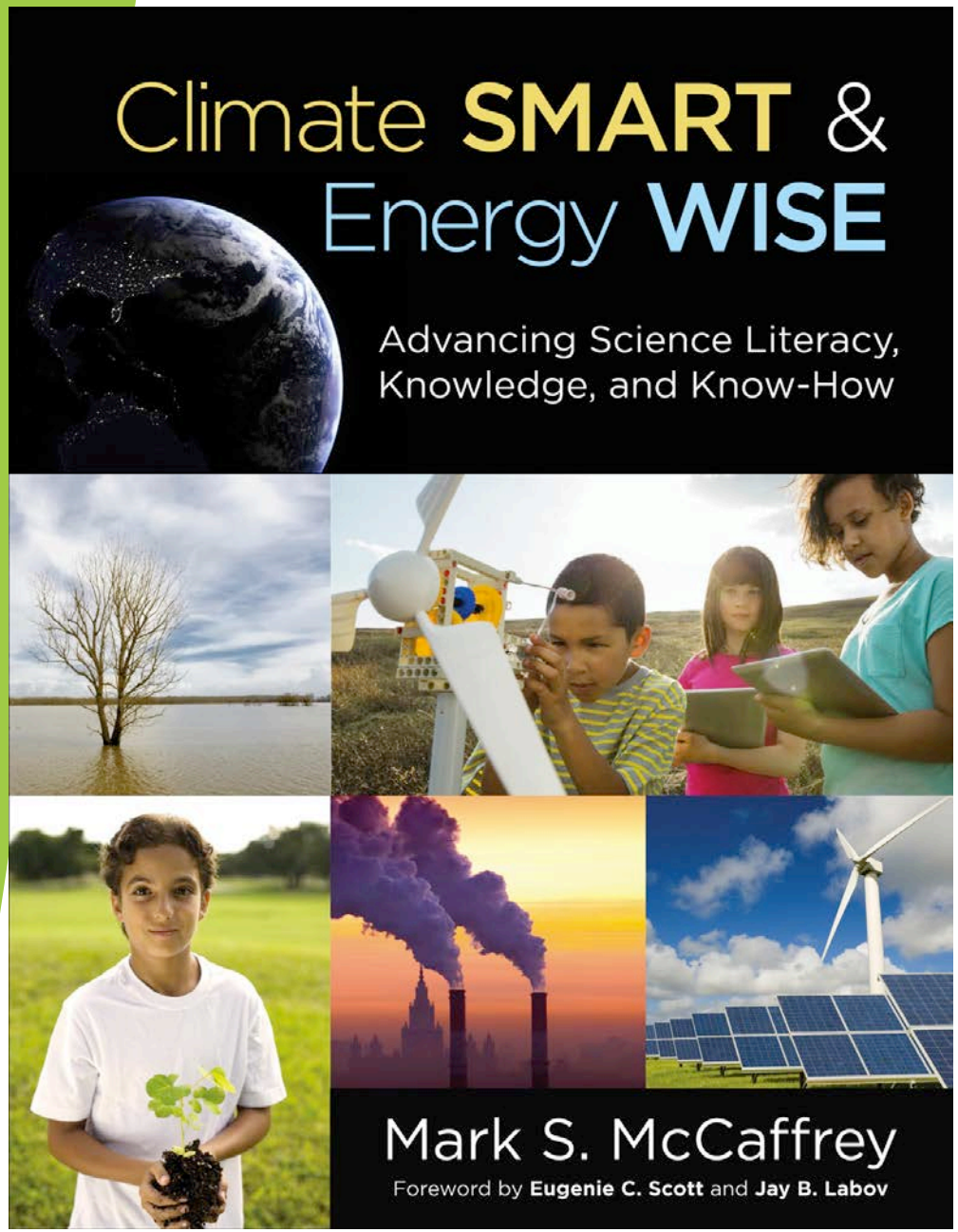
Education, Communication & Outreach NGOs (ECONGO)

A new community for individuals and organizations supporting climate action through informed decision-making and effective engagement

Preparing, Informing and Engaging for Climate Action and Empowerment

Published September 2014 by Corwin Press



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NATIONAL UNIVERSITY OF PUBLIC SERVICE

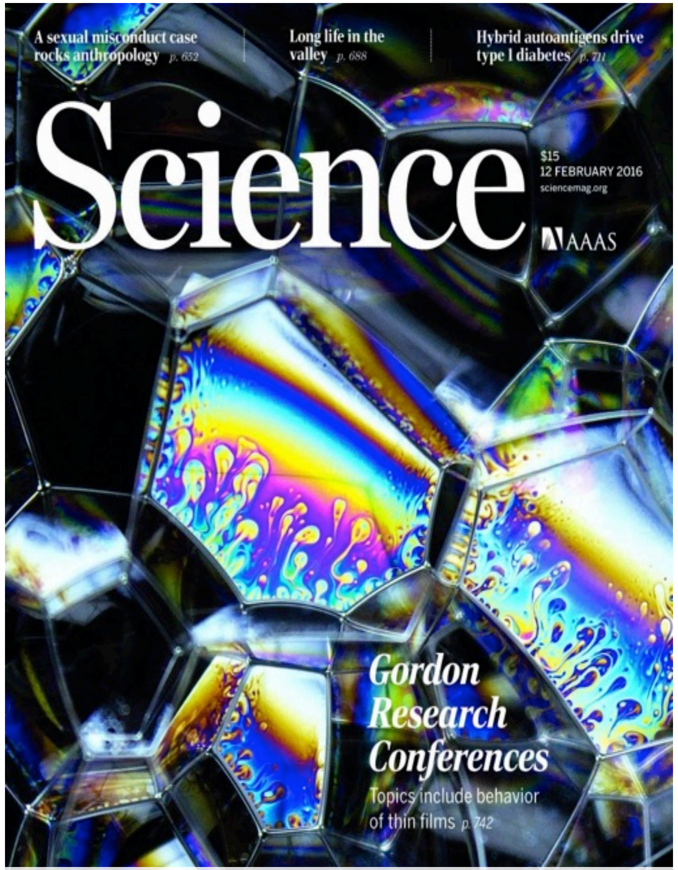
NATIONAL CENTER for Science Education

NCSE

DEFENDING THE TEACHING OF EVOLUTION & CLIMATE SCIENCE

PennState Social Science Research Institute

February 2016



SCIENCE EDUCATION

Climate confusion among U.S. teachers

Teachers' knowledge and values can hinder climate education

By Eric Plutzer,[1] Mark McCaffrey,[2] A. Lee Hannah,[3] Joshua Rosenau,[2] Minda Berbeco,[2] Ann H. Reid[2]

Although more than 95% of active climate scientists attribute recent global warming to human causes (1, 2) and most of the general public accepts that climate change is occurring, only about half of U.S. adults believe that human activity is the predominant cause (3), which is the lowest among 20 nations polled in 2014 (4). We examine how this societal debate affects science classrooms and find that, whereas most U.S. science teachers include climate science in their courses, their insufficient grasp of the science may hinder effective teaching. Mirroring some actors in the societal debate over climate change, many teachers repeat scientifically unsupported claims in class. Greater attention to teachers' knowledge, but also values, is critical.

EDUCATION

Prior surveys [e.g., (5, 6)] suggest that many teachers devote class time to climate change. Although these surveys are suggestive, their use of nonprobability sampling undermines the validity of their results. None quantified the amount of class time or the specific topics covered in class. We undertook the first nationally representative survey of science teachers focused on climate change. Working from a commercial database of 3.9 million teachers, we drew a stratified probability sample of 5000 names and implemented a multiple-contact paper and Web survey protocol during academic year 2014–15. We collected data from 1500 public middle- and high-school science teachers from all 50 U.S. states representative of the population of ... of school size, stu... s, and community economic and political characteristics. See supplemental materials (SM) for details.

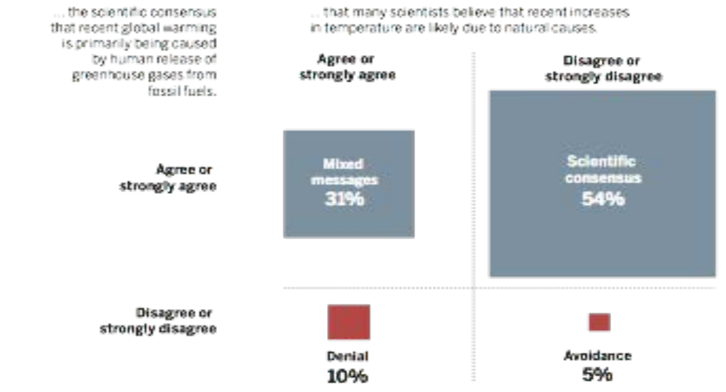
...ICS. Three in four science teachers allocate at least an hour to discussing recent global warming in their ... ding 70% of mid- ... and 87% of high-school biology teachers (table S7). Because virtually all students take middle-school science and 97% enroll in a general biology class (7, 8), the likelihood of any student missing instruction in climate change altogether is low—on the order of 3 to 4%. Most teachers reported covering the greenhouse effect (66%), the carbon cycle (63%), and four or more observable consequences, such as sea-level rise, or changes in seasonal patterns, like the flowering of plants and animal migrations. Teachers also discuss responses to climate change and careers addressing the challenges it poses.

Although most students will hear something about climate change in a science class, the median teacher devotes only 1 to 2 hours to the topic (table S7), inconsistent with guidance from leading science and education bodies [e.g., (9)]. Of course, quality of instruction is more important than quantity, so we turn to how students are introduced to climate change science.

MIXING MESSAGES. Notably, 30% of teachers emphasize that recent global warming "is likely due to natural causes," and 12% do not emphasize human causes (half of whom do not emphasize any explanation and thereby avoid the topic altogether). Of teachers who teach climate change, 31% report sending explicitly contradictory messages, emphasizing both the scientific consensus that recent global warming is due to human activity and that many scientists believe recent increases in temperature are due to natural causes (see the first chart). Why might this be the case? Some teachers may wish to teach "both sides" to accommodate values and perspectives that students bring to the classroom (6, 10). Beyond that, the survey data allow us to evaluate three explanations.

First, teachers might experience overt pressure from parents, community leaders, or school administrators not to teach climate change. Only 4.4% of teachers reported such pressure (6.1% reported pressure to teach it, mostly from fellow teachers). This is less than the 15% reporting pressure in Wise's pioneering survey (6), and far less than biology teachers reported in a survey on teaching evolution (10).

Second, teachers also may not be very knowledgeable about a wide range of evidence—e.g., CO_2 measurements from ice cores and from direct measures at Mauna Loa—and how climate models work. Given the relative novelty of the topic in classrooms, instructional materials, and preservice training, this would not be surprising, and nearly 50% said that they would prioritize one or



Teachers' emphasis. Teachers reported emphasis on causes of global warming, among those devoting an hour or more to the topic (see SM for details).

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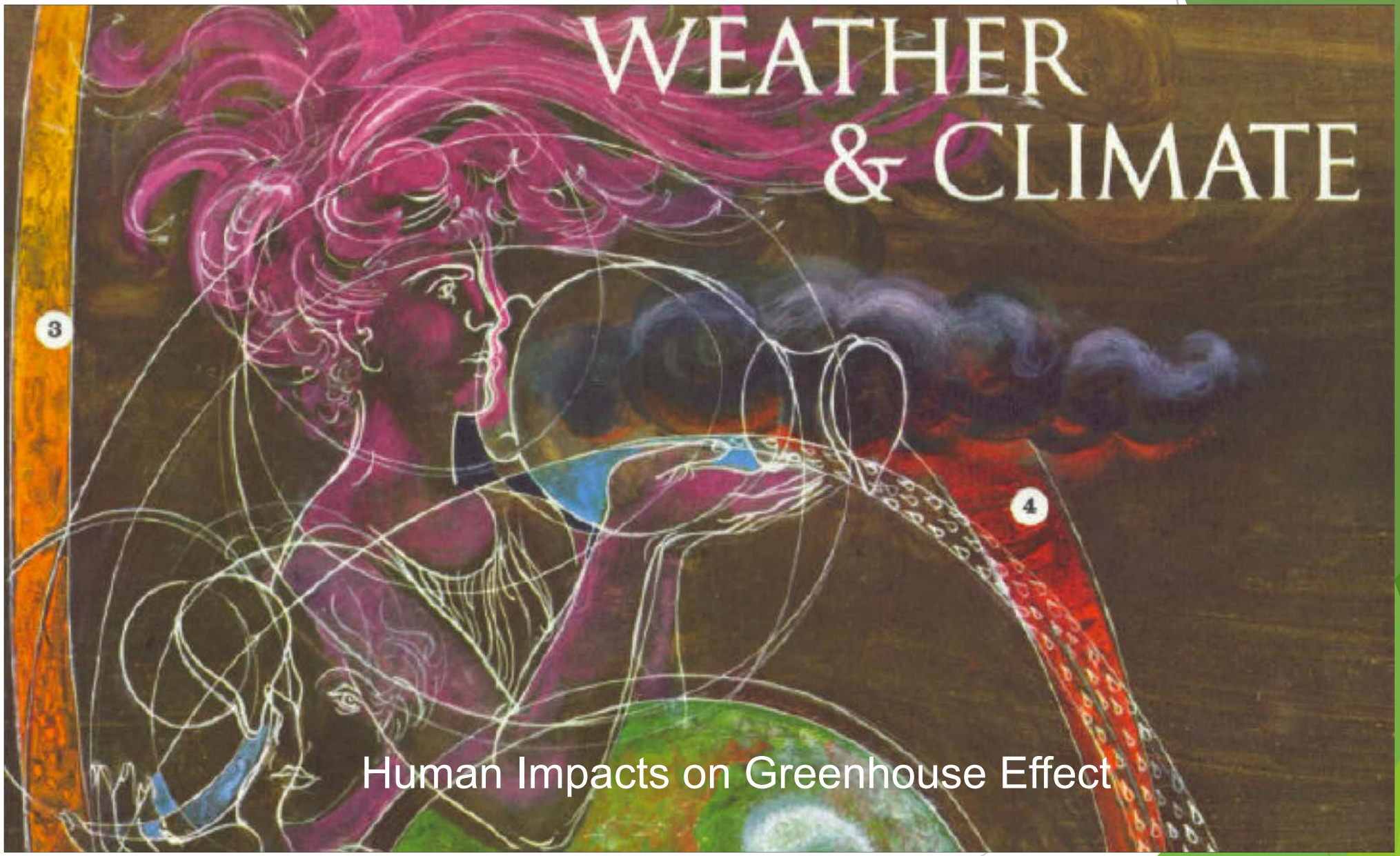
- Most teachers spend 1-2 hours a semester on climate change
  - Many suggest scientists uncertain about how serious it is

Early Climate Education during International Geophysical Year (IGY) 1957-58



Human Impacts on Greenhouse Effect

"Our industrial civilization has been pouring carbon dioxide into the atmosphere at a great rate....

If it remained, it would have a marked warming effect on the earth's climate…

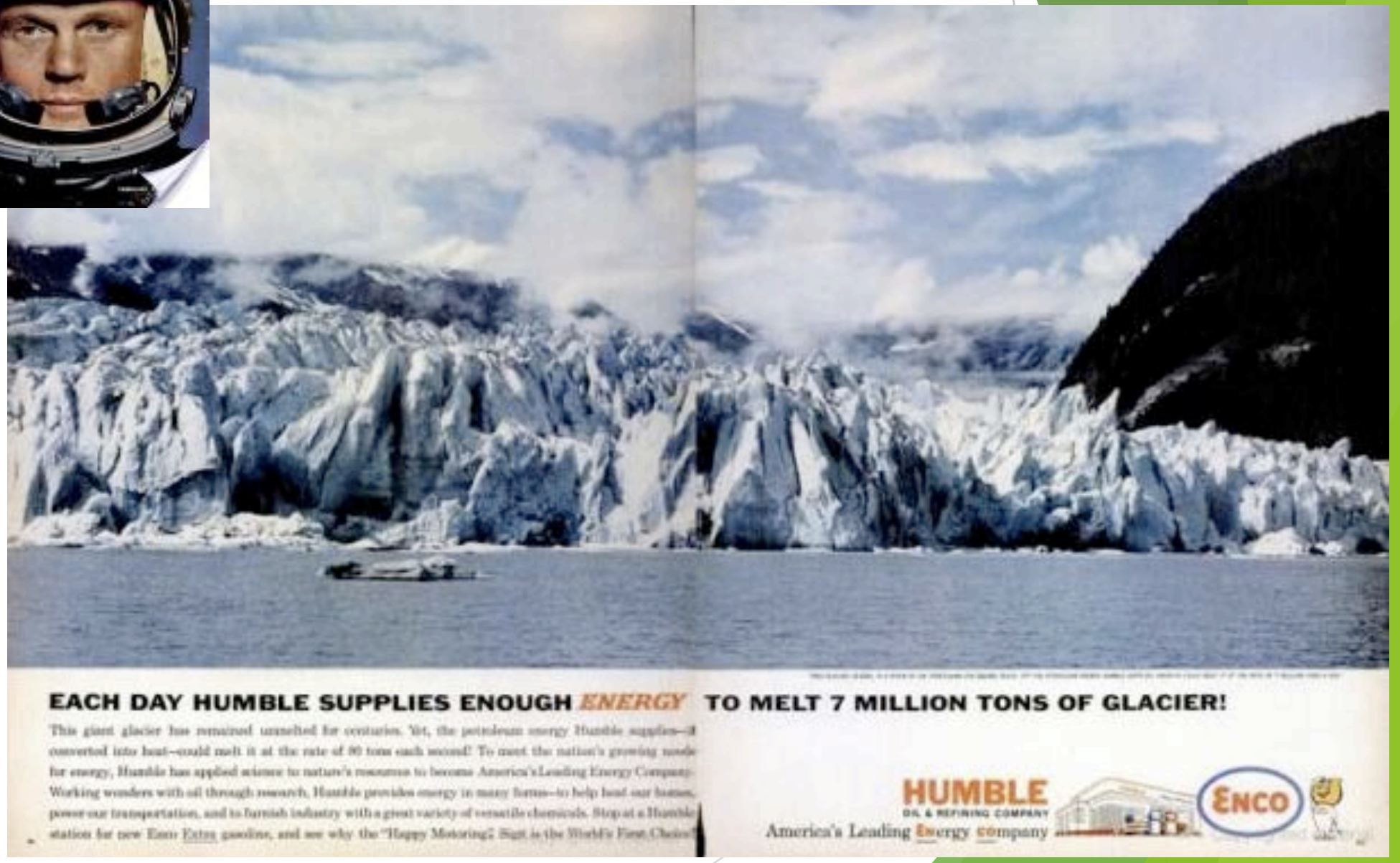
Conceivably… it could cause significant melting of the great icecaps and raise sea levels in time.”

Planet Earth: The Mystery with 100,000 Clues
National Academy of Sciences
1958

Early Climate Communication Circa 1958

Life Magazine February 2, 1962

Early Climate Outreach Circa 1962

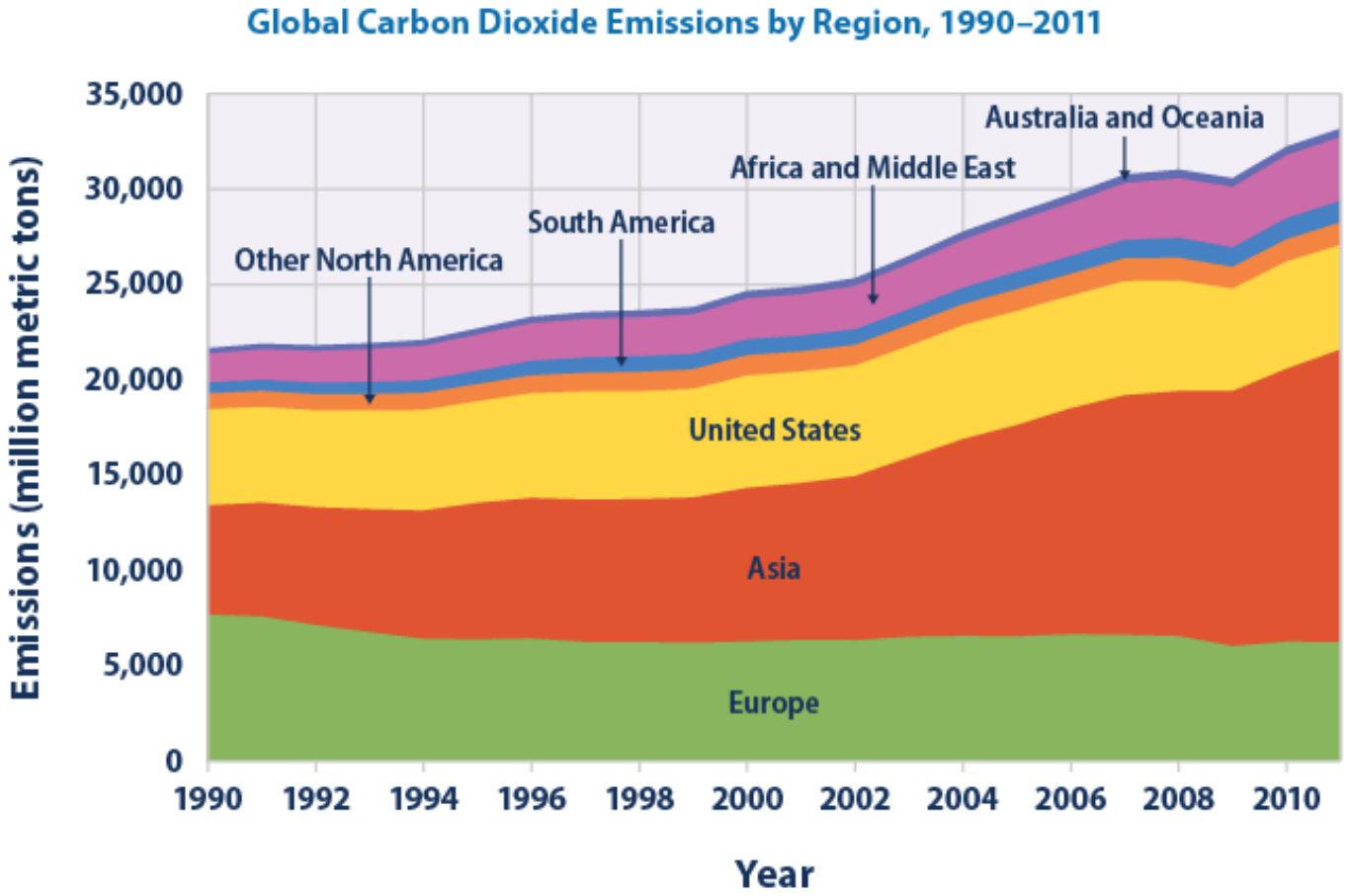


United Nations Framework Convention on Climate Change (UNFCCC) 1992

United Nations
Framework Convention on
Climate Change

UNFCCC Goal:

Stabilize Greenhouse Gas Concentrations [&] Prevent Dangerous Anthropogenic Interference with the Climate System



Data source: WRI (World Resources Institute). 2014. Climate Analysis Indicators Tool (CAIT) 2.0: WRI's climate data explorer.

UNFCCC ARTICLE 6: EDUCATION, TRAINING AND PUBLIC AWARENESS

ARTICLE 6: EDUCATION, TRAINING AND PUBLIC AWARENESS

In carrying out their commitments under Article 4, paragraph 1(i), the Parties shall:

(a) Promote and facilitate…

(i) The development and implementation of educational and public awareness programmes on climate change and its effects;

(ii) Public access to information on climate change and its effects;

(iii) Public participation in addressing climate change and its effects and developing adequate responses; and

(iv) Training of scientific, technical and managerial personnel.

1992

United Nations
Framework Convention on
Climate Change

UNFCCC ARTICLE 6: EDUCATION, TRAINING AND PUBLIC AWARENESS

(b) Cooperate in and promote, at the international level, and, where appropriate, using existing bodies:

(i) The development and exchange of educational and public awareness material on climate change and its effects; and (ii) The development and implementation of education and training programmes, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries.

United Nations
Framework Convention on
Climate Change

Doha Work Programme - 2012-2020

United Nations

FCCC/SBI/2012/L.47

Framework Convention on Climate Change

Distr.: Limited
1 December 2012

Original: English

Subsidiary Body for Implementation
Thirty-seventh session
Doha, 26 November to 1 December 2012

Agenda item 14
Article 6 of the Convention

Article 6 of the Convention

Draft conclusions proposed by the Chair

Recommendation of the Subsidiary Body for Implementation

(i) Identify gaps and needs for the implementation of Article 6 of the Convention; (ii) Assess the effectiveness of Article 6 activities.... National Focal Points to lead coordination of education, training, public information and engagement, international collaboration and cooperation

United Nations

Framework Convention on Climate Change

FCCC/CP/2014/L.1/Rev.1

Distr.: Limited

Conference of the Parties
Twentieth session
Lima, 1–12 December 2014

Agenda item 21
Other matters

The Lima Ministerial Declaration on Education and Awareness-raising

Draft decision -/CP.XX

Stress that education, training, public awareness, public participation, public access to information, knowledge and international cooperation play a fundamental role in meeting the ultimate objective of the Convention and in promoting climate-resilient sustainable development

Paris Agreement
12 December 2015
Adopted by Consensus

- Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels
- Adapt to...climate change and foster climate resilience [but] not threaten food production
- Making finance flows towards low greenhouse gas emissions and climate-resilient development

Paris Agreement

- Article 12:

Parties shall cooperate in taking measures, as appropriate, to enhance climate change education, training, public awareness, public participation and public access to information, recognizing the importance of these steps with respect to enhancing actions under this Agreement.

United Nations
Framework Convention on
Climate Change

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UNITED NATIONS ALLIANCE ON CLIMATE CHANGE

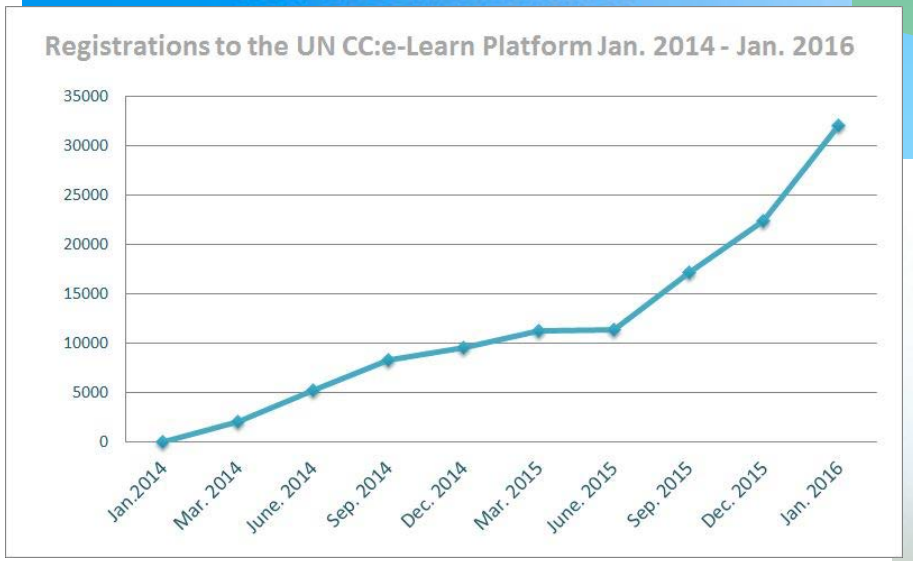
EDUCATION, TRAINING AND PUBLIC AWARENESS

Like 157

UN CC:Learn

The One UN Climate Change Learning Partnership

Investing in People and Learning to Foster a Climate Resilient and Green Transition



Global UN CC:Learn Partners

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

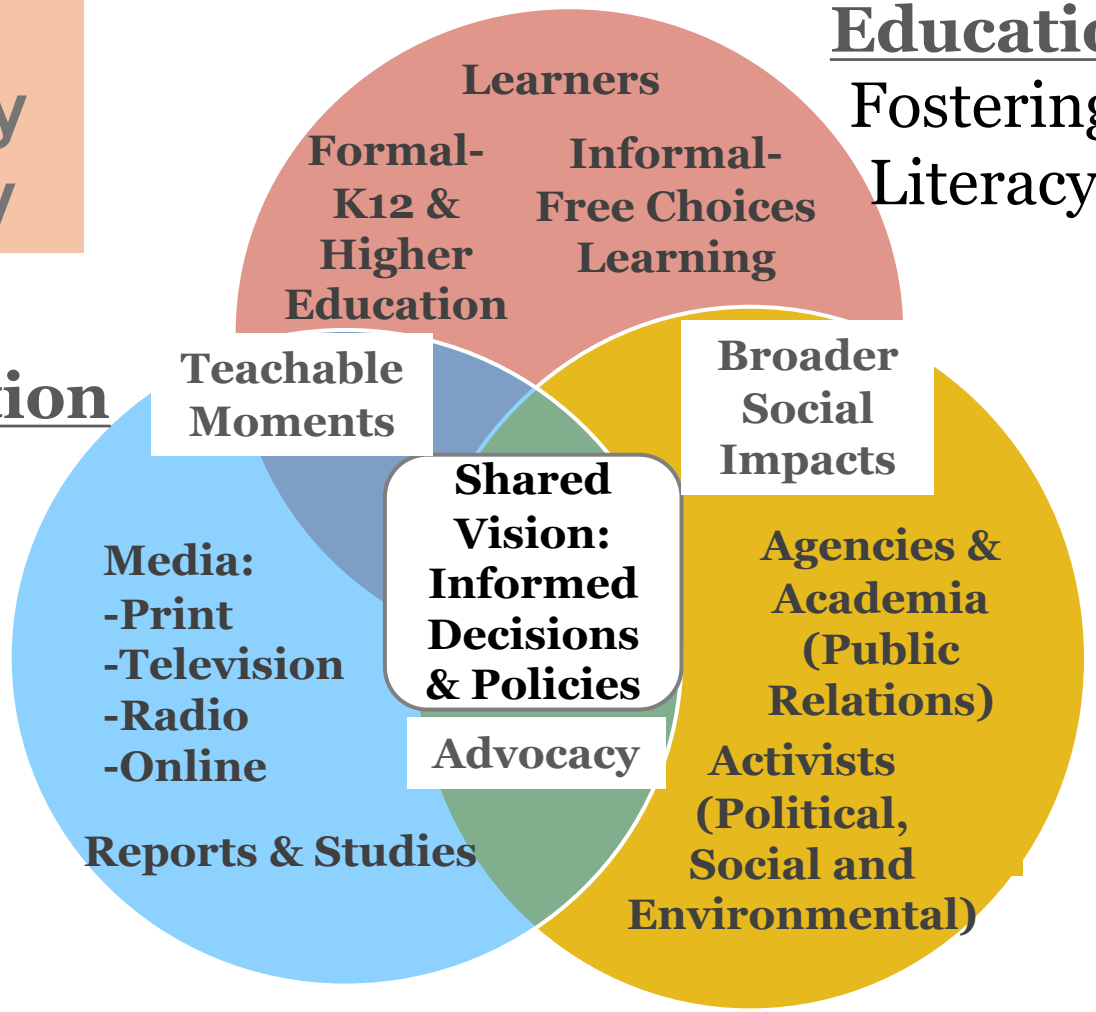
Knowledge & Know-how ECO-system

Building Community & Capacity

Education
Fostering Literacy

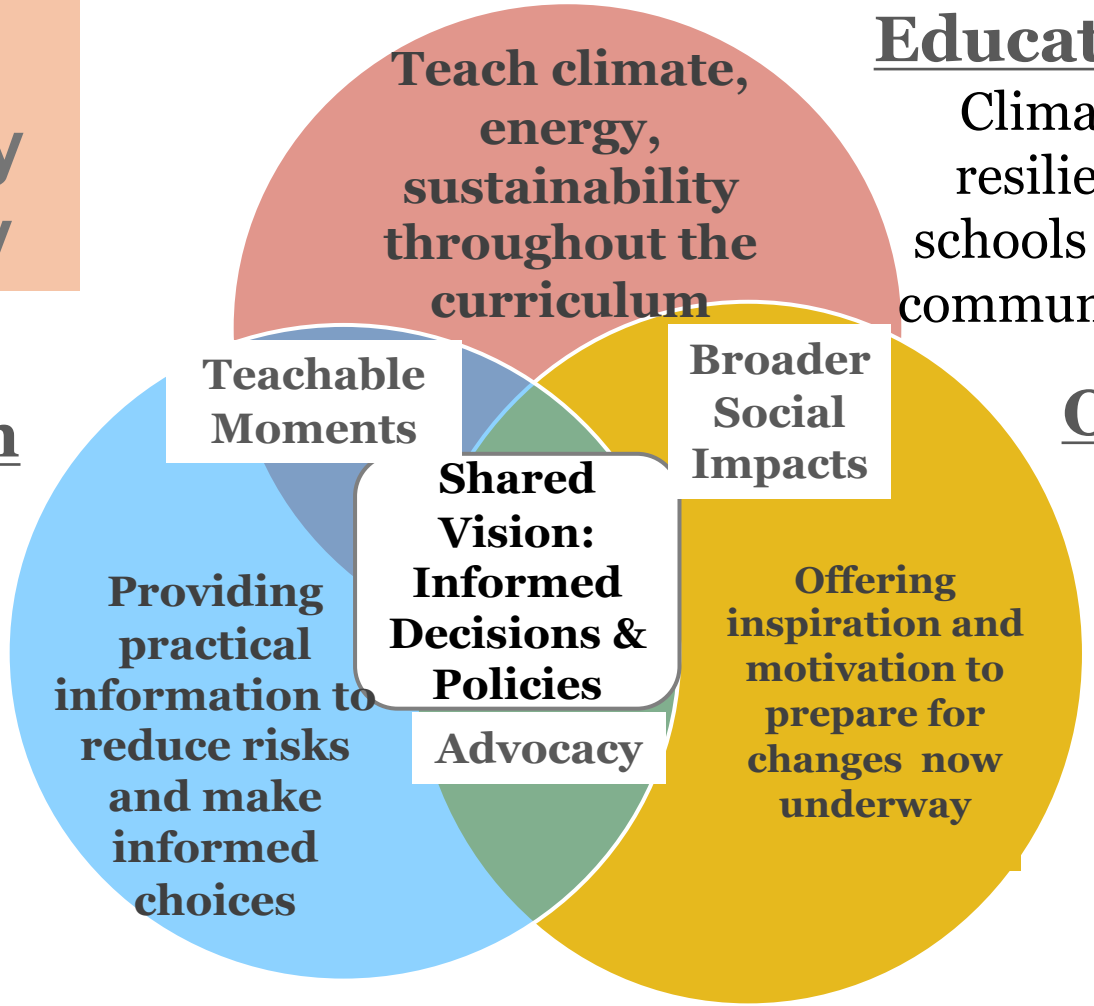
Communication
Translating & Conveying Information

Outreach
Promoting Brand or Agenda



Theory of Change
Measuring Impacts & Cross-fertilization

Building Community & Capacity



Education

Climate resilient schools and communities

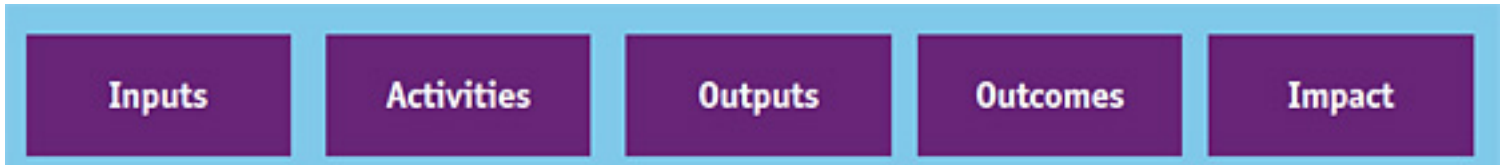
Communication

Conveying risks and responses

Outreach

Clear messages from trusted source repeated often

Logical Framework for Climate Action



Anthropogenic Climate Modification

Fossil Fuels - Burn for Energy - Increased GHG - Heating Atmosphere - Global/Local Impacts

Education

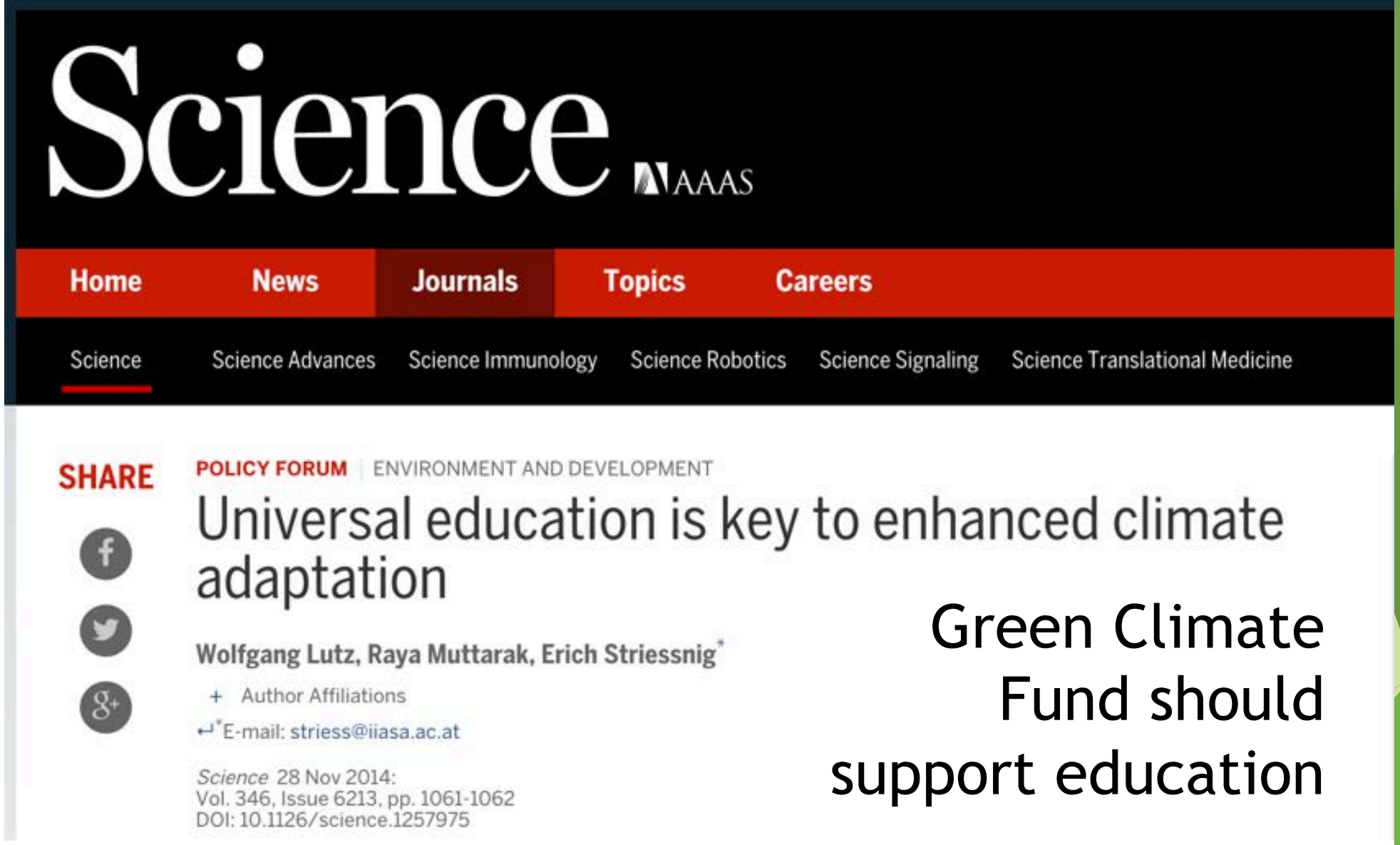
Life long learning and climate literacy

Communication

Ongoing information sharing for decision-making

Outreach

Inspiring through effective messages



Green Climate Fund should support education

"...efficient and effective to give part of this fund to educators rather than engineers."

The Innovation Imperative

Innovation (noun)

*the action or process of innovating.

- Innovate (verb)

- to introduce something new; make changes in anything established.

Innovation = make clean energy widely affordable

Richest man in the world ↗

Announced at COP21 in Paris- 1 December 2015

Japan infuses renewable energy into education

Images courtesy of Kyocera

- The Ministry of Education, Culture, Sports, Science and Technology of Japan
- Provided grants for installing renewable energy in schools
- +7,000 schools surveyed installed renewable energy:
  - solar panels
  - wind
  - biomass
  - geothermal
  - micro hydropower

What does success look like?
One possible indicator: Schools and communities transformed into living laboratories for resilience and sustainability

The Global Game Changer

TO BUILD A BETTER FUTURE, WE MUST IMAGINE OURSELVES THERE


SUS
DEV
17 G
1 NO POVERTY
2 ZERO HUNGER
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WO
ECONOMIC
13 CLIMATE ACTION
14 LIFE BELOW W
13 CLIMATE ACTION
Take urgent action to combat climate change and its impacts
6 CLEAN WATER AND SANITATION
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
SUSTAINABLE DEVELOPMENT GOALS

PLAN FOR THE FUTURE

- Planning for 1 year: plant rice
- Planning for 10 years: plant a tree
- Planning for 100 years: educate children
- Planning for 1000 years: inform, inspire & engage society