CLIMATE CHANGE RESOURCES
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I PUBLICATIONS—PRIMARY SOURCES

A. Open Access Peer-Reviewed Original Research Articles

1. Science Direct: https://www.sciencedirect.com/browse/journals-and-books

a. Instructions: Click on "Journals" and "Open Access." This will generate a list of 605 open access journals that can be downloaded for free. Choices can be narrowed by filtering the domains, for example by clicking on "Life Sciences" and then on "Environmental Science." After selecting a journal it is required to create a free account. Suggested useful keywords are: climate change; global warming; greenhouse effect; greenhouse gases.

b. Examples of climate change journals and representative articles:

Advances in Climate Change Research

Science of Global Warming:

https://ac.els-cdn.com/S1674927812500377/1-s2.0-S1674927812500377-main.pdf?_tid=e3336b40-298e-4bd4-8e9c-2832dcfc572c&acdnat=1532964541_b5a5d0c8210fb0b653c61e451377804d

Debates on Causes of Global Warming:

https://ac.els-cdn.com/S1674927812500043/1-s2.0-S1674927812500043-main.pdf?_tid=80825330-3733-4603-b21e-2b2d6a437f14&acdnat=1532962872_14028059e0a78593cb231954cdbd9057

Atmospheric Science Letters

Climate Change Due to Human Activity

https://rmets.onlinelibrary.wiley.com/doi/epdf/10.1002/asl.315

Climate Risk Management

Climate Risk and Urban Design:

https://ac.els-cdn.com/S2212096315000042/1-s2.0-S2212096315000042-main.pdf?_tid=7b8f8998-0ca6-4fc4-987f-106bdabdc8e0&acdnat=1532806930_2a345fb2450df15ce949f44e36305f09

Endeavor

History of Greenhouse Effect from Arrhenius to Today's Models:

https://ac.els-cdn.com/S0160932716300308/1-s2.0-S0160932716300308-main.pdf?_tid=b917acf0-87ab-4407-abc9-e3fb714b4cf2&acdnat=1532964384_3c2b3829324401bd1ad59797fb0be2e2

Urban Climate

Adapting Cities to Climate Change

https://ac.els-cdn.com/S2212095514000212/1-s2.0-S2212095514000212-main.pdf?_tid=e534f825-df6f-4eb3-9f1e-01e225fd5717&acdnat=1533569051_372ce7222270892d091c5758c928d151

Weather and Climate Extremes

Projected Weather and Climate Extremes:

https://www.sciencedirect.com/science/article/pii/S2212094715300165

Projected U.S. Temperature and Precipitation Extremes

https://reader.elsevier.com/reader/sd/8201B3BE39AC0588372BA9269A9717647D2603D21C97A80653666185907D1155F2EA1CBC5D06A5C8B897138828613895

Extreme Climate Change and Health

https://ac.els-cdn.com/S221209471530030X/1-s2.0-S221209471530030X-ma

in.pdf?_tid=304958b5-e000-44c4-88bc-ba3386424c5a&acdnat=1533570754_bf2009cf58afcc44c158f76611e39c1f

Suggested Causes of Climate Extremes

https://ac.els-cdn.com/S2212094716300020/1-s2.0-S2212094716300020-main.pdf?_tid=b021526c-faa1-4310-9c14-ff377e7aa7ea&acdnat=1533054167_5ce265abbc02efba48d799672e49453d

Also see other related articles in Special Issue Volume 11 (2016)

2. Public Library of Science https://www.plos.org Contains over 215,000 peer-reviewed articles.

a. Instructions: Suggested key words: climate change; global warming; greenhouse effect; greenhouse gases.

b. Sample articles:

Climate Change's Impact on Human Health

http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002599

Article Source: **Projected Carbon Dioxide to Increase Grass Pollen and Allergen Exposure Despite Higher Ozone Levels**
Albertine JM, Manning WJ, DaCosta M, Stinson KA, Muilenberg ML, et al. (2014) Projected Carbon Dioxide to Increase Grass Pollen and Allergen Exposure Despite Higher Ozone Levels. PLOS ONE 9(11): e111712. https://doi.org/10.1371/journal.pone.0111712

B. Government Reports

U. S. Environmental Protection Agency Publications https://www.epa.gov

This site includes literally thousands of downloadable articles and reports. To help narrow the search:

1. Click on "Environmental Topics"

2. Scroll to “Air Quality and Climate Change Research”
3. Scroll to “Journal Articles about Air Quality (or Climate)” and/or
4. Scroll to “Reports about Air Quality (or Climate)”
5. Since there are many article and reports, using narrow key words is advised. For example use specific names of gases instead of “greenhouse gas emissions.”

Sample EPA Report:

CLIMATE CHANGE IMPACTS ON HUMAN HEALTH DUE TO CHANGES IN AMBIENT OZONE CONCENTRATIONS (External Review Draft) (PDF,136 pp, 1390 KB, about PDF)

II HANDS-ON ACTIVITIES

A. Traditional Controlled Experiments

1. Investigating the Effects of Carbon Dioxide on Temperature

a. Suggestions:

Extend the investigations by testing for other variables: other greenhouse gases like water vapor; aerosols (that are climate coolers); carbon dioxide depleters like soda lime.

Modify the following examples from “recipe-type” investigations to hypothesis- testing investigations that are more open-ended and Inquiry-based. For example in the first experiment below, all students can have access to Alka Seltzer but must design their own experiment to investigate the question, How Does the Concentration of Carbon Dioxide Affect the Air Temperature in a Closed Environment?

https://mail.google.com/mail/u/0/#inbox/164ecbecd7787fe2?projector=1&messagePartId=0.0

http://nagt.org/

files/nagt/jge/abstracts/Lueddecke_v49n3p274.pdf

https://www.acs.org/content/dam/AACT/middle-school/gases/Temperature/lab-greenhousegas.pdf

_____2. Investigating the Effects of Global Warming on Soil, Air, and Water Temperatures

https://sealevel.jpl.nasa.gov/files/archive/activities/ts1hiac1.pdf

3. Investigating the Effects of Color on Temperature

http://www.sciencebuddies.org/science-fair-projects/project_ideas/Phys_p030.shtml#summary

Can be used in conjunction with STEM green roof project below.

4. Investigating the Efficiency of Biofuels

https://www.energy.gov/sites/prod/files/2014/06/f16/highschool_projects.pdf

Includes five investigations; investigations 1 and 4 focus on biofuels. Lab equipment required: sources of heat; glassware; chemistry apparatus. Can be modified as biology or chemistry

https://www.sciencebuddies.org/science-fair-projects/project-ideas/Energy_p030/energy-power/burning-biofuels-comparing-nonrenewable-and-renewable-fuels#makeityourown

5. Investigating the Efficiency of Solar Panels (Hardware required. Panels required either purchased or designed in STEM project 2c below.)

https://www.teachengineering.org/activities/view/cub_pveff_lesson01_activity1 (IV = angle of orientation)

https://www.teachengineering.org/activities/view/cub_pveff_lesson02_activity1

(IV = temperature)

B. STEM Projects

For each STEM Project teachers need to clarify the human needs that must be solved, the specific design constraints, and the specific criteria for success.

1. Counteracting Global Warming Effects—Designing Green Roofs—investigates energy transfer between buildings and external environment, urban heat island effects, and water conservation.

http://sciencenetlinks.com/lessons/green-roof-design/ Highly Recommended

Approaches green roof design as a New York City engineering project. (download "Action Step for Designing a Green Roof Solution" and https://earthobservatory.nasa.gov/Features/GreenRoof/greenroof2.php)

See also:
https://www.teacherstryscience.org/lp/its-easy-being-green-green-roof-design-project

2. Utilizing Renewable Energy Sources

a. Designing Wind Turbines (Hardware required.)

http://teachers.egfi-k12.org/lesson-wind-power/

http://teachers.egfi-k12.org/wind-power-for-home/

https://www.energy.gov/sites/prod/files/2014/06/f16/highschool_projects.pdf

(Refer to "Wind Energy" Projects 2-4.)

b. Designing Solar/Energy Efficient Houses

https://www.teachengineering.org/curricularunits/view/cub_housing_curricularunit

Contains an entire unit on Energy Efficient Houses including seven STEM activities.
Highly Recommended

http://tryengineering.org/sites/default/files/lessons/solarstructures.pdf

_____c, Designing Solar Panels (Hardware required.)

https://www.teachengineering.org/activities/view/cub_pveff_lesson04_activity1

C. Useful Web Sites

egfi-k12.org

http://www.gk12.org

https://www.sciencebuddies.org

https://www.teachengineering.org

https://www.teacherstryscience.org

http://tryengineering.org

https://www.youtube.com