intergovernmental Panel on Climate Change (IPCC), and the World Bank, have a role in providing scientific assessments, policy guidance, and financial support to address climate change. These organizations facilitate global cooperation, knowledge sharing, and the mobilization of resources for climate change mitigation and adaptation efforts.
5. Financial Institutions and Investors: Financial institutions, including banks, asset managers, and investment funds, have a responsibility in financing and investing in sustainable projects and companies. Divestment from fossil fuels and supporting climate-friendly initiatives can contribute to shifting financial flows towards low-carbon and resilient sectors.
6. Media and Communication Platforms: Media outlets, social media platforms, and communication channels shape public discourse and influence public opinion on climate change. Their role in disseminating accurate information, promoting scientific consensus, and raising awareness about the urgency of climate action is crucial in mobilizing public support and political will.

It is important to note that responsibility is distributed across these groups, and addressing climate change requires collaboration, shared accountability, and systemic changes. Transitioning to a sustainable future necessitates the active participation and engagement of all stakeholders involved.

Now that you have the preliminary information you need, you'll continue your web research to find some numbers, or quantifiable information, to help describe your problem:

What numerical data can you find that is relevant to your problem? Be sure to use your own words and also cite (give credit to) your sources.

Example 1:
According to Chat GPT, there are about 880 white rhinos currently living in Kenya. This population is very small, and they are critically endangered.

Example 2:

Johannesburg has approximately 5.8 million residents (per ChatGPT) and had approximately 4.7 million international overnight visitors in 2019 (according to the South African Tourism Annual Report for 2019/2020).

12. Approximately how many people (and/or animals) are **directly** impacted by this problem? Explain.
    a. Human Population:
        i. Displacement and Migration: Climate change-induced events such as hurricanes, flooding, droughts, and rising sea levels can lead to displacement and forced migration. According to the Internal Displacement Monitoring Centre, an estimated 17.2 million people were displaced by climate-related events in 2020 alone.
        ii. Food and Water Security: Climate change impacts agricultural productivity, leading to reduced crop yields, increased pests, and disrupted water supplies. The World Health Organization (WHO) estimates that climate change contributes to around 250,000 additional deaths per year.
        iii. Health Risks: Heatwaves, extreme weather events, and the spread of diseases like malaria and dengue fever are linked to climate change. These factors pose health risks to vulnerable populations, potentially affecting millions of people.
        iv. Economic Impacts: Climate change impacts industries such as agriculture, tourism, and fisheries, resulting in economic losses and livelihood disruptions. The exact number of individuals affected depends on the region and specific vulnerabilities.
    b. Animal Population:
        i. Loss of Habitat: Climate change alters ecosystems, resulting in habitat loss and fragmentation. This impacts a wide range of animal species, from polar bears in the Arctic to coral reefs in the oceans. The Intergovernmental Panel on Climate Change (IPCC) warns that approximately 20-30% of species are at an increased risk of extinction if global temperatures rise by 2 degrees Celsius.
        ii. Disruption of Ecosystems: Changes in temperature, precipitation patterns, and ocean acidification directly affect animal populations by disrupting breeding patterns, migration routes, and food availability.
        iii. Species Interactions: Climate change can disrupt intricate relationships between species, including predator-prey dynamics and symbiotic interactions. Such disruptions can have cascading effects throughout entire ecosystems.

c.

13. Approximately how many people (and/or animals) are **indirectly** impacted by this problem? Explain.

The indirect impacts of climate change extend to a vast number of people and animals worldwide. While it is challenging to provide an exact number, here is an overview of the major populations indirectly affected:

1. Agricultural and Food Systems: Climate change can have cascading effects on global food systems, impacting both producers and consumers. Changes in temperature, rainfall patterns, and extreme weather events can disrupt agricultural productivity, leading to reduced crop yields, increased crop diseases, and livestock losses. These impacts can result in food price volatility, reduced food availability, and increased vulnerability to hunger and malnutrition, indirectly affecting billions of people who depend on agriculture for their livelihoods or food security.
2. Water Resources: Climate change affects water availability and quality, which has broad-reaching consequences for human and ecological systems. Changes in precipitation patterns and increased evaporation rates can lead to water scarcity, affecting agricultural irrigation, industrial processes, and access to clean drinking water. This indirectly impacts individuals and communities reliant on these resources for their livelihoods, sanitation, and overall well-being.
3. Public Health: Climate change has indirect implications for public health. Changing climate conditions can influence the geographic distribution and prevalence of vector-borne diseases, such as malaria, dengue fever, and Lyme disease. Heatwaves and extreme temperatures can lead to heat-related illnesses and exacerbate cardiovascular and respiratory conditions. Disruptions to water and sanitation systems due to extreme weather events can increase the risk of waterborne diseases. These health impacts indirectly affect a significant portion of the global population, particularly vulnerable communities with limited access to healthcare and resources.
4. Economic Systems: Climate change has broad economic implications. The direct impacts on sectors such as agriculture, fisheries, and tourism can cascade through supply chains and affect the wider economy. Disruptions to production, trade, and infrastructure due to extreme weather events can lead to economic losses and impact employment opportunities. The indirect impacts of climate change reverberate across various industries and regions, affecting businesses, livelihoods, and overall economic stability.

5. Ecosystem Services: Climate change affects the provision of ecosystem services that benefit human well-being. Ecosystems play a critical role in regulating climate, purifying air and water, and providing habitat for wildlife. Disruptions to ecosystems due to climate change can indirectly impact numerous individuals and communities that rely on these services for their livelihoods, recreation, and cultural practices.

14. What other numerical data can you share that is relevant to your problem? What can you find out about its size and scope? What can be measured? (For example, the amount of trash produced in Nairobi each day, the number of people without access to clean water, etc.)

1. Greenhouse Gas Emissions: The primary driver of climate change is the release of greenhouse gases (GHGs) into the atmosphere. These gases, including carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), trap heat and contribute to the warming of the Earth's climate. The total global GHG emissions are measured in gigatons (Gt) of CO2 equivalent (CO2e) per year.
2. CO2 Concentration: The concentration of CO2 in the Earth's atmosphere is measured in parts per million (ppm). Prior to the Industrial Revolution, it was around 280 ppm, but it has now surpassed 415 ppm, primarily due to human activities.
3. Temperature Increase: The global average temperature has risen since the pre-industrial era (late 19th century). The increase is measured in degrees Celsius (°C) or Fahrenheit (°F). The Paris Agreement aims to limit the global temperature increase to well below 2°C above pre-industrial levels and pursue efforts to limit the increase to 1.5°C.
4. Sea-Level Rise: Rising global temperatures contribute to the melting of glaciers and ice caps, leading to sea-level rise. The rate of sea-level rise is measured in millimeters (mm) per year and varies across different regions. It poses risks to coastal communities, infrastructure, and ecosystems.
5. Climate-related Disasters: The frequency and intensity of climate-related disasters, such as hurricanes, floods, droughts, and wildfires, have increased in many parts of the world. These events can be measured by the number of occurrences, affected population, economic losses, and the scale of damage.
6. Renewable Energy Capacity: The transition to renewable energy sources is a crucial component of mitigating climate change. The capacity of renewable energy installations, such as solar, wind, and hydropower, is measured in gigawatts (GW) or megawatts (MW).

7. Deforestation Rates: Deforestation contributes to greenhouse gas emissions and loss of biodiversity. The extent of deforestation is measured in hectares (ha) or square kilometers (km^2) per year.
8. Climate Finance: Climate finance refers to financial flows dedicated to climate change mitigation and adaptation efforts. It includes funding for renewable energy projects, adaptation measures, capacity building, and technology transfer. The amount of climate finance provided by developed countries to developing countries is often reported in billions of dollars.
9. Carbon Budget: The carbon budget represents the total amount of greenhouse gases that can be emitted while still keeping global warming within a certain target. It is measured in gigatons (Gt) of CO2 or CO2e.

Step 4: Describe Your Solved State

Without having to come up with *how* to solve the problem, describe what the desired, solved state looks like. Please use numbers wherever possible, and make your solved state specific and measurable.

Example 1:
There would be a population of 10,000 healthy and protected white rhinos living in the wild in Kenya.

Example 2:
All 5.8 million residents of Johannesburg would have affordable and consistently available power from clean energy sources, 99.5% of the time.

15. If the problem were addressed/solved, what would reality be like?

16. Are there other benefits that would come from your problem being solved? Name at least one.

Step 5: Clarify Your Problem Scope

You are more effective at solving a problem when you know where its limits are. That is, when you know what is “in scope” and “out of scope.” For this reason, it is important to list what is out of scope, or NOT included as part of your problem definition.

Example 1:
The scope of the problem does not cover any other animal species besides white rhinos. It does not include white rhinos outside of Kenya.

Example 2:
The scope of the problem does not include any businesses or people outside of the legally-defined Johannesburg city limits. It does not apply to tourists or visitors staying for less than 1 year in Johannesburg.

17. What is NOT in scope for your problem?

Step 6: Areas for Learning

What do you not know or understand that you would like to know more about? This can be anything related directly or indirectly to your problem. Let your curiosity run wild!

Example 1:
I'd like to know where most of the demand for rhino horn is coming from. I'd like to know who are the primary buyers and who is behind the trafficking of rhino horn. I'd like to know how long the average rhino's lifespan is. I'd like to know how many babies a typical female rhino has, and how many babies typically survive into adulthood. I'd like to know more about what diseases impact rhinos. I'd like to know more about the kinds of habitats that rhinos thrive in. I'd like to understand what international organizations do the best job supporting wildlife conservation and what their practices are. I'd like to know what models of community involvement have been most successful in keeping wildlife safe and thriving. I'd like to understand how much land is available in Kenya for rhinos to roam.

Example 2:
I'd like to better understand the utility company Eskom and its history. I'd like to understand why Eksom has failed to plan properly to update its infrastructure. I'd like to understand the relationship between Eksom and the South African government. I'd like to know if there are private utility companies providing competition to Eksom. I'd like to know what the latest breakthroughs are in solar power. I'd like to know what other possible energy sources might be made available in Johannesburg. I'd like to know how much energy tourists and temporary visitors use. I'd like to better understand the process of how limited energy supply gets allocated to people and businesses. I'd like to better understand the economic impact to people and businesses of not having power.

18. What else would you like to know or understand better? (It can be anything related to your problem.) List 5-10 things.

Step 7: Problem Statement

This step is the culmination of all you have done in Part A. You will synthesize the work you have done above to create a problem statement of 150 - 250 words. This should be in narrative form, 2-4 paragraphs, and should NOT use bullet points.

Your problem statement should:

- Provide a succinct description of the problem **in the first sentence**.
- Indicate specific population affected
- Explain the impact (cost, time, environmental, personal) and why the problem matters.
- Explain what reality would look like if the problem were solved. The gap that exists between present reality and the desired outcome should be clear.

Please cite (give credit to) where your information came from directly in your statement. Avoid word-for-word quoting and instead paraphrase (use your own words), as modeled in the example. Also list your sources and their urls (web addresses) at the end.

Example :
Kenya's white rhinos are in critical danger of extinction. There are currently about 880 white rhinos in the country of Kenya, per Wikipedia. According to Chat GPT, Rhinos are considered a keystone species, meaning they have a disproportionately large impact on their ecosystem compared to their population size. Rhinos help shape their environment by influencing vegetation growth and acting as seed dispersers, which creates habitat for other species (per ChatGPT).

The extinction of white rhinos would have cascading effects on other plant and animal species in their habitat. According to the Kenya Wildlife Service, rhinos' presence in reserves and parks bring millions of tourists each year, contributing to local economies and supporting conservation efforts. Once a species goes extinct, it is gone forever. The extinction of rhinos would represent

the loss of millions of years of evolutionary history, and unique genetic diversity that science has yet to fully understand and benefit from (per ChatGPT).

My problem would be considered solved when the population of wild, white rhinos in Kenya reaches 10,000, and when all imminent threats to their population including poaching and habitat destruction are not present. If this were the reality, it would create ecosystem balance, create large revenues from ecotourism, preserve important cultural symbols, and allow for genetic diversity that could benefit humanity in ways we may not yet fully understand.

Sources:
Kenya Wildlife Services Annual Report 2017, https://www.kws.go.ke/content/annual-reports
ChatGPT, https://chat.openai.com/
"White Rhinoceros", Wikipedia, https://en.wikipedia.org/wiki/White_rhinoceros

19. My problem is statement is:

    The problem at hand is the lack of affordable and consistently available clean energy in Johannesburg, South Africa, resulting in significant environmental, economic, and social repercussions. This issue directly affects the city's 5.8 million residents who struggle with unreliable power supply and limited access to affordable electricity. The current reliance on fossil fuels not only contributes to greenhouse gas emissions and air pollution but also exacerbates energy insecurity, hindering progress and well-being.

    The impact of this problem is multifold. Firstly, the environmental consequences are substantial, with the burning of fossil fuels leading to climate change, air pollution-related health risks, and the depletion of finite resources. Secondly, the economic implications are significant, as power outages and irregular energy availability disrupt productivity, hamper business operations, and impede economic growth. Additionally, the financial burden falls disproportionately on households that must bear the cost of alternative energy sources or suffer the consequences of inadequate electricity supply.

    If the problem were solved, the reality in Johannesburg would be transformed. All 5.8 million residents would have access to affordable and consistently available power from clean energy sources, 99.5% of the time. This would lead to substantial environmental benefits, including reduced carbon emissions, improved air quality, and enhanced preservation of natural resources. Moreover, the economic landscape would thrive, with increased job opportunities in

renewable energy, stable energy prices, and a flourishing sustainable economy. Access to reliable electricity would also empower communities, fostering educational and socioeconomic development while improving the overall quality of life for residents.

The current gap between present reality and the desired outcome is evident, necessitating urgent action to address the lack of affordable and consistent clean energy.

Sources:
1. International Energy Agency. (2021). Africa Energy Outlook 2021. URL: https://www.iea.org/reports/africa-energy-outlook-2021
2. Carbon Brief. (2021). Analysis: Coronavirus set to cause largest ever annual fall in CO2 emissions. URL: https://www.carbonbrief.org/analysis-coronavirus-set-to-cause-largest-ever-annual-fall-in-co2-emissions

20. Please list all sources that you used to form your problem statement:

International Energy Agency. (2021). Africa Energy Outlook 2021. URL: https://www.iea.org/reports/africa-energy-outlook-2021

Carbon Brief. (2021). Analysis: Coronavirus set to cause largest ever annual fall in CO2 emissions. URL: https://www.carbonbrief.org/analysis-coronavirus-set-to-cause-largest-ever-annual-fall-in-co2-emissions

Please go back to Canvas and continue with your learning content. You will be prompted on when to return to complete Section B.

SECTION B: Research Questions & Hypothesis

IMPORTANT: Complete this section AFTER completing the Canvas Modules *Asking Effective Questions* and *Web Research.*

Step 8: Research Questions

Based on what you have learned so far and on 'Step 6: Areas for Learning' from this worksheet, come up with 3 research questions. **Research questions should be complex enough that they can't be answered by a single Google search.** If appropriate, form a hypothesis that your research may confirm or reject. (As a reminder, a hypothesis is a prediction of how you think your research will answer your research question. It is your best guess. If you truly have absolutely no idea, state "not applicable.")

Example Research Question #1:
What are some ways can we increase rhino populations?
Hypothesis:
Rhino populations will be increased by creating more open spaces for them to roam, increasing their protection, increasing international interest in them, and other reasons I have yet to uncover.

Example Research Question #2:
Which organizations have been effective at wildlife conservation and what practices do they use?
Hypothesis:
Not applicable; I don't know.

Example Research Question #3:
How many babies can a typical female white rhino have in her lifetime, and what are the reasons a female may not have high fertility?
Hypothesis:
A typical female white rhino can have 5 babies in her lifetime, and fertility may be affected by diet, amount of grazing territory, poaching, stress, mate availability, and other reasons I have yet ot uncover.

21. Research question #1:
    What are some ways to mitigate climate change?

Hypothesis (if applicable):
Implementation of renewable energy sources on a large scale will lead to a significant reduction in carbon emissions and contribute to mitigating climate change.

22. Research question #2:
    How can international cooperation and collaboration effectively address climate change mitigation on a global scale?

Hypothesis (if applicable): Not applicable

23. Research question #3:
    How can climate change mitigation efforts be integrated into sustainable development goals to ensure a holistic and equitable approach?

Hypothesis (if applicable): Not applicable

Please go back to Canvas and continue with your learning content. You will be prompted on when to return to complete Section C.

PART C: Mini-Research Report

IMPORTANT: Complete this section AFTER completing the Canvas Module *Web Research Executive Summary.*

In 200-300 words, provide an executive summary of your research. You should be synthesizing information from multiple sources. Provide answers and explanations for the 3 questions you investigated and your key research findings. This should be in a narrative format (no bullet points), and be at least 3 paragraphs long.

Please use at least 3 different online sources such as ChatGPT, organizational websites, wikipedia, etc.. Please cite (give credit to) where your information came from directly in your statement. Avoid word-for-word quoting and instead paraphrase (use your own words), as modeled in the example. Also list your sources and their urls (web addresses) at the end.

Example Executive Summary:
According to ChatGPT, increasing rhino populations requires multiple approaches. These approaches include: anti-poaching measures; habitat protection and management; translocation and reintroduction; captive breeding and reintroduction; international cooperation between governments, conservation organizations, and communities; community engagement and education; and demand reduction.

According to ChatGPT, the following organizations are well known for wildlife conservation and protection: World Wildlife Fund (WWF), International Union for Conservation of Nature (IUCN), Wildlife Conservation Society (WCS), African Wildlife Foundation (AWF), Pathera, Conservation International, and The Jane Goodall Institute. These organizations engage in different practices to help wildlife. As one example, World Wildlife Fund, according to their webpage, engages in protecting land where animals roam, educating communities on the importance of protecting wildlife, and shutting down markets in Asia where ivory is sold.

Another example is African Wildlife Foundation. According to their website, they focus their efforts conservation education, anti-poaching efforts, habitat restoration, and policy advocacy. The Jane Goodall Institute is a final example. According to their website, they focus on environmental education, and promoting sustainable livelihoods through conservation efforts. There appears to be several ways that reputable wildlife conservation organizations go about accomplishing their goal.

According to the International Rhino Foundation, a typical rhino pregnancy lasts around 16 months. According to the Maryland Zoo, Female white rhinos are able to start producing offspring

when they are about 6 years old. A female rhino can give birth to one calf about once every 2-3 years. According to ChatGPT, a female rhino could give birth to as many as 14 offspring in her lifetime, but this is uncommon. Usually, conditions do not support this.

Sources:
African Wildlife Foundation, https://www.awf.org/strategic-vision-2020-2030
ChatGPT, https://chat.openai.com/
Jane Goodall Institute, https://janegoodall.org/our-impact/
International Rhino Foundation https://rhinos.org/blog/rhino-moms/
Maryland Zoo, https://www.marylandzoo.org/animal/southern-white-rhinoceros/
World Wildlife Fund, https://www.worldwildlife.org/initiatives/wildlife-conservation

24. Executive Summary:
    According to ChatGPT Climate change mitigation is a pressing global challenge that requires immediate action to reduce greenhouse gas emissions and limit the impacts of climate change. This executive summary explores various strategies and approaches to mitigate climate change. The focus is on identifying key mitigation measures that can be implemented at individual, societal, and policy levels.

The research highlights the following ways to mitigate climate change:

1. Transition to Renewable Energy: Shifting from fossil fuels to renewable energy sources, such as solar and wind power, is crucial. Accelerating the deployment of clean energy technologies and improving energy efficiency can significantly reduce carbon emissions and promote sustainability.
2. Energy Efficiency and Conservation: Emphasizing energy efficiency measures in buildings, transportation, and industrial sectors can lead to substantial energy savings and reduced emissions. This includes promoting energy-efficient technologies, improving infrastructure, and implementing energy conservation practices.
3. Sustainable Land Use and Forestry: Sustainable land management practices, including reforestation, afforestation, and reducing deforestation, can enhance carbon sequestration. Protecting and restoring ecosystems, such as forests, wetlands, and mangroves, can play a vital role in mitigating climate change.
4. Decarbonization of Transportation: Shifting towards low-carbon transportation systems, including electric vehicles, public transportation, and active mobility options, can significantly reduce emissions from the transportation sector, which is a major contributor to greenhouse gas emissions.
5. Circular Economy and Sustainable Consumption: Transitioning to a circular economy that promotes resource efficiency, waste reduction, and recycling can contribute to climate change mitigation. Encouraging sustainable consumption patterns, such as reducing food waste and promoting conscious consumer choices, can also have a positive impact.

6. Policy and Regulatory Measures: Governments and policymakers play a crucial role in mitigating climate change by implementing supportive policies and regulations. This includes carbon pricing mechanisms, renewable energy subsidies, emission reduction targets, and international agreements to foster global cooperation.

25. Please list all sources that you used to form your executive summary:
ChatGPT, Wangari Maathai foundation

Please go back to Canvas and continue with your learning content. Return to Part D after you have completed your City Hub Activities.

PART D: Hub Activities Report

IMPORTANT: Complete this section AFTER completing the Canvas Lessons " Hub Activity: Problem Statement" and "Hub Activity: Web Research."

Hub Activity #1: Problem Statement

Please report on your process of getting peer feedback.

26. Who reviewed your problem statement (item #19)? (Give the first and last names of your 2 peers.)

Leila Natasha
Tecla Kiplangat

27. In brief, what feedback did they give to you?

I had omitted some of the important information when formulated my problem statement.

28. Was their feedback useful to you? Did it feel kind? Why or why not?

Yes the feedback was so useful and helped come up with a better problem statement.

29. Who did you give feedback to? (Give the first and last names of 2 peers- they may be the same or different peers from above.)

Jahath Mwarori
Esther Mboche

30. Do you feel that you gave useful and kind feedback to your peers? Why or why not?
    Yes , am confident my feedback played a good role.

Hub Activity #2: Web Research

Please report on your process of getting peer feedback.

31. Who reviewed your executive summary (item #24)? (Give the first and last names of your 2 peers.)
    Jahath Mwarori
    Esther Mboche

32. In brief, what feedback did they give to you?
    I had done the executive summary great.

33. Was their feedback useful to you? Did it feel kind? Why or why not?
    Yes

34. Who did you give feedback to? (Give the first and last names of 2 peers- they may be the same or different peers from above.)
    Jahath Mwarori
    Esther Mboche

35. Do you feel that you gave useful and kind feedback to your peers? Why or why not?
    Yes I gave the right feedback

After you updated earlier parts of the worksheet based on your feedback, please go back to Canvas and continue with your learning content. Return to Part E prior to submitting your milestone.

PART E: Daily 3 Challenge Report

Please answer the following questions honestly. There are no wrong answers! This is your opportunity for self-reflection.

36. How many days out of the past 7 did you do 20 minutes of movement?
    6

37. How many days out of the past 7 did you write 3 morning pages?
    6

38. Overall, how do you feel you are doing on building your Daily 3 habits? Explain.
    Am feeling much better and awesome flexibility especially for movement habit, I have been dancing everyday. Am loving the morning pages, they have helped to pre-empty myself and help me to be ready for the day.

39. What is your biggest barrier to staying motivated? Procrastanition

40. If you have been practicing at least some movement and/or morning pages:

    A) What effect (if any) have you noticed on your mood, focus, and productivity?
    My productivity has increased ,especially when I write the morning pages.

    B) What helps you stay motivated?
    The total feeling of practicing the morning pages and the movement .

41. If you haven't been practicing any movement and morning pages, what would motivate you to get started? Not applicable for me , I have already started.

Once you have completed this worksheet, export/convert to .pdf, rename it per the instructions, and upload to Canvas as your Milestone 3 Submission. Celebrate a job well done!