DISCIPLINE-SPECIFIC MODULE

Climate Justice in Biology, Exposure Science, and Epidemiology

CJIT

CLIMATE JUSTICE INSTRUCTIONAL TOOLKIT

What's in this module?

Contents

This module demonstrates how biology can inform climate justice and how climate justice can help create more inclusive biologists. Case studies span from general biology to microbiology and epidemiology and the broader field of exposure science.

Activities

4 readings
1 activity

Key Resources

- *An applied environmental justice framework for exposure science* (Van Horne et al., 2022)
- *Conducting Culturally Responsive Research Across Borders* (Lahman, 2022)
- *Pervasive structural racism in environmental epidemiology* (Perry, 2021)

Learning Objectives

01

Recognize how climate justice can influence biology

02

Understand the CJ approach to biological research

03

Identify the importance of microbiology in climate science

04

Discover how you can address inequalities with biology

Introduction

PART 1

"Flood Water Measurement" by U.S. Geological Survey is marked with CC0 1.0.

What is Climate Justice?

Definition

Climate justice is both a term and a movement which recognizes that climate change has unequal social, economic, health, and other negative impacts on people, with an emphasis on its impacts on underprivileged populations (Simmons, 2022).

Discuss with a partner

- Do you think this definition is complete? What would you add?
- Can you think of examples of climate justice in your community, country, or the world?
- How do you think biology can help the climate justice movement?

Climate Justice through Biology

Why climate justice is important in biology (iSEE)

Understanding the biological impacts of climate change is important for creating appropriate, holistic responses using:

- Soil science
- Microbiology
- Public health and epidemiology
- Animal and plant responses to heat and extreme weather

Discuss this quote as a class

“the field of science itself will have to reconcile its shameful past and revisit the reprehensible displays of racially driven confirmation bias that form its foundations” –Ayana Elizabeth Johnson, All We Can Save

"Micro-Canyonlands formed by Cyanobacterial soil" by National Park Service is marked with CC0 1.0.

Alternative Approaches to Biology Research

PART 2

Review: *An applied environmental justice framework for exposure science*

How to advance biology and exposure science with CJ

- Culturally and ethically responsible research methods
- Data and knowledge sharing
- Input from many perspectives
- Including different types of knowledge
- Respecting community's rights
- prioritize research questions to benefit those most affected

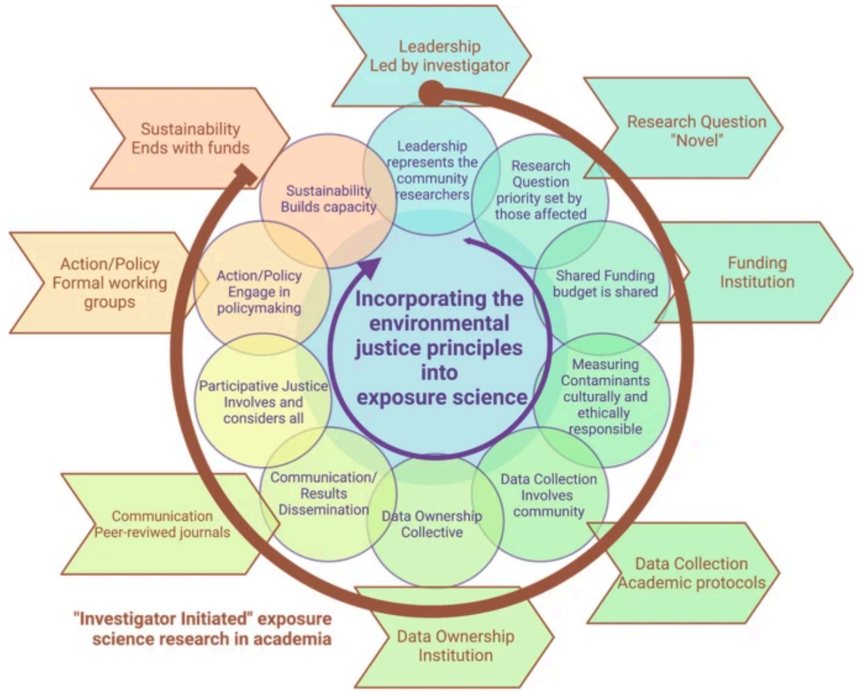
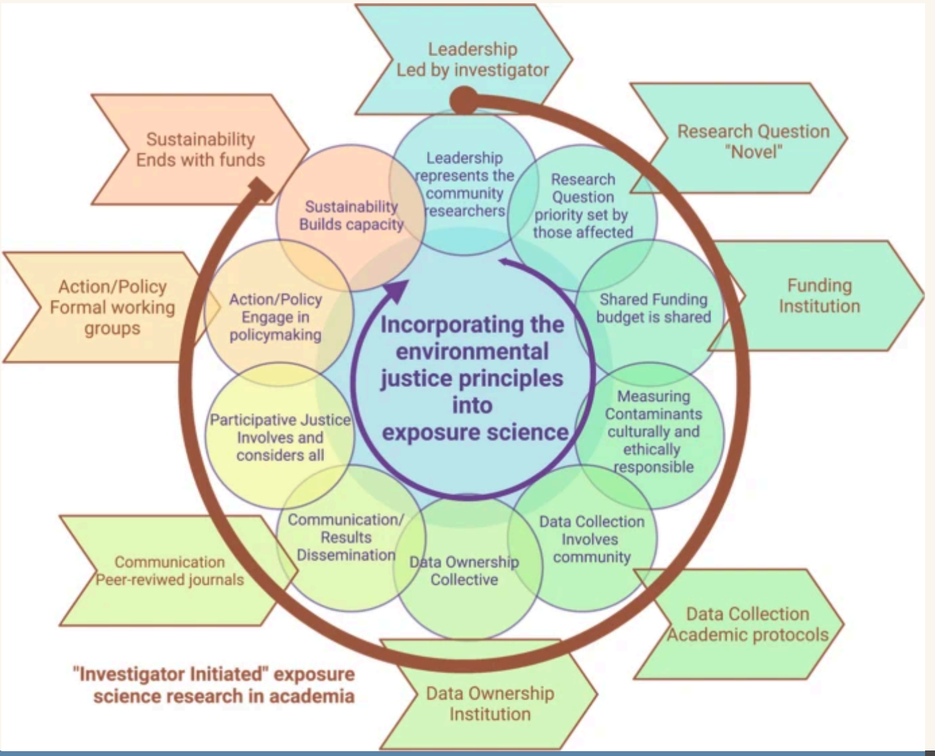


Fig. 1: Roadmap for redefining exposure science strategies. (Van Horne et al., 2022)

ACTIVITY #1

DISCUSS THE POSSIBLE IMPLICATIONS AND EFFECTS OF THE READING



Group and assign a question

Divide the class into 4 groups and assign one question to each:

1. Why is this framework important for biologists?
2. How does this framework better prepare biologists for working with marginalized communities?
3. Why is conscious science important for communities?
4. How can we include communities in the research process?

Small group discussion

In your small group, spend 5–10 minutes discussing your assigned question. Take notes as you discuss, and nominate someone from your group to share your answers with the class.

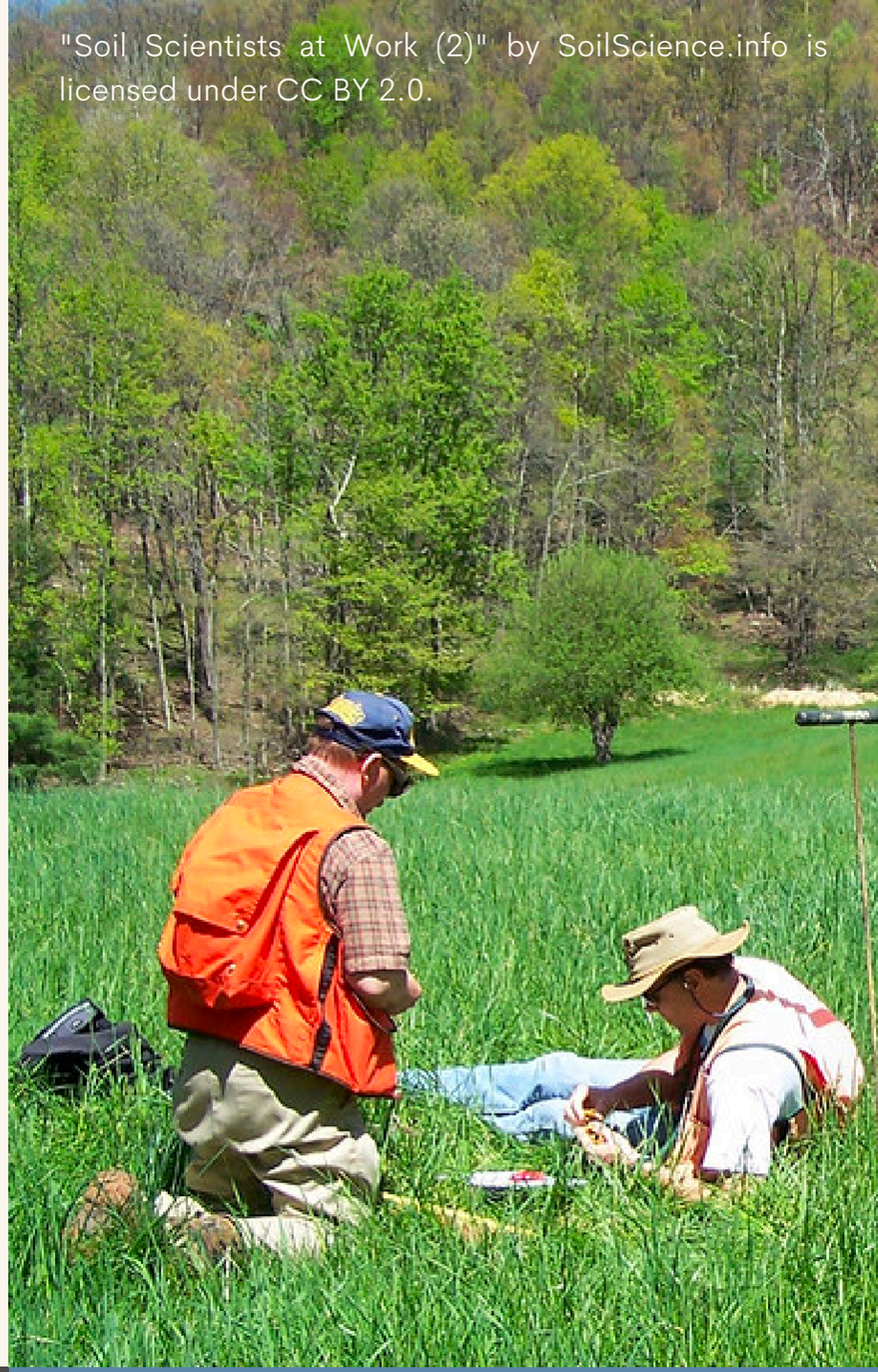
Class discussion

Allow the first group to share the answers they came up with, and then open up the discussion to the class for 5–10 minutes. Repeat this for each group.

Review: *Conducting Culturally Responsive Research Across Borders*

Culturally responsive research includes

- Explicit recognition, valuing, and discussion of cultural differences
- Validation of the worldviews of participants
- Explicit discussion of power differentials
- Acknowledgment that nontraditional research methods may work better with participants of differing cultural values



ACTIVITY #2

DISCUSS THE POSSIBLE IMPLICATIONS AND EFFECTS OF THE READING

Group and assign a question

Divide the class into 4 groups and assign one question to each:

1. How can you be a more culturally responsive researcher?
2. Do you think there are other guidelines not mentioned in the article?
3. What is the importance of culturally responsive research?
4. How is the framework for ethical exposure science similar and/or different to the guidelines to be a culturally responsive researcher?

Small group discussion

In your small group, spend 5–10 minutes discussing your assigned question. Take notes as you discuss, and nominate someone from your group to share your answers with the class.

Class discussion

Allow the first group to share the answers they came up with, and then open up the discussion to the class for 5–10 minutes. Repeat this for each group.

ACTIVITY #3

READ AND DISCUSS WITH A PARTNER

Read

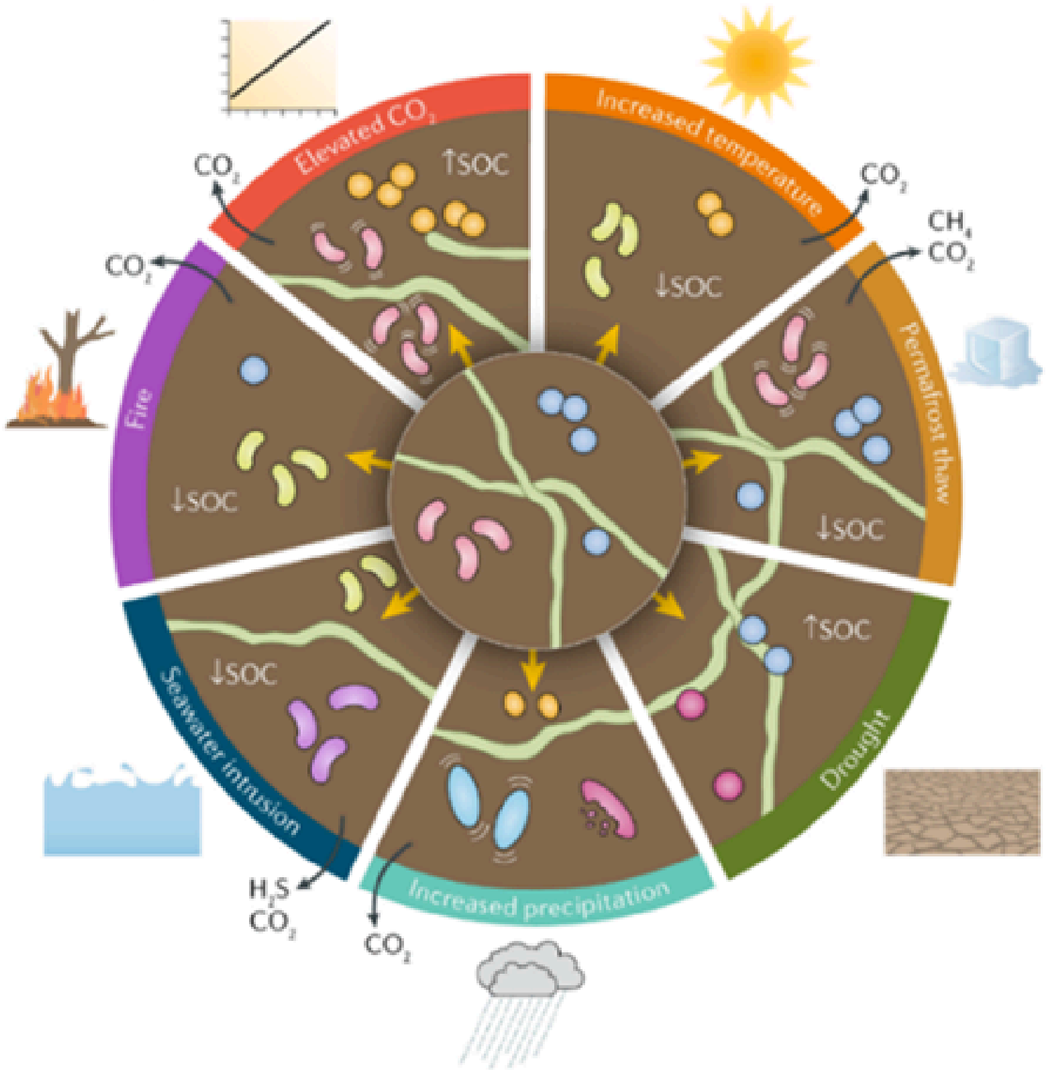
With a partner or in small groups, read *Microbiologists as Experts in Climate Change Conversations*

Discuss

After you read the article, spend 5-10 discussing these questions with your partner (or group):

- How can microbiologists advance the climate change discussion?
- What can microbiologists contribute to the fight for climate justice?

(Jansson & Hofmockel, 2019)



Climate change induces alterations in soil microbial communities. Bacteria, archaea and fungal hyphae are impacted by changes in temperature, precipitation, storms, soil organic carbon and greenhouse gases, leading to changes in community structure as indicated in the diagram by changes in color.

CJ in Biology Research Case Studies

PART 3

Background

From: *Pervasive structural racism in environmental epidemiology*

- Meta-analysis of studies of male infertility and environmental health to demonstrate how environmental epidemiology ignores racism in research and medical practice
- Paper illustrates "how failing to address racism neglects the health of entire populations"

"Failing to include populations who are Black, Indigenous, and people of color (BIPOC) in health research means researchers actually know very little about the effect of environmental contaminants on a range of population health outcomes"

Perry et al. Environmental Health (2021) 20:119
https://doi.org/10.1186/s12940-021-00801-3

Environmental Health

COMMENTARY Open Access

Pervasive structural racism in environmental epidemiology

Melissa J. Perry*, Suzanne Arrington, Marlaina S. Freisthler, Ifeoma N. Ibe, Nathan L. McCray, Laura M. Neumann, Patrick Tajanlangit and Brenda M. Trejo Rosas

Abstract

Background: Epistemological biases in environmental epidemiology prevent the full understanding of how racism's societal impacts directly influence health outcomes. With the ability to focus on "place" and the totality of environmental exposures, environmental epidemiologists have an important opportunity to advance the field by proactively investigating the structural racist forces that drive disparities in health.

Objective: This commentary illustrates how environmental epidemiology has ignored racism for too long. Some examples from environmental health and male infertility are used to illustrate how failing to address racism neglects the health of entire populations.

Discussion: While research on environmental justice has attended to the structural sources of environmental racism, this work has not been fully integrated into the mainstream of environmental epidemiology. Epidemiology's dominant paradigm that reduces race to a mere data point avoids the social dimensions of health and thus fails to improve population health for all. Failing to include populations who are Black, Indigenous, and people of color (BIPOC) in health research means researchers actually know very little about the effect of environmental contaminants on a range of population health outcomes. This commentary offers different practical solutions, such as naming racism in research, including BIPOC in leadership positions, mandating requirements for discussing "race", conducting far more holistic analyses, increasing community participation in research, and improving racism training, to address the myriad of ways in which structural racism permeates environmental epidemiology questions, methods, results and impacts.

Keywords: Environmental health, Environmental epidemiology, Environmental justice, Racism, Structural racism, Male reproductive health, Solutions

Introduction

Currently, epistemological biases in environmental epidemiology prevent the full understanding of how racism's societal impacts directly influence health outcomes. The field continues to parameterize conditions of communities of color [1] without recognizing that these social forces are in fact root causes of many disease etiologies.

If public health researchers seek to achieve health equity for persons of all backgrounds, the impact of racism on health outcomes needs to be acknowledged, quantified, and addressed. This will require advancing paradigms that identify how racism affects both population health and the health research enterprise. To address racism in public health, our own racist structures need to be examined and dismantled.

Leading medical and public health institutions have long recognized that racism perpetuates health disparities [2, 3]; numerous calls have been made over the last several decades to reform how race and racism are

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Key Findings

01

Sperm counts are indicative of both fertility and general health. For decades, declines in Western sperm counts have been observed.

02

Almost all that is known about population sperm health comes from White men only, very little has been recorded about sperm counts among people of color.

03

The few studies including POCs have recorded lower semen values among Black men compared to other groups.

04

Environmental toxins including lead, pesticides, air pollution and plasticizers are affect sperm counts, yet there is little data from POC participants in reproductive health studies despite often bearing the greatest pollutants.

(Perry et al., 2021)

Solutions

01

Acknowledge racism in public health research

Address how racism has affected research findings in the past and how systemic racism still impacts research today

02

Include affected communities in decision-making

BIPOC scholars must hold leadership positions in science

03

Develop requirements and standards for discussing race in research

Create guidelines for how race and ethnicity can be used in research

04

Embrace a more holistic approach to analysis

Work beyond internal discipline boundaries

05

Partner with community members to conduct research

Empower study participants by giving them a say in how and what research is conducted

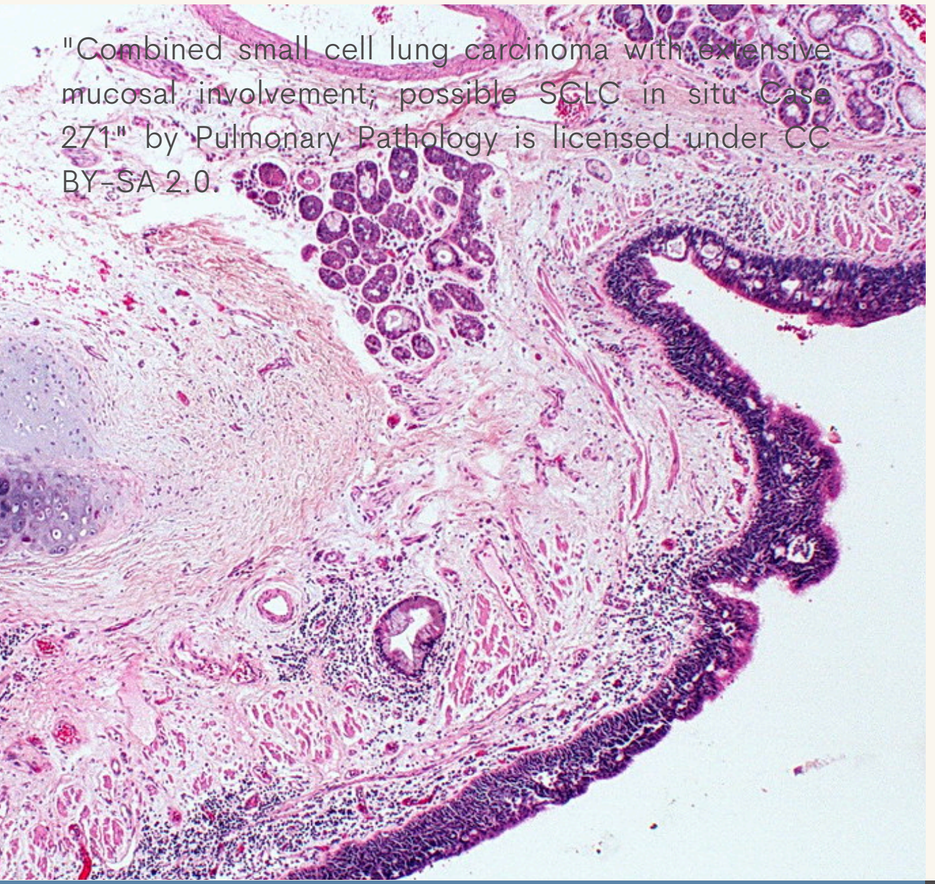
06

Improve training for researchers and students

Antiracism literacy can help researchers/professionals identify and analyze racism

ACTIVITY #4

GROUP DISCUSSION OF THE CASE STUDY



Disscus as a class

Spend about 15 minutes as a class discussing the key takeaways, arguments, and implications of the case study.

Guiding questions

- How can we address racism in epidemiological research?
- What is missing in current research?
- How can climate change exacerbate the inequalities in research representation?
- Who is suffering as a result?
- What do you think of the conclusions do the researchers come to?
- Do you agree with the proposed solutions?

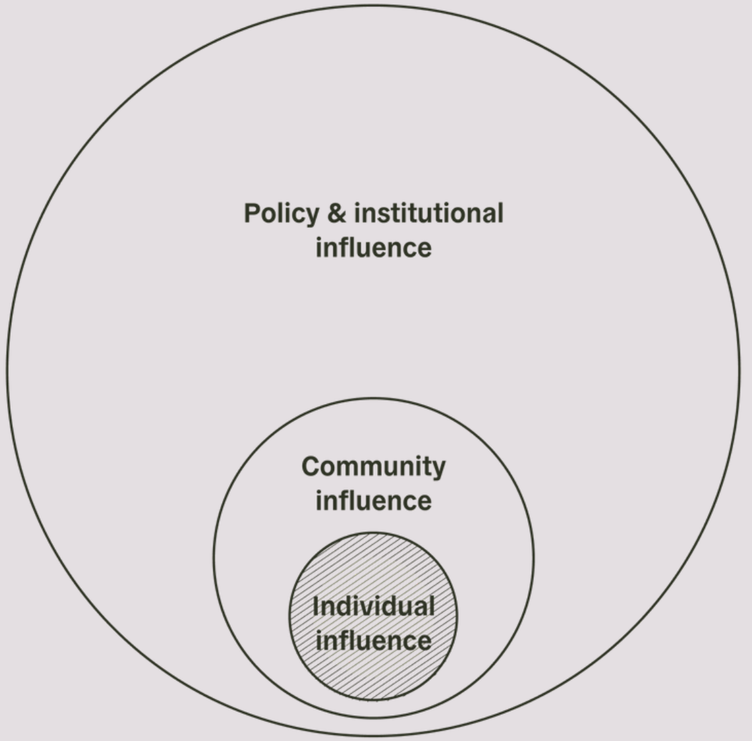
PROJECT OPTION #1

Report on Integrating Biology into Climate Action

Prompt suggestion

Using the template to the right from the All We Can Save Project, identify ways you can include biology in climate justice policy, research, and personal actions.

Write a report detailing the steps that can be taken to integrate climate justice more deeply within biology, epidemiology or exposure science research or study. Consider how this could this impact the widening circles of influence shown on the right.



Widening circles of influence for climate action

As formulated by Dr. Leah Stokes

Additional Resources

Academic Articles

- Climate and the Personal Essay — A Reading List (Martines, 2020)
- Environmental Justice (Mohai et al., 2009)
- Trends and Directions in Environmental Justice: From Inequity to Everyday Life, Community, and Just Sustainabilities (Agyeman et al., 2016)
- Evolution of the environmental justice movement: activism, formalization and differentiation (Colsa Perez et al., 2015)
- From environmental to climate justice: climate change and the discourse of environmental justice (Schlosberg & Collins, 2014)
- The Dakota Access Pipeline, Environmental Injustice, and U.S. Colonialism (Kyle Powys Whyte, 2017)
- Theorising environmental justice: the expanding sphere of a discourse (Schlosberg, 2013)
- Transforming knowledge creation for environmental and epistemic justice (Temper & Del Bene, 2016)
- Climate Justice in the US. What Next? (Dayaneni, 2009)

For more resources on climate and environmental justice: **Please explore other modules in the Climate Justice Instructional Toolkit.**

Module References

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