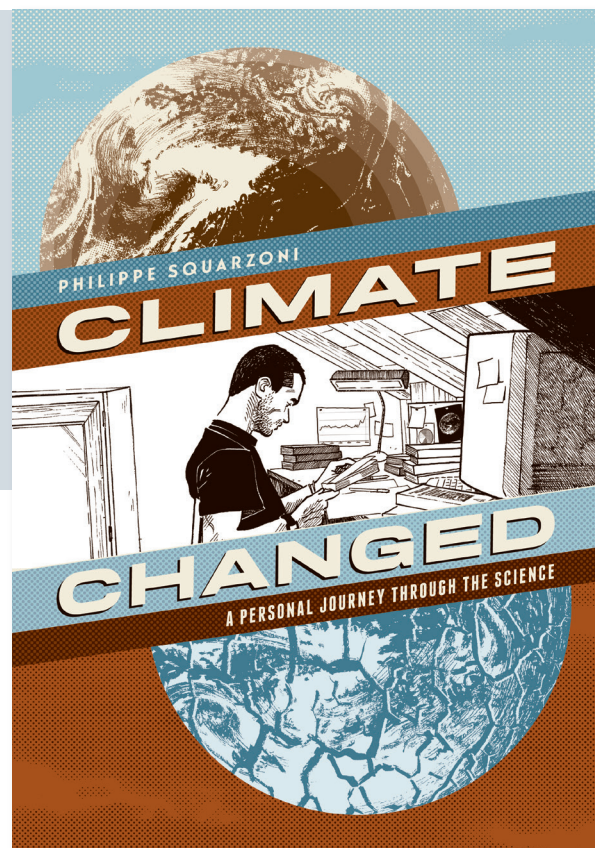


TEACHER'S GUIDE TO *CLIMATE CHANGED* A PERSONAL JOURNEY THROUGH THE SCIENCE BY PHILIPPE SQUARZONI



CURRICULAR RATIONALE

The issues addressed in *Climate Changed* provide multiple opportunities for educators to deepen student engagement with the scientific method generally and with specific—and compelling—scientific content. These include questions of how to gather and evaluate evidence, synthesize knowledge from several subdisciplines (e.g., earth science, biology, chemistry), and analyze both the impact and promise of technology on humans and the environment. Moreover, in a manner that naturally supports cross-disciplinary learning and team teaching with social studies educators, Philippe Squarzoni's rigorous presentation of the relevant science and thoughtful reflection on the implications for policy, both public and personal, allow teachers to integrate economic, political, and individual responses to the realities of climate change that students will experience in their lifetime. The fact that *Climate Changed* is also a highly expressive work of graphic nonfiction rich in text features, and thoroughly capable of functioning as a primary and secondary source, make it an optimal text for students at various levels to approach the subject matter and exercise a wide range of literacies and critical-thinking skills.

USING THIS GUIDE / STANDARDS ALIGNMENT

In terms of the structure of this guide, a framework for inquiry is first provided, followed by a reproducible page of assessment, various extension activities, and, finally an index to the book's teachable content. For your convenience, this guide is aligned with the Common Core State Standards (CCSS), specifically the "Literacy in Science & Technical Subjects" strand, and the framework of thematic standards of the National Council for the Social Studies (NCSS). These correlations appear alongside the central questions as well as the activities and extensions. Please note that for the CCSS, the relevant grade spans are 9–10 and 11–12, as the content is easily applicable across high school curricula and also appropriate for introductory college-level courses, particularly those with a "Science in Human Affairs" focus.



THE POWER OF METAPHOR

JOINING ART, SCIENCE, AND INDIVIDUAL RESPONSIBILITY

Throughout his book, Squarzoni employs visual metaphors, sometimes dramatically, often quite subtly. A key recurring motif concerns entrances, thresholds, and the important decisions that must be made by societies and individuals in response to climate change—"There's a doorway we need to pass through" (p. 453). Ask: What does this doorway represent in terms of practical action and how does the author's revisiting of this symbol (pp. 11, 26, 34, 300, 460) underscore the ethical and emotional dimensions of the scientific and political issues?

CCSS RST.9-10.4 RST.11-12.4 NCSS Science, Technology, and Society; Civic Ideals and Practices

CENTRAL QUESTIONS

The following can serve as a framework to focus reading when assigned, to organize and stimulate discussion after reading, or as the basis for assessment or reflective writing assignments. Each central question is followed by examples of specific subtopics and page references.

1. What convincing evidence exists for anthropogenic climate change?

- Evaluate: which evidence is most compelling, and why? (A summary appears on **p. 429**.) Has the author always provided evidence for causation, not simply correlation (e.g., **p. 51**)?
- How do the experts represented in the book consider, and refute, evidence for counterarguments (e.g., solar activity as a cause of warming, **p. 101**)?
- Is the extended account of Hurricane Katrina (**pp. 390–401**) evidence of climate change and what might be in store for us as a result, or an example of the social chaos that could ensue if adequate planning does not take place?

CCSS RST.9-10.1 RST.11-12.1 **NCSS** People, Places, and Environment; Power, Authority, and Governance

2. What are the potential consequences of global climate change?

- Rank these consequences in order of severity, both in the short and long term.
- How might these consequences reinforce each other (**pp. 272–73**)?
- Describe some of the possible social and political consequences and the factors that would prompt them (**pp. 238–39, 244–47, 262, 274–75**).
- How will the unequal distribution of consequences mirror current inequalities? (E.g., **p. 277**: “Where there is a lot of water, there will be even more water. The more fortunate are responsible for what’s happening than the less fortunate, who are more affected.”)

CCSS RST.9-10.2 RST.11-12.2 **NCSS** Global Connections; Time, Continuity, and Change

3. On the levels of the individual and society, should we feel optimistic or pessimistic regarding the prospects of combatting the most pressing of these consequences?

- Consider this statement: “The beginning of the end of the world is beginning” (**p. 304**). Does it belong in a book about science? Does it make the discussion more authentic and/or state clearly what’s at stake in terms of climate change? Does Squarizoni sufficiently prove this point? Why or why not?
- Are there reasons to be optimistic that the text neglects or too easily dismisses (**pp. 313, 449**)? Explain.
- How might the lack of scientific understanding among the general public contribute to unfounded optimism (e.g., climate change will be far in the future—there will be tech solutions by then), often through the manipulation of data (**p. 416**)?

CCSS RST.9-10.6 RST.11-12.6 **NCSS** Time, Continuity, and Change

4. How should we go about taking concrete steps in terms of policy?

- Why do some feel that technological solutions to energy reduction (and therefore climate change) actually mask the real issues (**pp. 340–41**)? Is it really necessary to “rethink our way of life”? Why or why not?
- What does the author mean when he consistently cites “ideology” (**pp. 380, 419, 423**) as a problem? What deep-seated economic, political, and personal beliefs make it difficult to mount effective policy shifts in response to climate change?
- In which areas would you be willing to make different personal choices? Would you cut back on travel (**pp. 205, 209, 217, 219**, etc.)? What about “eating local” (**p. 212**) or giving up meat (**p. 211**)? Do such sacrifices accomplish any significant change in the end (**p. 259**)?

CCSS RST.9-10.8 RST.11-12.8 **NCSS** Science, Technology, and Society; Production, Distribution, and Consumption; Global Connections

5. How does the use of personal narrative and/or the graphic novel medium affect the delivery of the book’s information and message?

- What effect does embedding graphs and featuring numerous images of the natural world have on the nature of graphic storytelling? What is the effect of “seeing” scientists speak rather than just reading interview quotes or excerpts from their work?
- At both the beginning and the end of the book, the author confesses to ignorance (**p. 31**) or the possibility of being wrong (**p. 457**)—What effect, if any, does this have on the text’s credibility?
- Does writing from the perspective of a French citizen enhance or undermine the author’s critique of the “American way of life”? Do you detect any cultural or political biases in the book? Support your opinion with relevant text evidence.

CCSS RST.9-10.10 RST.11-12.10 **NCSS** Individual Development and Identity; Global Connections

KNOWLEDGE INVENTORY

CLIMATE CHANGED WORKSHEET

Name _____ Date _____

TRUE OR FALSE

1. Some countries will benefit from climate change. T / F
2. Oddly, there's a fairly good chance that the depletion of one fossil fuel—oil—will reduce global warming in a generation or so. T / F

SHORT ANSWER

3. What single phenomenon threatens agricultural production, coral reefs, and sixteen of the world's twenty largest cities
4. Provide an example of a "feedback loop."
5. The author writes that "humanity is caught between two threats." What are they?

MULTIPLE CHOICE

6. Which best defines "IPCC"?
 - a) an international measurement of carbon
 - b) a greenhouse gas that does not occur naturally
 - c) a group that summarizes and synthesizes research
 - d) an organization that suggests alternatives to capitalism
7. Why are renewable energies not viewed as an effective solution to climate change?
 - a) Most people are prejudiced against technology such as wind power.
 - b) The renewable forms simply won't be able to match the scale of the non-renewables.
 - c) When scrutinized, nearly every renewable actually creates more emissions.
 - d) Climate change will create conditions under which the renewables won't function as well (e.g., erratic wind and water flow patterns).
8. Which is NOT a greenhouse gas?
 - a) ozone
 - b) methane
 - c) radon
 - d) water vapor
9. What would the U.S. have to reduce by approximately 90 percent to achieve close to the planet's average?
 - a) its coastal population
 - b) CO2 emissions per person
 - c) overall use of fossil fuels
 - d) per capita wealth of adults

ESSAY QUESTION (please use the other side of this sheet as necessary)

10. According to the author, how does media coverage of climate change, including its current consequences, hamper the ability of societies to take necessary steps?

EXTENSION PROJECTS AND ACTIVITIES

Writing Activities

Using *Climate Changed* as a model, assign a personal narrative that involves students' growing and evolving awareness of an environmental issue. Encourage them to incorporate the recorded voices of peers or adults who opened their eyes to it as well as digital artwork and photos that depict both the topic and themselves at particular points in time.

CCSS WHST.9-10.10 WHST.11-12.10 **NCSS** Time, Continuity, and Change

Geography/Fine Arts

Drawing inspiration from the author's renderings of his childhood home, ask students to select a place that holds special meaning for them. Then, using graphic storytelling, photography, or painting, they should show not only how it appears in memory, but also how climate change or other related environmental shifts might affect it in the future (e.g., resource extraction, fluctuations in water availability, severe weather, etc.)—providing written evidence from the text and/or other sources as needed.

CCSS WHST.9-10.1. WHST.11-12.1. **NCSS** People, Places, and Environment; Time, Continuity, and Change

“Revised Edition” Research

Scientific studies on climate change are constantly being conducted; such is the pressing nature of the issue. Ask students to research important new evidence that has surfaced since this book was first published and make recommendations on whether it deserves inclusion in a hypothetical update of its content. Which specific pages or sections would they revise if they were an editor of a new edition?

CCSS WHST.9-10.1.B WHST.11-12.1.B WHST.9-10.8 WHST.11-12.8

Further Reading

Squarzoni writes that climate “has determined the history of civilizations. It has contributed to their rise and fall.” Assign students works that address this notion at length, such as Jared Diamond’s *Collapse* (2005), and ask them to summarize and evaluate their ideas for the class.

CCSS WHST.9-10.7 WHST.11-12.7 RST.9-10.2 RST.11-12.2 **NCSS** Production, Distribution, and Consumption; Science, Technology, and Society; Global Connections

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ANSWER KEY TO KNOWLEDGE INVENTORY

1. T (pp. 276, 278–79)
2. F (p. 313)
3. rising sea levels (pp. 238–39)
4. Answers will vary. Samples: melting ice reduces reflection, hastens warming; thawing soil releases CO₂ deposits, increasing the greenhouse effect.
5. Climate change; the depletion of fossil fuels (p. 309)
6. C
7. B (pp. 331, 363)
8. C
9. B (p. 189)
10. Answers will vary. Examples include the gradualness/distribution of climate-related deaths (pp. 250–51) as well as the “shoddy journalism” shown during the so-called “climategate” incident (pp. 418–19)

This teaching guide was developed in June 2014 by **Peter Gutiérrez**, author, curriculum developer, and a spokesperson on graphic novels for the **National Council of Teachers of English**.