Unit 1: New Unit

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

GOALS/PURPOSE

Identifying real-world factors of climate change and evaluation of real-world solutions. In addition, students will study impacts of climate change on humans as well as other systems on Earth.

SCI.HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
SCI.HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
SCI.HS-ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
SCI.HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
SCI.HS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
SCI.HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
SCI.HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
SCI.HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
SCI.HS-ESS3-6	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).

READ ALOUD TEXTS/EXCERPTS

Book - The Role of Agriculture in Climate Change Mitigation

Author - Lucjan Pawlowski, Zygmunt Litwinczuk, Guomo Zhou

Summary - According to IPCC reports, one of the greatest threats to the Earth ecosystems is climate change caused by the anthropogenic emissions of greenhouse gases, mostly carbon dioxide, mainly from the combustion of fossil fuels, cement production and land-use change which leads to an excessive temperature rise. Agriculture and forestry are responsible for quiet big emissions of greenhouse gases: CO2, CH4 and N2O, and have significant potential to reduce these emissions mainly through enhancement of CO2 absorption by terrestrial ecosystems. To evaluate the impact of agriculture on climate change, ruminant farming should be also taken into account. These animals emit considerable amounts of methane which has strong greenhouse effects. Methane emissions may be reduced by using appropriate feed for ruminants. Decreasing the meat consumption of these animals can also make an important contribution to reducing methane emissions. The methods for reducing greenhouse gas emissions through appropriate management of terrestrial ecosystems and animal husbandry are

widely discussed in *The Role of Agriculture in Climate Change Mitigation*. The book will be of interest to academics, professionals and policy makers in environmental sciences.

Book - Rising Seas : Flooding, Climate Change and our New World

Author - Keltie Thomas

Illustrator - Belle Wuthrich and Kath Boake W.

Summary - The Earth's oceans are on the rise. Since 1900, global sea levels have risen steadily each year to a global average of about 8 inches (20cm) today, and they're still rising. By 2100, the sea could climb as much as 14 feet (4.3m) to 32 feet (9.75m). Rising Seas: Flooding, Climate Change and Our New World gives youth an eye-popping view of what the Earth might look like under the rising and falling water levels of climate change. Photographs juxtapose the present-day with that same area's projected future. The shocking images will help them understand the urgency for action. Key issues in today's news will be better understood, such as the 2015 Paris Protocol in which the world agreed to limit temperature increases to 2 degrees Celsius (ideally 1.5 degree).

Book - How To Avoid a Climate Disaster

Author - Bill Gates

Summary - Bill Gates shares what he's learned in more than a decade of studying climate change and investing in innovations to address the problems, and sets out a vision for how the world can build the tools it needs to get to zero greenhouse gas emissions. Bill Gates explains why he cares so deeply about climate change and what makes him optimistic that the world can avoid the most dire effects of the climate crisis. Gates says, "We can work on a local, national, and global level to build the technologies, businesses, and industries to avoid the worst impacts of climate change." His interest in climate change is a natural outgrowth of the efforts by his foundation to reduce poverty and disease. Climate change, according to Gates, will have the biggest impact on the people who have done the least to cause it. As a technologist, he has seen firsthand how innovation can change the world. By investing in research, inventing new technologies, and by deploying them quickly at large scale, Gates believes climate change can be addressed in meaningful ways. According to Gates, "to prevent the worst effects of climate change, we have to get to net-zero emissions of greenhouse gases. This problem is urgent, and the debate is complex, but I believe we can come together to invent new carbon-zero technologies, deploy the ones we have, and ultimately avoid a climate catastrophe.

Book - The Physics of Climate Change

Author - Lawrence M. Krauss

Summary - The first book to briefly and clearly present the science of climate change in a way that is accessible to laypeople, providing the perspective needed to understand and assess the foundations and predictions of climate change.

Book - ALL THE FEELINGS UNDER THE SUN: HOW TO DEAL WITH CLIMATE CHANGE

Author - LESLIE DAVENPORT

Illustrator - Jessica Smith

Summary - *All the Feelings Under the Sun: How to Deal With Climate Change* is a timely, thoughtful book that will help young readers work through their feelings of anxiety about climate change. Through informative text and activities, the book gives children age-appropriate information about the climate crisis and gives them the tools they need to manage their anxiety and work toward making change. climate statistics and helpful resources with stories of positive change already happening, such as the resurgence of the Eurasian beaver due to conservation efforts. Along the way, readers meet other superheroes, both animal and human, who are changing the world too. With advice about speaking up and inspiring others to join in, veteran environmentalist Martin Dorey infuses optimism and encouragement into this essential guide to saving Earth, two minutes at a time.

ARTICLES AND/OR VIDEO RESOURCES (FOR INSTRUCTIONAL PURPOSES)

Climate Change Causes a Mountain Peak Frozen for Thousands of Years to Collapse - Live Science

Which Animals Are Most Likely to Survive Climate Change? - Live Science

NYC's Air Quality Ranked Worst of Any Major City on Wednesday. With Climate Change, Will it Happen Again? - Live Science

Is Climate Change Making The Weather Worse? - Live Science

Is Atlantic hurricane season getting worse (and is climate change to blame)? - Live Science

First Martian life likely broke the planet with climate change, made themselves extinct - Live Science

Supreme Court cripples the US government's power to fight climate change - Live Science

Climate change is making Earth dimmer - Live Science

Could climate change make humans go extinct? - Live Science

What is Climate Change? - Crash Course Video

How Can We Respond to Climate Change? - Crash Course Video

Why Do We Release So Much Gas? - Crash Course Video

Can We Make Electricity Without Fossil Fuels? - Crash Course Video

How Can We Store Renewable Energy? - Crash Course Video

Can We Keep Warm and Stay Cool Without Fossil Fuels? - Crash Course Video

Can We Gas Up... Without Gas? - Crash Course Video

Can We Capture Greenhouse Gases? - Crash Course Video

How Will Climate Change Continue to Affect Us? - Crash Course Video

Are Natural Disasters Actually Natural? - Crash Course Video

International Climate Agreements - Crash Course Video

The Hidden Price of Climate Change - Crash Course Video

Supreme Court cripples the US government's power to fight climate change - Live Science

What is Climate Change? - Crash Course (Geography) Video

Climate Science - Crash Course (History) Video

The Engineering Challenges of Renewable Energy - Crash Course (Engineering)

The Future of Clean Energy - Crash Course (Engineering) Video

5 Human Impacts on the Environment - Crash Course (Biology)

WEBSITES (FOR STUDENTS TO INTERACT WITH)

The Climate Game

Summary: You need to keep global warming to 1.5C by cutting energy-related carbon dioxide emissions to net zero by 2050. In 2021, they reached a record 36bn tonnes a year. You must also deal with other greenhouse gases, and protect people and nature, for the planet to remain habitable.

This game is based on published scientific research and bespoke modelling by the International Energy Agency for the FT.

Mission 1.5 - Game

Summary: Mission 1.5 is an online game developed by UNDP and Playmob that educates players about climate solutions through voting on key climate actions they want to see adopted. The responses are used by UNDP to help governments develop and implement climate plans and policies around the world.

Survive The Century - Game

Summary: You are the senior editor of the world's most popular and trusted news organization. You have the enviable power to set the news agenda, and thereby shift the zeitgeist.

Lead the world towards utopia, or unleash your inner villain to see how bad things can get. Nobody's judging. Your

choices will determine how well humanity will survive the 21st century.

PROFESSIONAL RESOURCES FOR TEACHERS (LESSON PLANS, REPRODUCIBLES, ETC.)

NASA - Lesson Plans & Activities

Standford University - Curriculum & Map

New York State University of Fredonia - Lesson Plans and Curriculum

NY Times - Lessons & Suggested Activities

Climate Change Lesson Plans - Full Listing of Resources/Lessons for HS students.