Multicultural climate change education in an informal learning environment

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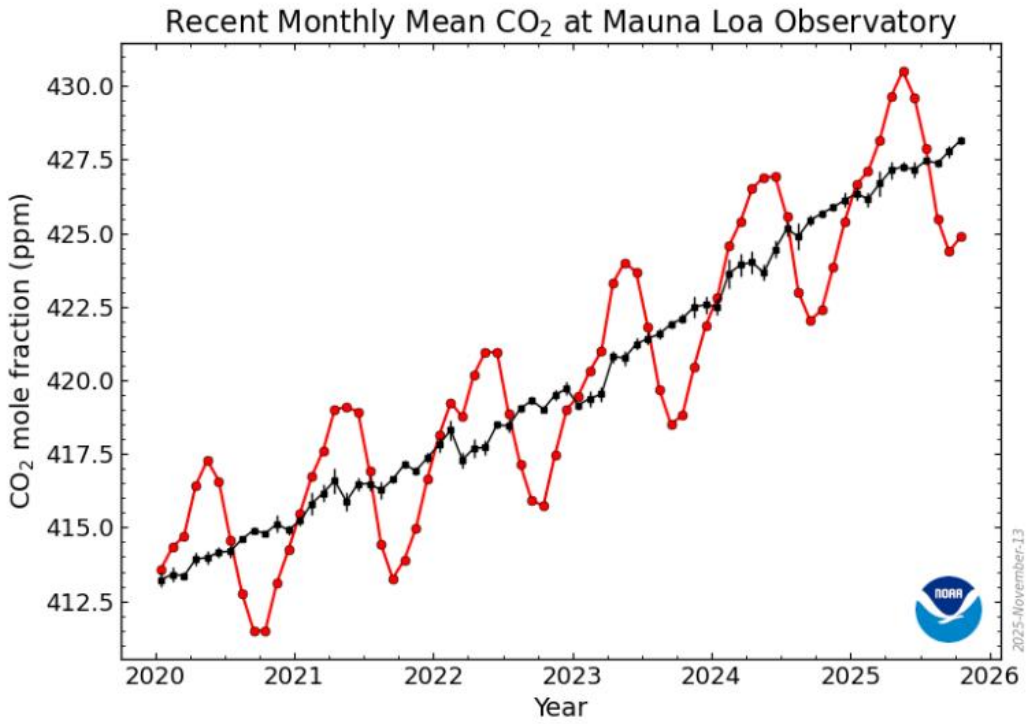
As anthropogenic climate change approaches critical tipping points

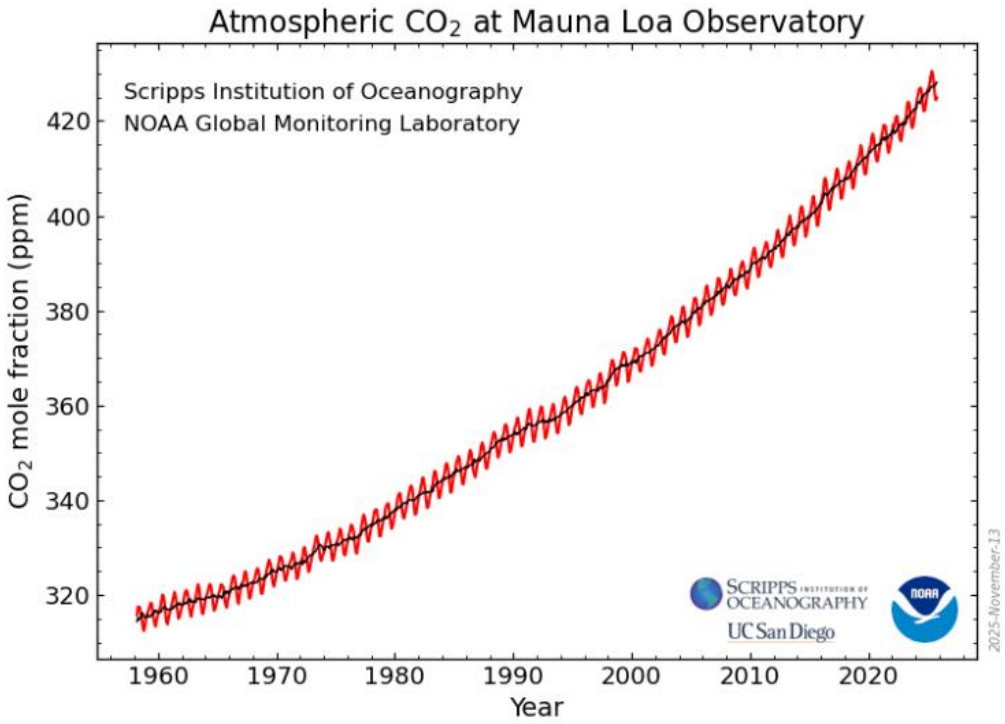
Trends in Atmospheric Carbon Dioxide

https://www.esrl.noaa.gov/gmd/ccgg/trends/

Monthly Average Mauna Loa CO_2

October 2025: 424.87 ppm
October 2024: 422.38 ppm
Last updated: Nov 13, 2025





Navigating Complexity: Climate, Migration, and Conflict in a Changing World

November 28, 2016 | *By Schuyler Null*

BACK TO STORIES

RESEARCH HIGHLIGHT | ENVIRONMENT

Why climate change matters for women

21 Apr 2023

By Sara Duerto Valero, Sneha Kaul

Photo: Md Harun Or Rashid

Climate resilience:

Climate change is having profound and unequal impacts on women and girls, particularly those who are vulnerable and depend on natural resources

POLICY FORUM

NATURAL HISTORY

A global approach for natural history museum collections

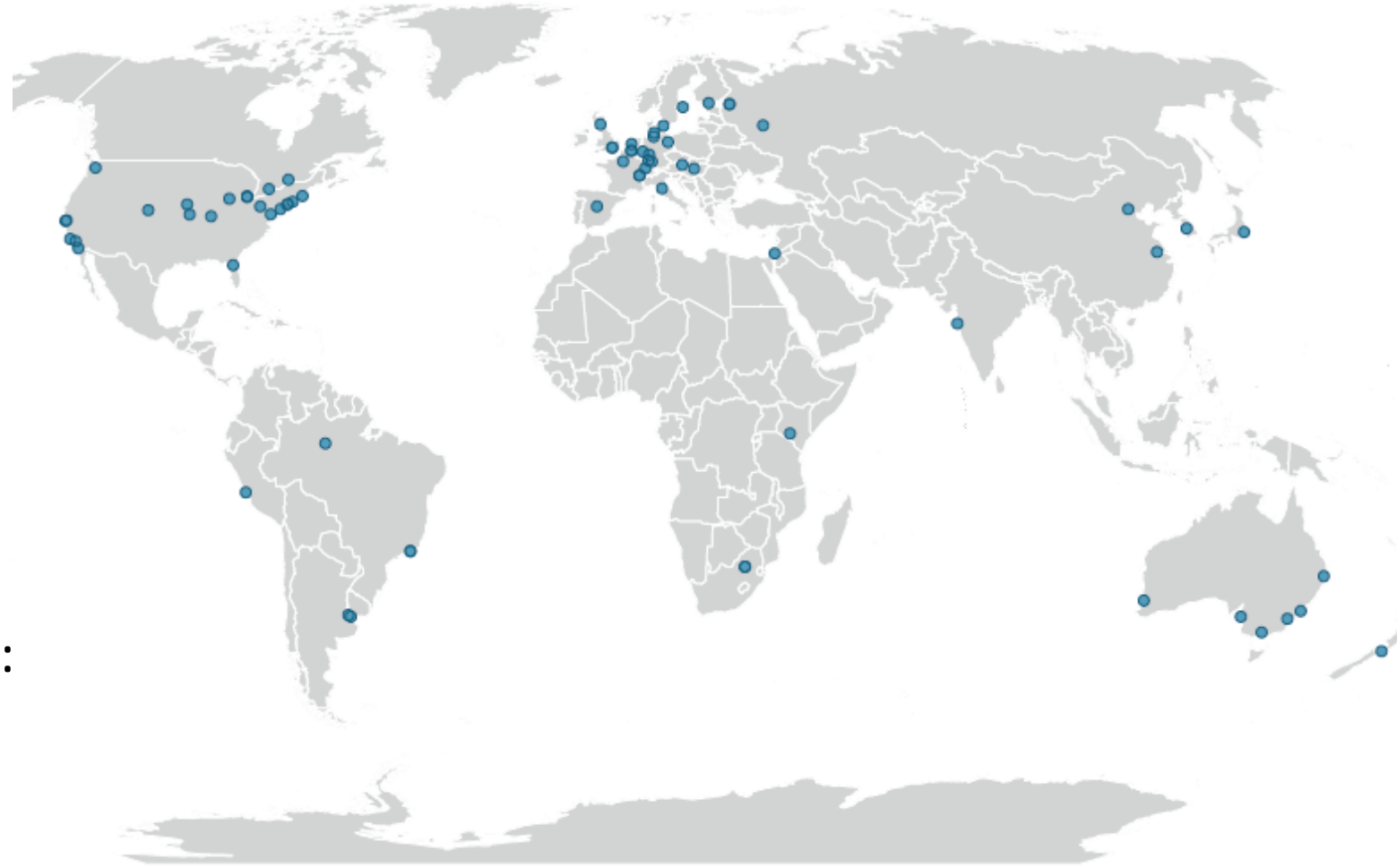
Integration of the world's natural history collections can provide a resource for decision-makers

By Kirk R. Johnson[1], Ian F. P. Owens[2], the Global Collection Group

Johnson, K. R., Owens, I. F., & Global Collection Group. (2023). A global approach for natural history museum collections. Science, 379(6638), 1192-1194.

Locations of participating natural history museums

These 73 museums (●) collectively hold more than 1.1 billion objects.



Collecting in a rapidly changing planet:

In the year 2100, scientists and policy-makers will look back to the collections made in the 21st century to inform their decisions about the 22nd century Global Biodiversity.

MUSEUM FÜR NATURKUNDE BERLIN

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Who will survive climate change?

"Fossils preserved from Earth's past provide the only direct evidence of which species are most at risk of extinction under rapid global warming," said Dr. Carl Reddin, lead author of the study. "One advantage of working with fossil records is that we can see the impact of global warming without all the other human impacts, such as overfishing and pollution. "This demonstrates the relevance of research collections for current and future predictions."

Reddin, C. J., Aberhan, M., Raja, N. B., & Kocsis, Á. T. (2022).
Global warming generates predictable extinctions of warm-and cold-water marine benthic invertebrates via thermal habitat loss.
Global Change Biology, 28(19), 5793-5807.

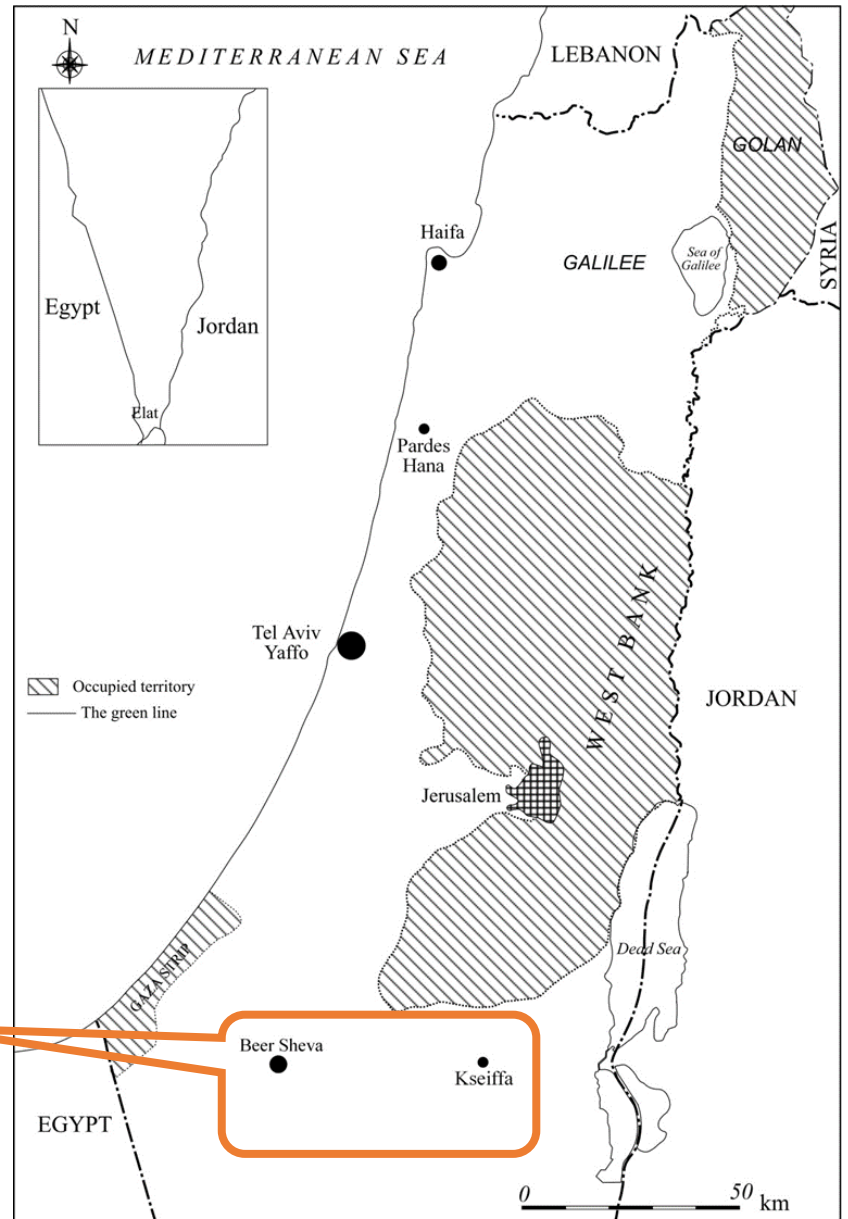
What characterizes multicultural climate change education in an informal learning environment?

Cultural responsiveness is defined as an approach that acknowledges the importance of cultural diversity and seeks to integrate this understanding into policies, practices, and interactions.

It goes beyond mere tolerance of differences; it involves actively engaging with diverse cultural perspectives and ensuring that all individuals feel valued and included.

Unpacking Connections Between Climate Literacy and Sense of Place in a Place-Based Climate Program for Bedouin Youth

The Bedouins of the Negev are an indigenous ethnic minority, geographically and culturally distinct from other Israeli Muslims Arabs and Jews.



The Bedouin

- Indigenous people
- Rapid process of settlement
- A sub-group within the Arab minority.
- Maintain a highly rural lifestyle
- Third live in 36 unrecognized villages in the south of Israel.
- Suffer from a lack of basic infrastructure

Bedouin & Climate

- They are most vulnerable populations affected by climate change
- Climate challenges:
  - Uneven rainfall distribution
  - A decrease in natural grazing areas
  - Droughts
  - Extreme weather conditions

(Yosef et al., 2020)

My place
Our unique
Climate

مكاني العزيز، مناخنا الفريد

(a) Fostering sense of place through place-based education;

(b) Promoting climate literacy through an evidence-based understanding of climate;

(c) Embracing intergenerational discourse.

- **For graduates, climate change was a source of uncertainty and anxiety. The shifting seasons, rising temperatures, and unpredictable rainfall were disrupting familiar ways of life.**

“The weather changes make me worried about our future here; it’s like the land we know is slipping away from us.” *(Rama)*

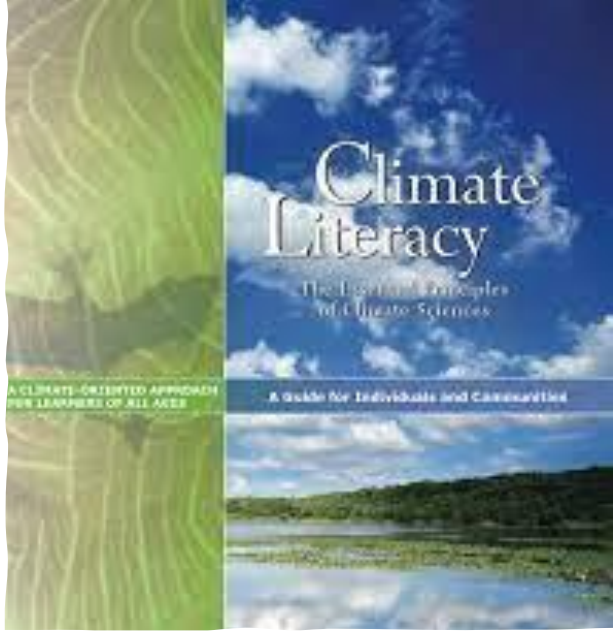
“The land around us is drying up. Everything feels more fragile now—like we’re losing something important.” (Boshra)

- **Teachers recognized climate change as a multi-dimensional crisis, affecting their families, agriculture, and infrastructure. Their narratives also highlighted their community's vulnerability due to limited resources and infrastructure.**

"Dust storms are becoming more frequent. Last year, I gave birth during one, and my newborn struggled to breathe even inside the house." (Hanan)

"The price of vegetables has skyrocketed. Okra used to be affordable—now, it's 100 NIS per kilo. Climate change is making life expensive." (Mai,)

National Oceanic and Atmospheric Administration
U.S. Department of Commerce



A climate-literate person

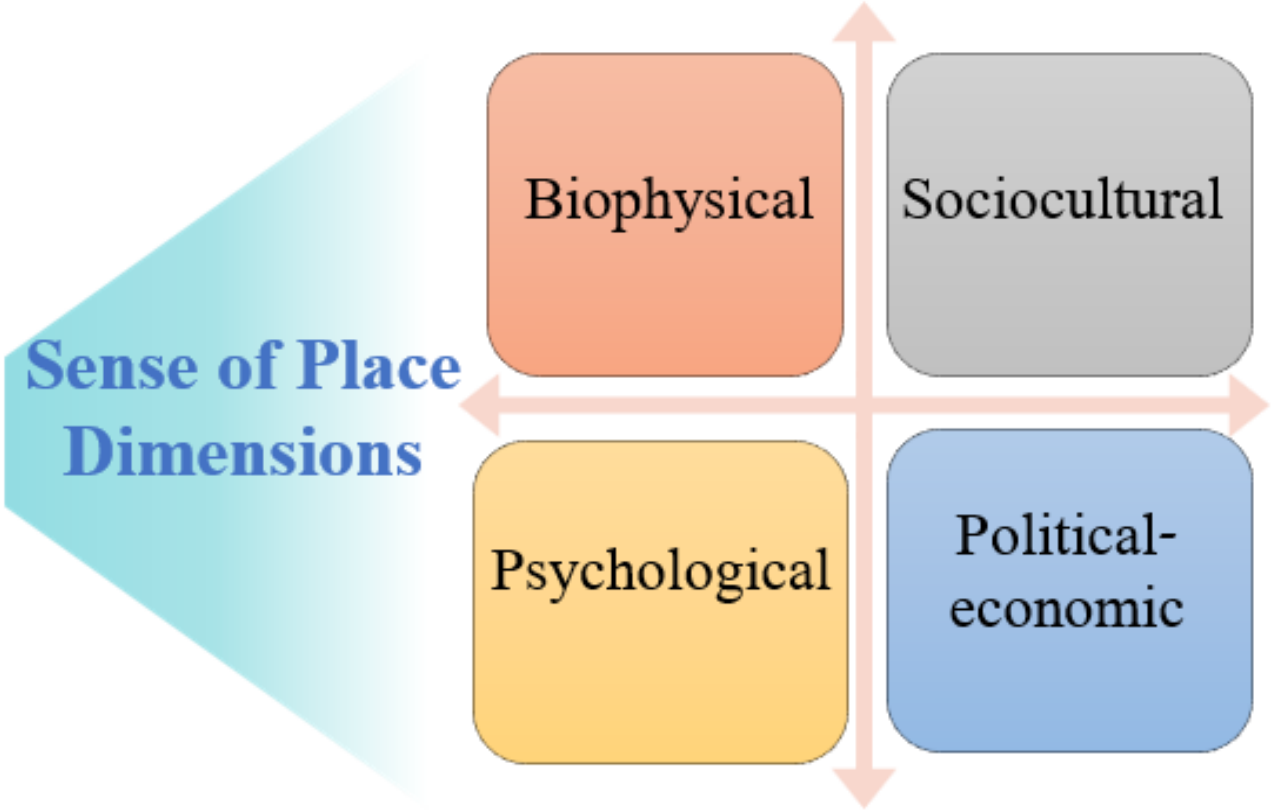
✓understands the essential principles of Earth's climate system,

✓knows how to assess scientifically credible information about climate,

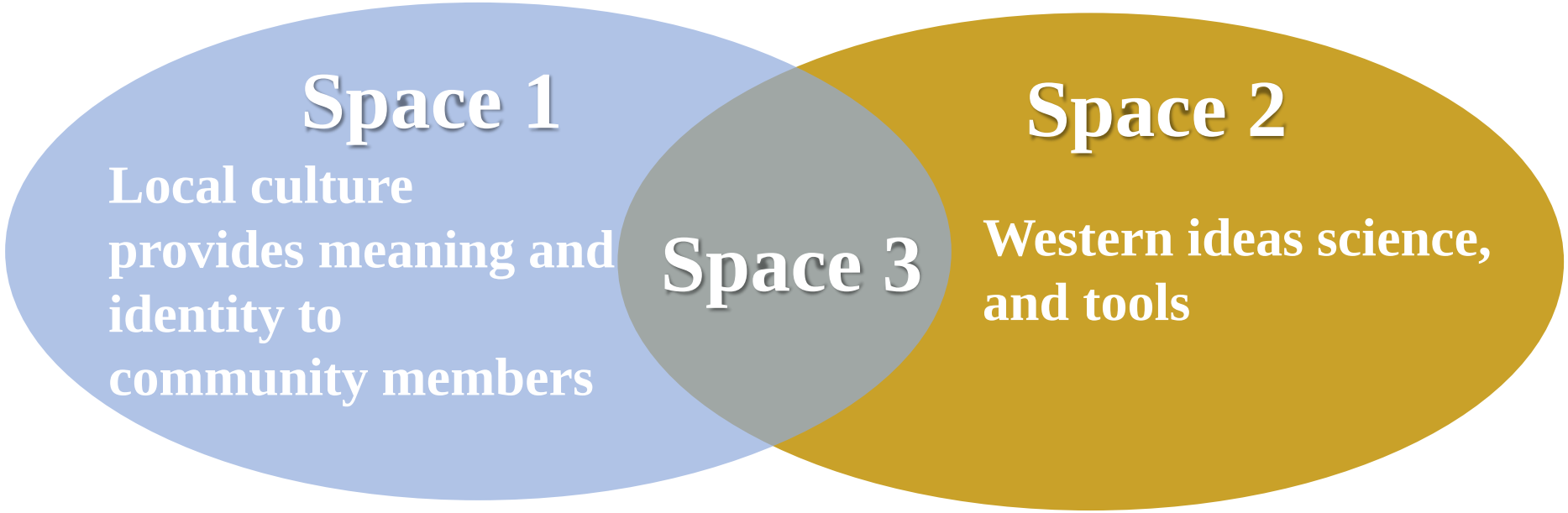
✓communicates about climate and climate change in a meaningful way,

✓ is able to make informed and responsible decisions.

“Sense of place” reflects the web of lifestyles between people and their place. A strong sense of place enables students to deal with and adapt to the climate crisis.



Third space as “hybrid space”



“Everyday resources are integrated with new practices that merge the different “ways of knowing”

A space where scientific knowledge, cultural identity, and local experience intersect

The Climate Crisis and Me

climate science used place as a natural laboratory for local climate phenomena

Intergenerational discourse

Interviews with family and community elders, integrating local ecological knowledge, and lived experiences

Project-Based Climate Investigations

Students selected local issues Integrated scientific reasoning with community stories and responsibilities

Asan, a 15-year-old from a rural traditional community

She entered the program with an understanding of climate shaped by her physical and spatial experience of place and by her daily exposure to heat and dust as defining features of her environment: “The dust chokes us… the heat sits on the houses.”

She began exploring her immediate surroundings in new ways, shifting from everyday noticing to structured inquiry, and applying this learning at home by helping her family prepare for storms.

Following the intervention, Asan showed substantial growth across all dimensions of climate literacy. She articulated system-based explanations linking heat, vegetation, and soil stability, noting: “When the ground becomes dry and there are no plants to hold it, the wind lifts everything… it’s hotter and drier.”

Place-based and Culturally Responsive Education

- **Creating inclusive and equitable learning environments that honor the cultural identities and experiences of the Bedouin students.**
- **Understanding the key role that sense-of-place can play in youths' conceptualization of climate-based phenomena.**
- **Learning processes that promote agency are designed to increase their community's climate resilience.**

Place-based and Culturally Responsive Education

- Connect students to local issues
- The role of power historically contextualized within a space
- Learn from elders about local history and indigenous ways of knowing
- Recognizing the importance of students' cultural backgrounds and experiences
- Connecting students, teachers, schools, community
- Critical stance toward sociopolitical structures

(Wallace et al., 2022)

(Dean, 2021; Mannion, 2020; Smith, 2013; Wooltorton et al., 2020)

How can we implement multicultural education in an informal learning environment?

Culturally sensitive:

awareness that cultural differences exist without assigning value to them.

Culturally relevant:

Linkages between students' learning, and their community cultural practices and

Culturally responsive:

Adaptation to students' interest and diversity .

Culturally sustaining:

Community heritage cultural practices are resources to honor, explore, and extend.