



Smithsonian  
*Science Education Center*

# Science Education for Global Goals

Dr. Carol O'Donnell, Lapp-Keiser Director, Smithsonian Science Education Center

*"Trust in science, multiple perspectives, indigenous knowledge, traditional decolonized knowledge"*

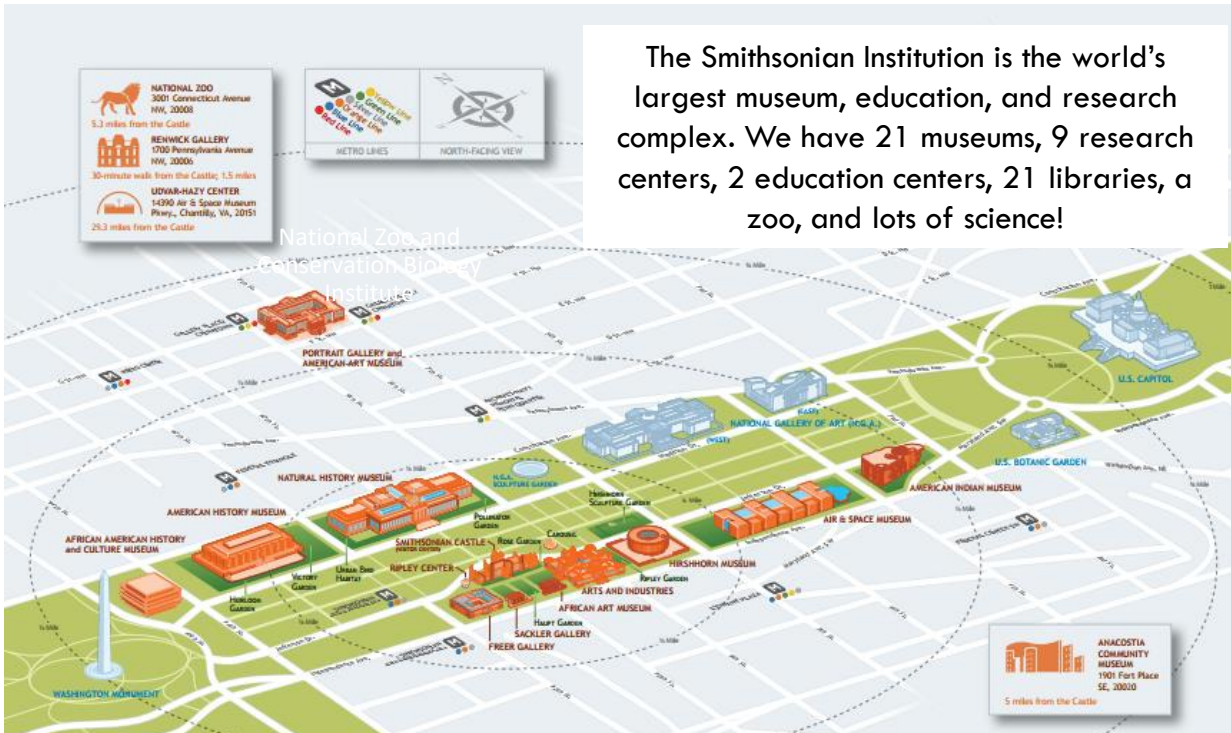
Education for Sustainable Development (ESD)

Thematic Session organized by TWAS, IAP, and UNESCO

The World Science Forum

November 22, 2024



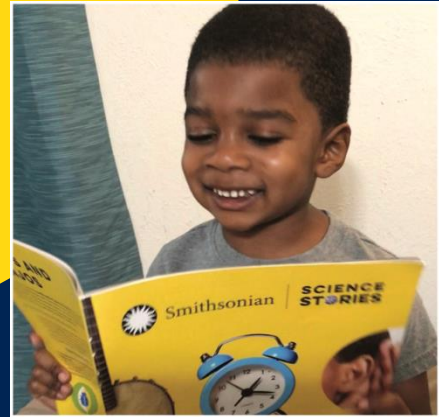




## WHAT I DO

I direct the Smithsonian Science Education Center. We develop science curriculum for youth ages 5-18; provide professional learning for K-12 teachers; and support school systems through leadership development. We bring the Smithsonian to students *where they are*, in their homes and classrooms.

**We believe that the science of the Smithsonian is for everyone.**



In 2023, the  
**Smithsonian Science Education Center** worked with Gallup to conduct a survey of K-12 educators across 5 countries (Brazil, Canada, France, India, U.S.) to assess their perspectives on “Educating for Sustainable Development.”



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## Educating for Sustainable Development

Perspectives of U.S. and Global Educators



% Brazil, Canada,  
France and India  
60

% U.S.  
17

3x

- 1 Compared with teachers in Brazil, Canada, France and India, U.S. teachers report having less support, time and expertise to incorporate sustainable development<sup>7</sup> into their curriculum.<sup>8</sup>

31%  
Clean energy

31%  
Responsible  
consumption

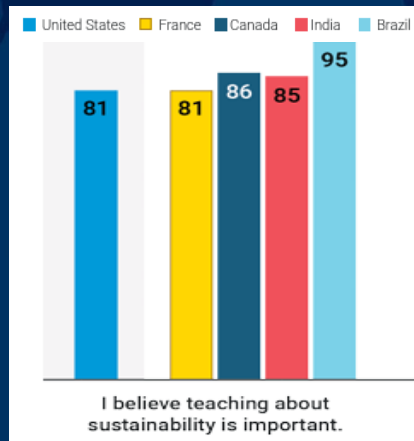
26%  
Sustainable  
communities



32%  
Climate  
action

32%  
Clean water  
and sanitation

- 2 Sustainable development — especially socio-scientific topics — is largely missing from U.S. curriculum, especially compared with Brazil, Canada, France and India.



- 3 U.S. teachers and administrators believe teaching about sustainable development is important and want to incorporate it into their lessons.

## These results align with UNESCO's 2022 Report: *Youth Demands for Quality Climate Education*



### Key Findings



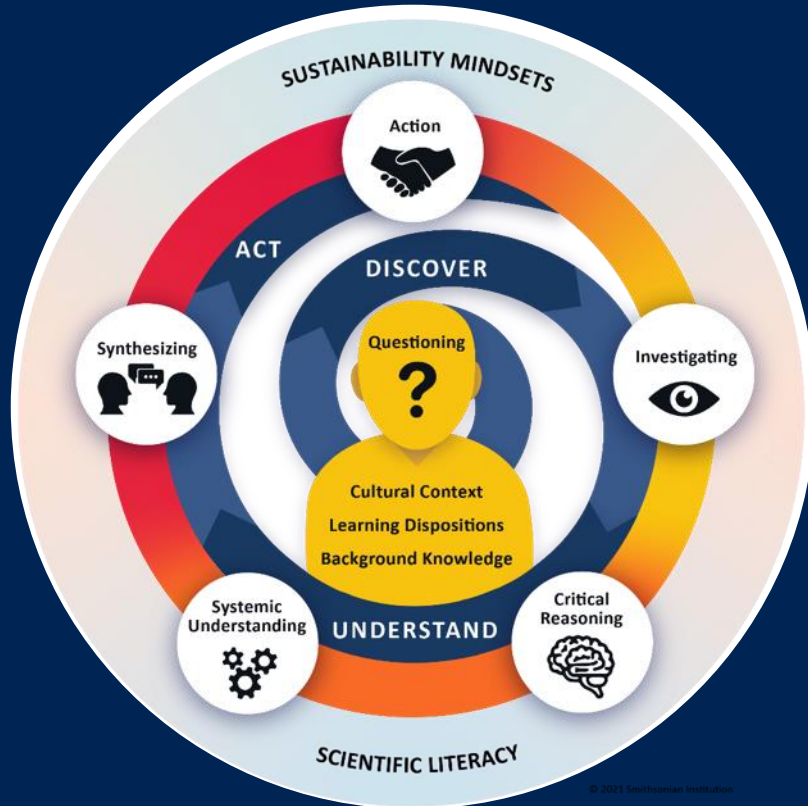
Around half of 100 countries reviewed in a recent UNESCO survey had no mention of climate change in their national curriculum



While 95% of surveyed primary and secondary teachers felt that teaching climate change is important, less than 30% expressed a readiness to teach it.



70% of young people say that they do not feel ready for climate change based on what they have learned.



We believe young people should be given the opportunity to **discover** what they already know about a topic, **understand** the scientific and socio-scientific principles of the topic using their communities as their laboratories, and **act** – designing solutions to achieve sustainable development.





If you prioritize STEM Education and Global Competence, students will not only be scientifically literate, but can develop Sustainability Mindsets, which are foundational for achieving a shared transformative future.


# SUSTAINABILITY MINDSETS





Smithsonian SCIENCE for Global Goals

**BIODIVERSITY!**  
How can we balance the needs of people with the needs of other living things?



SUSTAINABLE DEVELOPMENT GOALS

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Smithsonian SCIENCE for Global Goals

**BIOTECHNOLOGY!**  
How can we ethically create a sustainable future using biotechnology?




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**CLIMATE ACTION!**  
How can we mitigate human impacts on the atmosphere?




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**CLIMATE RESILIENCE!**  
How can communities best adjust to changing climates?




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**COVID-19!**  
How Can I Protect Myself and Others?




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**ECOSYSTEM RESILIENCE!**  
How can people with interconnected lives best adjust to a changing world?




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**ENERGY!**  
How can we harness sustainable energy for all?




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**ENVIRONMENTAL JUSTICE!**  
How can we create environments that are healthy for everyone?




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**FOOD!**  
COMMUNITY RESEARCH GUIDE  
HOW DO WE ENSURE GOOD NUTRITION FOR ALL?



SUSTAINABLE DEVELOPMENT GOALS

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Smithsonian SCIENCE for Global Goals

**MOSQUITO!**  
COMMUNITY RESEARCH GUIDE




HOW CAN WE ENSURE HEALTH FOR ALL FROM MOSQUITO-BORNE DISEASES?

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**OCEAN!**  
How can we create a sustainable future for the ocean?




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**SUSTAINABLE COMMUNITIES!**  
How will we help our community thrive?



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**VACCINES!**  
How can we use science to help our community make decisions about vaccines?



SUSTAINABLE DEVELOPMENT GOALS

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<https://ssec.si.edu/global-goals>

# Action research approach



Using variety of disciplines

Students as community  
researchers

STEM investigations

Social science investigations

Recognizing multiple ways of  
knowing

Exploring different perspectives



# Representation of Diverse Professional Mentors

Diverse representation of different ages, careers, nationalities, genders, races, and ethnicities to create a sense of connection to students

Inspirational and insightful quotes

Sharing research mentor identities so students can find points of similarity



## Meet Your Research Mentor

Meet Karuna Bajracharya. Karuna (pronounced *Kah-ROO-nah*) will be your research mentor to help you understand what kinds of **sustainable energy** can be used for cooking and how communities make decisions.

Karuna is the country manager in Nepal for the Clean Cooking Alliance. The Clean Cooking Alliance is an organization that helps communities use safer and more sustainable sources of energy for cooking. Karuna has advanced degrees in business and social science. However, she also has knowledge and **perspectives** that come from other parts of her **identity**. Since Karuna is now working with you, it is important to understand who she is.

### Karuna's Identity Map

A central circular portrait of Karuna is surrounded by 14 rounded rectangular boxes, each containing a different aspect of her identity. The boxes are arranged in two columns around the portrait.

- Female
- 56 years old
- Nepalese (Newar ethnicity)
- Is 1.8m (5'11") tall
- Lives in Nepal
- Has black hair
- Enjoys trekking and gardening
- Likes to help others
- Is shy at first
- Likes clean cooking, sustainability
- Mother of two young children
- Is a clean cooking expert in her community
- Believes everyone has special qualities and capacities
- "There is no such thing as intelligent or unintelligent."

# Transdisciplinary investigations: Example: Draw a biometric scan; consider the **ethical implications**.

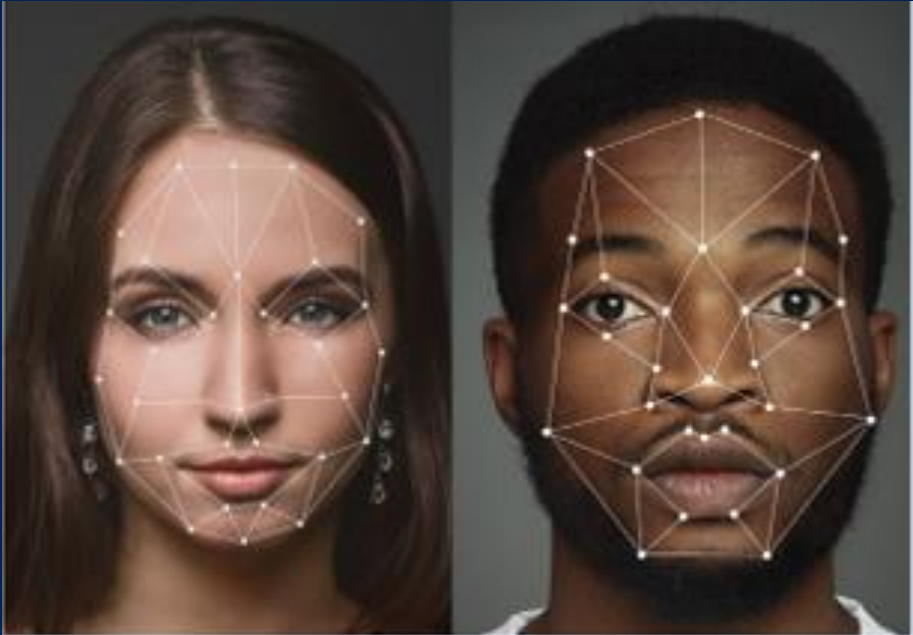


Figure 7-6: Examples of facial recognition landmarks.

 Smithsonian	<b>SCIENCE</b> <i>for Global Goals</i>
<b>BIOTECHNOLOGY!</b>	
How can we ethically create a sustainable future using biotechnology?	
	
<b>SUSTAINABLE DEVELOPMENT GOALS</b>	
 Smithsonian Science Advancement Center	 iap INSTITUTE FOR ADVANCED POLICY STUDIES



# Free Guides

Free: Available for download

Organized: Guide planners for educator support

Modular: Can be customized; are place-based

Multi-modal: Media extensions online

Translated: Available in multiple languages – contact me if you want to translate a guide into your language.



Planner					
Activity	Description	Materials and Technology	Additional Materials	Approximate Timing	Page Number
<b>Task 1: What is a sustainable future?</b>					
<i>Discover</i>	Develop a personal identity map showing the different parts of who you are and create a futures mood board showing your ideas about the future.	<ul style="list-style-type: none"><li>• Paper</li><li>• Pens or pencils</li><li>• Objects that represent you (optional)</li><li>• Class board or poster paper</li><li>• Photos or magazines (optional)</li></ul>		25 minutes	7
<i>Understand</i>	Survey your community to discover different perspectives on a sustainable future.	<ul style="list-style-type: none"><li>• Paper</li><li>• Pens or pencils</li></ul>		25 minutes + survey time	12
<i>Act</i>	Examine the Sustainable Development Goals, consider how biotechnology can play a role in a sustainable future, and pick the guide parts you want to use.	<ul style="list-style-type: none"><li>• Paper</li><li>• Pens or pencils</li></ul>	<i>Futures Mood Board</i>	25 minutes	17

Part 1 Planner

## Global Youth Action Projects



**Rehomed native flora  
on school campuses  
to preserve  
biodiversity** (Florida)



**Redesigned local coastal  
land-use plan to meet  
community needs**  
(Uruguay)



**Developed nature-based  
mosquito repellent to  
combat malaria spread**  
(Panama)



**Held a sustainability expo to showcase  
local efforts and businesses**  
(Philippines)



**Designed green bus shelters to  
improve air quality and support the  
local bee population** (France)

# Smithsonian Science for Global Goals Impact Data

Smithsonian | **SCIENCE**  
*for Global Goals*

**LEARNING WITHOUT BORDERS**

Media Kit

developed by  
Smithsonian  
*Science Education Center*

in collaboration with  
**iap** SCIENCE  
HEALTH  
POLICY  
the Interacademy partnership

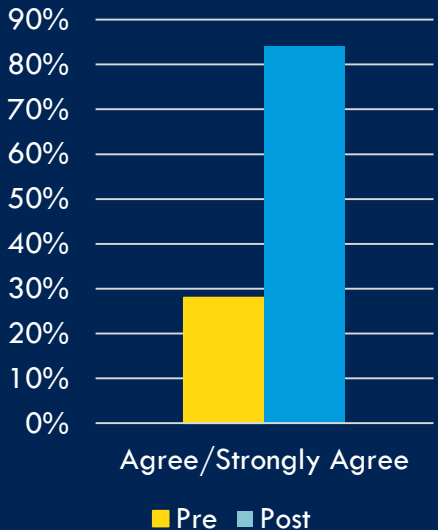
**6.7 Million Students Reached**

**50,000 Educators Trained**

**108 Countries Reached**

# Student and Educator Perception Data

I have a clear understanding of a sustainable human existence



Students who engaged with the  
*Environmental Justice!* Guide

*“My students took action to get rid of Styrofoam in their cafeteria after learning from the Smithsonian guide. **This changed my perspective as an educator**, as I realized my students were more capable of action and deep thinking than I previously thought.”*

*US High School Science Teacher*

*In utilizing these guides, differences in background became a resource for accomplishing the tasks. **Students appreciated science as a tool to understand and serve the community.***

*Science Educator in the Philippines*



# Conclusion:

Implementation of Education for Sustainable Development (ESD) is not consistent across countries or educators, who want to teach ESD, but need the support and resources to do so.

Through the Smithsonian Science for Global Goals project, the Smithsonian and IAP can help students discover the connections between themselves, their communities, and global issues; investigate issues using their communities as their laboratories; gather data relevant to them and their community using science and social science approaches; and act on what they have learned, applying their new knowledge for social good.

Upending traditional approaches to IBSE, the project centers student voices, diverse perspectives, representational role models, an emphasis on inclusion, and multiple ways of knowing. This innovative approach centers young people in leading their science learning and casts science educators as facilitators of that process.

Filtered through the lenses of systems and futures thinking, this approach transforms education into an experience relevant to the complexities of the 21<sup>st</sup> Century and integral to the accomplishment of the SDGs.

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