LIVING DOWNSTREAM

In the Classroom

An interdisciplinary guide for university, college, and high school educators

By Chanda Chevannes
In Collaboration with Sandra Steingraber

WWW.LIVINGDOWNSTREAM.COM
FOR MAREL BUCKLEY,
the best teacher I ever had.

Marel loved to share the lessons she learned from her life and from her struggles with breast cancer. I learned a lot from Marel. Her bold and caring spirit taught me how to see the world and how to be in the world.

~ Chanda Chevannes
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There was once a village along a river.
The people who lived there were very kind.

These residents, according to parable,
began noticing increasing numbers of drowning people
caught in the river’s swift current.

And so they went to work devising ever
more elaborate technologies to resuscitate them.

So preoccupied were these heroic villagers with rescue and treatment
that they never thought to look upstream to see who was pushing the victims in.

THIS GUIDE IS A WALK UP THAT RIVER.
This guide has been designed specifically for use with the *Living Downstream* Educational DVD. It provides lesson planning resources and instructional tools for deepening students’ educational experiences. The following provides an overview of the content, focus, and intent of the guide. It is intended to help educators navigate to the sections most suited to their subject areas, students’ needs, and teaching goals.

**Core Contents**

The main sections of this guide represent three distinct ways instructors may choose to engage students:

**Exploring *Living Downstream***  
*For in-depth study of the discrete *Living Downstream* works: film, book, and mini docs.*¹  
Begins on page 15.

Featuring detailed information and resources (including synopses, scene and chapter descriptions, discussion guides, assignment suggestions, and resource lists), this section supports an exploration of the content, construction, and comparison of these works.

**Examining the Issues**  
*For using *Living Downstream* to enable more expansive topical learning.*  
Begins on page 91.

Organized into three expandable lessons, this section uses the film, book, and mini docs as springboards for deeper inquiry into the history and regulation of synthetic chemicals (lesson 1), cancer prevention as a human rights issue (lesson 2), and personal storytelling for public change (lesson 3). Each lesson plan includes one or more screenings from *Living Downstream*, discussion questions, and sample answers to selected questions. Optional lesson plan extensions include readings, post-reading discussion questions, assignment suggestions, and additional materials such as info sheets and resource lists. Three more lesson ideas (on proving a link between chemicals and cancer, the evolving understanding of cancer causation, and *Living Downstream* as feminist literature and cinema) are outlined in brief. For educators who wish to learn more about ways to teach about environmental issues, a list of resources can be found at the end of this section.

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¹ The mini docs are short educational documentaries that provide additional information and perspectives on concepts from the film using new footage, interviews, and graphics. For full descriptions of the five mini docs, see page 79.
Effecting Change Beyond the Classroom
For engaging in school-wide solutions to environmental health problems. Begins on page 219.

Providing tools and ideas for various forms of action, this section encourages a response to the environmental health problems described in Living Downstream. Resources focus on making the school community a greener, healthier, and more sustainable place. Also included are suggestions for organizing a screening of Living Downstream as a way to bring the issues to the attention of the school community.

A fourth section, Navigating the Living Downstream Resources, provides at-a-glance information about the various resources that have been created in conjunction with this publication: the Educational DVD, the interactive website, and the community guide. In addition, ordering information for the Educational DVD, the book, and the community guide are available on page 259.

Subject Index

Living Downstream, both the book and the film, are interdisciplinary works that draw on a broad range of knowledge. As such, they fit well into a wide range of educational subject areas. The sections of the guide most relevant to particular subject areas are listed below.

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- Chemistry  ✔  ✔  ✔  ✔
- Dramatic Arts  ✔
- English  ✔  ✔  ✔
- Ecology/Environmental Science  ✔  ✔  ✔  ✔
- Environmental Studies  ✔  ✔  ✔  ✔
- Ethics  ✔  ✔  ✔  ✔
- Film/Media Studies  ✔
- Geography  ✔  ✔  ✔
- Health  ✔  ✔  ✔  ✔

2 Environmental Studies is intended to include a range of disciplines, such as Environmental Health, Environmental Ethics, Environmental Law, and Ecosystem Health.
About This Guide

Exploring Living Downstream
Examining the Issues

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Legend: ✓ = highly relevant to subject area
✓ = moderately relevant to subject area
= not relevant to subject area

Recommended Grade Levels

The film Living Downstream and this guide are appropriate for high school, college, and university students. Discussion questions, assignments, and materials have been designed to be scalable for grade 10 to senior undergraduate studies.

Guide Design

This guide is designed to enable the following:

Customization

The contents are modular and easily customized. The tools and resources can be used to construct a single lesson or a full study unit, and can easily be adapted to different knowledge and skill levels.

Distribution

Any part of this guide may be reproduced by educators and distributed to their students. Most sections address both students and instructors as readers3 and have been formatted as ready-made handouts.

3 Exceptions to this are as follows: instructors are addressed exclusively in the lesson plan overviews, lesson plans, and in the note about the second edition of the book, whereas students are addressed exclusively in the various assignment suggestions.
Multidisciplinary and Interdisciplinary Instruction
The guide may be used for instruction in single-subject areas (see page 2 for a comprehensive subject index) or for interdisciplinary instruction within a single topic. “Exploring Living Downstream” and “Examining the Issues” feature a broad range of assignment suggestions in each of the following categories: expository writing, creative writing, multimedia projects, scientific analysis, lab/field research, oral presentations, and community engagement.

Critical Thinking
The contents aim to inspire critical thinking and spirited debate. While both the film and the book present strong points of view, the discussion questions, assignments, and resources in this publication have been designed to facilitate an examination of the issues from a range of perspectives.

In-Depth Research and Study
The film is intended as a springboard for further in-depth research and study. Therefore, the guide contains a range of additional information (in the form of info sheets and readings) and resource lists covering a broad array of topics. The annotated resource lists appear throughout the guide and are arranged by subject matter.

Examination of Both Form and Content
In addition to a strong focus on the issues presented in Living Downstream, this guide also offers opportunities to explore the book and the film as creative works. It includes discussion questions about narrative, structural, and artistic techniques and features reflections on the creative process from author Sandra Steingraber and filmmaker Chanda Chevannes.

Living Downstream by Sandra Steingraber
The second edition of Living Downstream: An Ecologist’s Personal Investigation of Cancer and the Environment was published by Da Capo Press in 2010 to coincide with the release of the documentary film. This guide makes myriad references to that book, and readings from it feature prominently in the lessons and assignments. It is highly recommended that instructors use the book in tandem with the film and this guide. (In the event that this is not possible, the guide contains four excerpts from the book as alternative reading assignments, found in lessons 1 and 2.) For a detailed overview of the book, including synopsis, chapter descriptions, and discussion questions, see page 53. For ordering information, see page 271.

TIP  Living Downstream ~ In the Classroom and Living Downstream ~ In the Community (a guide for nonprofit organizations and community groups) are both available for download in PDF format at www.livingdownstream.com/guides. We welcome your feedback on the film and the guides. Please email us at dvd@livingdownstream.com.
I have a PhD in biology and a master’s degree in poetry, which is a nice way of saying that I had trouble deciding what to do when I grew up. But in my work as an environmental author, which is what I do now, I draw on all parts of my education on a daily basis.

To understand how chemical contaminants called polychlorinated biphenyls (PCBs) migrate from dumpsites full of junked electrical equipment to estuaries full of beluga whales, I rely on organic chemistry and physics. To understand how exposure to PCBs impairs immunity in both whales and people, I depend on physiology and genetics. To understand how the pesticide atrazine kills weeds, I revisit botany. To understand how atrazine alters breast development in exposed animals, I draw on anatomy and endocrinology.

And to write about all these things in ways my readers find compelling, I deploy techniques I learned from many English teachers. Explication. Imagery. Metrical patterns. A narrative arc. A comedic turn. A flashback or two. As an author, I am continuously trying to seduce my readers through some complicated—and scary—scientific evidence by constructing a language lovely enough, and by telling a story suspenseful enough, that they keep reading.

Straddling the realms of biology and poetry has defined much of my life. In college, I declared a major in biology, despite my high school aspirations to become a poet. And this decision served me well: Two years in, I was diagnosed with bladder cancer, and biology became more important to me than ever. It gave me a language with which to talk to my physicians, the ability to read the medical literature, and a foundation from which to ask the inevitable question that all cancer patients ask, Why me?
But biology was not enough. It couldn’t help me understand my new identity as a cancer patient, with all the social isolation and medical surveillance that came with it. By contrast, poetry was full of stories about crisis, exile, and redemption, about extremes and survival. I studied William Blake, John Keats, Walt Whitman, and Pablo Neruda. I read the poets Adrienne Rich, Carolyn Forché, and Audre Lorde—sometimes in radiology waiting rooms where many others were trying to grasp their own stories.

Statisticians are fond of reminding us that “the plural of anecdote is not data,” and there are good reasons for skepticism about the significance of individual events and experiences. But within cancer registries, each data point represents a human life. There is a biography behind each one. Every day, over 4,400 Americans and over 450 Canadians are told they have cancer. All together, these diagnoses are useful data. Their changing distribution over space and time provides clues about cancer causation (says the biologist in me). But individually, they also represent the beginnings of more than 4,850 unplanned, unwanted journeys. They are the first sentences of more than 4,850 different stories that no one authors voluntarily. More than 1.8 million stories a year. And each one matters (says the poet in me).

In the mid-1990s, I spent time in the Harvard Medical School library preparing to write Living Downstream, a book that would explore the links between cancer and the environment. When I returned to my hometown in central Illinois to continue the research there, I would have been hard-pressed to say whether it was biology or poetry that brought me. I simply felt the calling to connect the science and the people, to bridge what science knows about environmental links to cancer (quite a lot) and what people know as they live their lives (quite a little). The book Living Downstream represents my best attempt as a biologist to summarize the evidence. It is organized as an argument, and science is the engine of the book. Yet I needed my skills as a poet to weave the scientific evidence with my personal story—and many other personal stories—so that the information would be widely accessible.

One happy consequence of inhabiting two different disciplines is that I have opportunities to visit both science and liberal arts classrooms. I’m still not sure which field I like better, but I know that whenever the conversation turns to the environmental crisis—in any classroom—the lesson can become more challenging to teach. It’s not that the subject matter is inherently more difficult. Indeed, composing a villanelle requires far more intricate skills than understanding the global carbon cycle. Rather, it’s the psychology surrounding the environmental crisis that makes it so tricky. In my experience, students often approach environmental subjects with wary defensiveness. Fearful that I am going to confront them with the prospect of catastrophic ecological ruin and make them feel depressed, they become withdrawn. (Or, in a high school class, they drift toward goofy, disruptive behavior.)

One teaching strategy would be to de-emphasize the dire nature of our ecological crisis. To not point out that one in every four mammal species is now heading toward extinction. To not include in the syllabus a discussion of disappearing pollinators (which provide us one-third of the world’s food supply). To not initiate a conversation about the collapsing food chain within our oceans (which provide us half of our planetary oxygen supply). To not talk about pesticides in raindrops.
The problem with this approach is that it leaves available for discussion only the problems that can be addressed by individuals, through personal sacrifice or altered shopping habits. Which can make the topic seem trivial and the students feel patronized. Most students are sophisticated enough to know that dutiful recycling won’t keep the icecaps frozen or the Gulf Stream from collapsing.

But between the overwhelming and the trivial lies another path. This involves talking with students less about the impact of humans on the environment and more about the flow of the environment into humans. This is an idea that many students have never considered, so I often ask them to meditate on it for a while: Other than the 46 chromosomes our parents bequeathed us at conception, the human bodies we inhabit consist entirely of rearranged molecules of food, air, and water. The jet stream fills our lungs. Groundwater fills our blood plasma. Wheat fields walk us to work. Pasture grasses become milk; milk becomes the bones of our hands. The flesh of fish becomes the neurons of our brains. The whole ecological world becomes ourselves, our minds, our bodies. And when the world is contaminated through acts of toxic trespass, so, too, are we.

The advantage of this approach is that it reframes the ecological crisis as an issue of human rights. And that shift allows comparisons to other human rights struggles throughout history—struggles that were terribly difficult but morally necessary. Abolitionism. Women’s suffrage. The defeat of global fascism. Here, I sometimes invoke my own father, who was a teenage combatant in World War II. And sometimes I quote novelist Audrey Schulman: “This is the tipping point. This is our moment. Perhaps you never thought you’d get a chance to play hero. Here it is.”

And so, whether it’s a science class or a liberal arts class, my dialogue with students often evolves in the same way, by contemplating the issues through the lens of our own humanity. This dialogue always proves fertile ground for whatever learning must be accomplished, whether the most intricate science or the most expressive art. In this way, I have come to believe that biology and poetry are more alike than they seem. They are both, fundamentally, about the mystery of being alive. But whereas biology attempts to explain the mystery, poetry simply says behold. Through the study of the environment within us, we can provide students an opportunity to do both.
I first read Sandra Steingraber’s book *Living Downstream* in 1998, just after I graduated from high school. I loved how it meshed so many disciplines into one narrative. I was intrigued by the historical passages describing our use of chemicals and our attitudes toward cancer, and by the complicated yet comprehensible biology and chemistry. I was captivated by Steingraber’s personal experiences as a cancer patient and how she used these in making her argument for a human rights approach to cancer prevention. By the time I reached the last page, Steingraber’s book had changed the way I viewed our bodies and our environment. It changed how I saw the world and our use of chemicals in it.

I immediately thought that *someone* should make a film based on this book. But it didn’t occur to me until years later that I could be that *someone*. The documentary adaptation that I eventually created honors how the book first engaged me as a student. It also updates both the scientific evidence and Steingraber’s personal story.

Just as I never imagined myself making this film, I also never imagined that my work would lead to a second edition of Steingraber’s book. But it did. Published by Da Capo Press to coincide with the release of the documentary, the 2010 edition draws on all the newest evidence—bringing it fully up to date and covering substantial new scientific ground.

My best teachers always encouraged me to open myself to new information, to analyze it and its relevance to my life, and then to act on my new knowledge. That is how I first approached Steingraber’s book so many years ago, and that is the approach we have chosen for this guide.

The guide includes three main sections: “Exploring *Living Downstream*” for delving into the information, ideas, and creative techniques presented in the film, book, and mini docs; “Examining the Issues” for analyzing and internalizing the information through three topical lessons; and “Effecting Change beyond the Classroom” for taking action on what has been learned.

Students and educators who are moved to take further action can also draw on *Living Downstream - In the Community*, a guide developed for organizations and individuals working for the environmental
health of their communities. Both *Living Downstream ~ In the Community* and *Living Downstream ~ In the Classroom* are available for electronic download in PDF format at www.livingdownstream.com/guides.

My hope is that *Living Downstream* and the educational resources we have created will do for today’s students what Steingraber’s book and my best teachers did for me: I hope it will inform—and possibly change—the way they see the world. And I hope many will then choose to take action based on what they’ve learned, changing the world for the better.

Chanda Chevannes
Filmmaker of *Living Downstream*
Author of *Living Downstream ~ In the Classroom*
The concept for this guide began during pre-production of the documentary *Living Downstream*. In that film project, I benefited from the tremendous skill and boundless energy of countless crew members. Additionally, many individuals—from toxicologists to nurses and from public health experts to filmmakers—gave their time to review the film for scientific accuracy and narrative cohesion. While they are too numerous to name here, they all deserve my greatest thanks and have been recognized in the credit list at the end of the film. However, there are a few individuals from that film project to whom I owe an unusually enormous debt; they are Nathan Shields, Benjamin Gervais, Trent Richmond, J.R. Fountain, P. Marco Veltri, and Randall Wallace.

Before the film was completed, we launched an outreach project aimed at promoting the film and creating a range of complementary resources. I am grateful to Marni Rosen, who helped me see the value of this undertaking early on, and to Adam Shamoon, my creative and diligent outreach manager, who spearheaded this project and led a team of enthusiastic outreach assistants: Irene Meimaris, Kaitlyn Kochany, Zach Pedersen, Kathy Threlkeld, and Anam Abbas. I am also thankful to everyone on Sandra Steingraber’s team, who shared her with this project and provided support for our work in many ways: Merloyd Lawrence and Lissa Warren of Da Capo Press, Charlotte Sheedy of the Charlotte Sheedy Literary Agency, and Jodi Solomon of Jodi F. Solomon Speakers Bureau.

My work on this guide has been heavily influenced by my past educational experiences, in both formal and informal learning environments. I am especially grateful for my experiences in four very different educational settings: the Media Arts Program at Sheridan College, where I studied film production and learned about Canada’s long tradition of documentary filmmaking for public education and social change; the Richmond Hill Public Library, where I have had the incredible opportunity to act as an artist-educator, leading a broad range of workshops and screening series for its diverse community of patrons; Raising Voices, a nonprofit organization dedicated to creating educational tools for preventing violence against women and children, where I learned about the process of social change that is especially reflected in “Effecting Change beyond the Classroom”; and the Alternatives to Violence Project, a volunteer-run initiative that provides conflict resolution workshops in prisons, schools, and the wider community—and in which I am currently an apprentice facilitator. These groups taught me
a great deal about the power of education, the importance of group process, the need for more robust critical thinking, and the value of creative educational resources.

This guide could not have been all that it is without the thoughtful comments and critique of many dedicated educators: Meryl Altman, former director of the women’s studies program and associate professor of English at DePauw University; Kamyar Enshayan, director of the Center for Energy and Environmental Education at the University of Northern Iowa; Tracy German, media arts professor at Sheridan College; Dorothy Goldin Rosenberg, environmental health educator at the Ontario Institute for Studies in Education at the University of Toronto; Jason Hamilton, associate professor of environmental studies and sciences at Ithaca College; Stella Mok and Jocelyn Paas, science teachers at the Peoples Christian Academy; Dorothy Goldin Rosenberg, environmental health educator at the Ontario Institute for Studies in Education at the University of Toronto; Jason Hamilton, associate professor of environmental studies and sciences at Ithaca College; Stella Mok and Jocelyn Paas, science teachers at the Peoples Christian Academy; Kathryn Murphy, associate professor of nursing at Naugatuck Valley Community College; Janet Ross, former sessional instructor of religious studies at McMaster University; Elizabeth Straszynski, biology teacher at University of Toronto Schools; and Jody Tockes, science teacher at East Peoria Community High School. I am especially indebted to Rebecca Gasior Altman, lecturer with the Community Health Program at Tufts University, whose insights into the emotional responses of students greatly informed the content of this publication.

I am incredibly grateful to the team that labored with me through the various iterations of this publication. I owe thanks to Anne Connolly, vice president of McNabb Connolly, for waiting so patiently to distribute the film and this guide; to Anne Wordsworth, for contributing her extensive knowledge on chemicals regulations and authoring an info sheet on this topic; to Nancy Myers, Carolyn Raffensperger, and Ted Schettler of the Science and Environmental Health Network for reviewing our materials on the precautionary principle and vulnerable populations; to Liz Armstrong, who conducted extensive research on various portions of this guide; to Dan Philippon, English professor at the University of Minnesota, who graciosly allowed me to include some of the questions he crafted for discussion of Steingraber’s book in this guide; and to Jody Tockes, who contributed the lab/field research assignments that appear throughout this guide. I am particularly indebted to copy editor and fact checker Susan Fitzgerald for her amazing attention to detail, and to graphic designers Adam Hunt and Dominic Wong for bringing so much of themselves to this project. It is thanks to Adam Hunt’s hard work and talent that we are able to offer such a comprehensive and beautiful Educational DVD.

And I am grateful to my family: Nathan, Hannah, Henry, Jill, Leighton, Margo, Brian, Beth, Stuart, Garrett, Adam, Heather, and Bethany. Throughout this journey, they provided support, encouragement, and advice; offered babysitting; or were willingly babysat. In particular, it is because of my partner Nathan’s infinite patience and understanding that I had the time and focus to dedicate to this work.

The outreach project, including the two guides, was funded by The Ceres Trust, the Kendeda Sustainability Fund of the Tides Foundation, The Fledgling Fund, Adelaide Gomer, and the Ontario Arts Council. The outreach project and film were produced in association with Insight Productions, Inc., and Women’s Healthy Environments Network. The film itself was funded by The Ceres Trust, the Kendeda Sustainability Fund of the Tides Foundation, The Canadian Independent Film and Video Fund, Canada Council for the Arts, the Park Foundation, the Canadian Auto Workers Union—Social
Justice Fund, the Cancer Prevention Challenge (Ya Ya Sistahs & Bruddahs Too! and Team Vitality), Doris Cadoux and Hal Schwartz, and Saunders-Matthey Cancer Prevention Coalition. Special thanks to Judith Kern, Mike Smith, Diane Ives, and Adelaide Gomer for championing this project’s vision from beginning to end. All our funders operated at arm’s length: they provided us with the funding for this work but trusted us to make the creative and editorial decisions. For the freedom their funding provided and for showing such confidence in us, I am profoundly grateful.

Finally, I am particularly indebted to two amazing women for collaborating with me on this project: Stephanie Sauvé and Sandra Steingraber. The substantive and stylistic editor on this piece, Stephanie worked with me on its conception and execution every step of the way. Her dedication, encouragement, creativity, and fearlessness made it possible for me to take this guide much further than I ever expected. To Sandra, I owe my deepest thanks on countless levels. For writing such a compelling and inspiring book. For allowing me to adapt it into a documentary film. For engaging in the making of the film and the writing of the guides in such a wholehearted way. It has been an honor to work with and learn from someone as eloquent, passionate, knowledgeable, and skilled as Sandra.

The making of a film requires a team of people. The writing of a guide, as I have come to realize, also requires a team of people. And while they share in any praise for the quality of this publication, any errors or omissions are my responsibility alone. I am incredibly grateful to my team.
“Living Downstream represents my best attempt as a biologist to summarize the evidence. Yet I needed my skills as a poet to weave the scientific evidence with my personal story so that the information would be widely accessible. As such, the book and the film can be seen as both factual and creative resources. Poetry and biology are both about the mystery of being alive. Whereas biology attempts to solve the mystery, poetry simply says, behold. In my experience, students need both.”

~ Sandra Steingraber
**LIVING DOWNSTREAM**

**THE FILM | SYNOPSIS**

Feature-Length Film: 85 minutes  
One-Hour Version: 55 minutes  
Format: High Definition  
Produced: 2010

*Living Downstream* is a feature-length documentary film based on the book by American ecologist and cancer survivor Sandra Steingraber, PhD. It is the first feature by Canadian director Chanda Chevannes.

This film follows Steingraber during one pivotal year as she travels across North America, working to break the silence about cancer and its environmental links. After a routine cancer screening, Steingraber receives some worrying results and is thrust into a period of medical uncertainty. Thus, we begin two journeys with Steingraber: her private struggles with cancer and her public quest to bring attention to the urgent human rights issue of cancer prevention.

Steingraber is not the only one who is on a journey—the synthetic chemicals against which she is fighting are also on the move. We follow these invisible toxicants as they migrate to some of the most beautiful places in North America. We see how these chemicals enter our bodies and how scientists believe they may be working to cause cancer.

Several experts in the fields of toxicology and cancer research make appearances in the film, highlighting their own findings on two pervasive chemicals: atrazine, one of the most widely used herbicides in the world, and polychlorinated biphenyls (PCBs), industrial chemicals that have been banned in the United States and Canada for decades. The research of these scientists further illuminates the issues at the center of Steingraber’s work.

At once Steingraber’s personal journey and her scientific exploration, *Living Downstream* is a powerful reminder of the intimate connection between the health of our bodies and the health of our air, land, and water.

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The documentary film *Living Downstream* was produced by The People’s Picture Company (The PPC). The PPC is an award-winning documentary production company that creates entertaining and educational films that compel thought, encourage discussion, and inspire change. For information about The PPC’s work, visit [www.theppcinc.com](http://www.theppcinc.com). For information on ordering copies of the *Living Downstream* Educational DVD, see page 261.
**LIVING DOWNSTREAM**

THE FILM | FEATURED EXPERTS

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**Sandra Steingraber, PhD**  
Author of the book *Living Downstream*  
Main Subject of the film


For her writing of *Living Downstream*, Steingraber received the biennial Rachel Carson Leadership Award from Chatham University and the Jenifer Altman Foundation’s first annual Altman Award, and was named a *Ms. Magazine* woman of the year. She also received a Hero Award from the Breast Cancer Fund, the Environmental Health Champion Award from Physicians for Social Responsibility—Los Angeles, and a Heinz Award from the Heinz Family Foundation.

Steingraber has served as an adviser to the California Breast Cancer Research Program, provided congressional briefings, and lectured on many college campuses. Currently, Steingraber is a columnist for *Orion* magazine and a scholar in residence at Ithaca College in Ithaca, New York. More information about Steingraber is available at [http://steingraber.com](http://steingraber.com).

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**Tyrone Hayes, PhD**  
Biology Professor, University of California, Berkeley  
Featured in scene 7

Since his childhood, Dr. Tyrone Hayes has been fascinated by amphibians and the influences that environmental changes have on their development, growth, and reproduction. A graduate of Harvard University, Hayes has published more than forty papers and 150 abstracts and has given more than 300 presentations throughout the world.

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1. The descriptions in this section include wording that has been drawn in large part from the experts’ professional biographies. Experts in this section are listed in order of appearance.
2. Unless otherwise indicated, all scene numbers refer to the scenes in the feature-length film (85-minute version).
talks. Presently, Hayes’ work in the lab and field is focused on the effects of pesticides on amphibians and the role of this threat in amphibian declines. Among other awards, Hayes has received both the Distinguished Teaching Award and the Distinguished Research Mentoring of Undergraduates Award from the University of California, Berkeley; the Jenifer Altman Award for Integrity in Science (Jenifer Altman Foundation); the Rachel Carson Memorial Award (Pesticide Action Network); and the President’s Citation Award (American Institute of Biological Sciences). Hayes was also named an Emerging Explorer by the National Geographic Society. More information about Hayes is available at http://ib.berkeley.edu/hayes.

Rachel Carson  
Biologist and Author of Silent Spring  
Featured in scenes 10, 29, and 33

Rachel Carson graduated from Pennsylvania College for Women (now Chatham University), studied at Woods Hole Marine Biological Laboratory, and received her master’s in zoology from Johns Hopkins University. She worked as a government scientist and science editor for fifteen years in the US Bureau of Fisheries (now the US Fish and Wildlife Service). Carson wrote three popular books about the ocean before writing Silent Spring, the book that is often said to have launched the modern environmental movement. She died of breast cancer in 1964, but not before testifying before the United States Congress on the potential problems caused by the broadcast spraying of chemical pesticides. Carson’s work had a tremendous impact on public policy. She is credited with alerting the American public to the risks of chemical pesticides, setting the wheels in motion for a ban of DDT, and inspiring the creation of the US Environmental Protection Agency. More information about Carson is available at www.rachelcarson.org.

Stéphane Lair, PhD  
Veterinary Professor, University of Montreal  
Featured in scene 15

Dr. Stéphane Lair is the director of the St. Lawrence beluga whale pathology program, which has been in operation for over twenty years. His work focuses on major marine ecosystem changes that result from diverse factors, including the overexploitation of resources, increased industrial activity, and climate change. Lair sees marine mammals as “signal” species. By studying the health of these animals, he hopes to contribute to a better understanding of the St. Lawrence River and other marine habitats. More information about Lair is available at www.medvet.umontreal.ca/departements/ sciences_cliniques/professeurs/lair.htm.
Linda Birnbaum, PhD  
Director, National Institute of Environmental Health Sciences  
Featured in scene 20

Dr. Linda Birnbaum oversees a budget that funds more than 1,000 research grants. She is the author of several hundred peer-reviewed publications, book chapters, abstracts, and reports. A board-certified toxicologist, Birnbaum has served as a federal scientist for thirty years, nineteen of which were with the US Environmental Protection Agency. Birnbaum has received numerous awards, including the Women in Toxicology Elsevier Mentoring Award, the Society of Toxicology Public Communications Award, the Environmental Protection Agency’s Health Science Achievement Award and Diversity Leadership Award, and twelve Science and Technology Achievement Awards. More information about Birnbaum is available at www.niehs.nih.gov/about/od/director/index.cfm.

John Spinelli, PhD  
Senior Scientist, BC Cancer Agency  
Featured in scene 25

In addition to his position at the BC Cancer Agency, Dr. John Spinelli is a professor at the University of British Columbia’s School of Population and Public Health and an adjunct professor in Simon Fraser University’s Department of Statistics and Actuarial Science. Spinelli’s research focuses on the identification of environmental and genetic risk factors for cancer. He conducts and collaborates on a large number of epidemiological, statistical, and clinical research projects and has authored over 150 peer-reviewed publications addressing various aspects of health research and statistical methodology. More information about Spinelli is available at www.bccrc.ca/dept/cc/john-spinelli.

George Woodwell, PhD  
Founder and Director Emeritus, Woods Hole Research Center  
Featured in scene 30

Dr. George Woodwell is an ecologist with broad interests in global environmental issues and policies. Prior to founding the Woods Hole Research Center, he was founder and director of the Ecosystems Center of the Marine Biological Laboratory and a senior scientist at Brookhaven National Laboratory. Woodwell was also a founding trustee and continues to serve on the board of the Natural Resources Defense Council. He is a former chairman and a founding trustee of the World Resources Institute, a founder and honorary member of the board of trustees for the Environmental Defense Fund, and former president of the Ecological Society of America. Woodwell is the author of more than 300 major papers and books on ecology. More information about Woodwell is available at www.whrc.org/about/cvs/gmwoodwell.html.
Richard Clapp, DSc, MPH
Professor Emeritus, Boston University School of Public Health
Featured in the mini docs

Dr. Richard Clapp is an epidemiologist with over forty years of experience in public health practice and consulting. He has a master's degree in public health from Harvard University and a doctorate in epidemiology from Boston University. He has worked in state and local health departments as the director of a community health center, a statewide childhood lead poisoning prevention program, and the Massachusetts Cancer Registry. He has also served as director for an environmental health consulting group at the JSI Research and Training Institute. His research focuses on cancer in military veterans and other workers whose cancers may be due to workplace exposures or living environments with toxic or radiation hazards. Clapp was co-chair of the steering committee for the Greater Boston Physicians for Social Responsibility and has served on several other professional advisory committees. More information about Clapp is available at [www.psr.org/environment-and-health/environmental-health-policy-institute/richard-clapp-dsc-mph.html](http://www.psr.org/environment-and-health/environmental-health-policy-institute/richard-clapp-dsc-mph.html).
The scene numbers and names in the list below reference the feature-length film. Scene numbers for the one-hour version are directly below the main scene number, and viewers should note that many scenes in the one-hour version have been abbreviated. For ease in studying the book and the film together, page numbers of the corresponding sections in Steingraber’s book are listed.

**TIP** To understand the full variety of screening options available, including the ability to play individual scenes or thematic scene compilations, see “The Educational DVD” on page 261.

**Scene 1 | The Parable—a reading (1 min, 25 sec)**  
*Scene 1 in the one-hour version.*  
*Page ix in the book.*

Sandra Steingraber reads a passage from her book *Living Downstream*, a parable that alludes to our tendency to overlook the importance of prevention.

**Scene 2 | Introducing Sandra Steingraber, PhD (1 min, 25 sec)**  
*Scene 2 in the one-hour version.*  
*Pages xiii and 270 in the book.*

Steingraber describes the disconnect between the existing scientific knowledge about carcinogens and the information the medical community shares with patients.

**Scene 3 | Sandra and Her Mother (3 min, 40 sec)**  
*Scene 3 in the one-hour version.*  
*Pages xiii and 256 in the book.*

Steingraber visits her mother in Pekin, Illinois. They discuss their personal experiences with cancer, as well as those of other family members. Steingraber reveals that she is adopted, and asks what else families share besides genes.

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1 Unless otherwise noted, all references made to Steingraber’s book in this guide refer to the second edition of *Living Downstream*, published by Da Capo Press in 2010.
Scene 4 | A Possible Cancer Cluster (3 min, 12 sec)

Driving through Normandale, Illinois (a subdivision of Pekin), Steingraber describes the possible cancer cluster in this community and the primitive nature of the investigation undertaken by the county’s public health department.

Scene 5 | Chemicals Travel (1 min, 20 sec)

Driving through the industrialized area of Pekin, Steingraber reflects on the extensive number of chemicals produced and used here. She asks, “Where is all this stuff going?”

Scene 6 | Atrazine (53 sec)

Steingraber introduces the herbicide atrazine. One of the most commonly used pesticides in North America, it is applied to more than three quarters of the cornfields in Illinois. It is water-soluble and can now be found in rivers, streams, and rain.

Scene 7 | Atrazine, Frogs, and Tyrone Hayes, PhD (4 min, 27 sec)

Hayes, biology professor at UC Berkeley, explains his research on frogs and atrazine. He highlights the growing evidence that atrazine converts testosterone into estrogen—turning male frogs into functional females—which suggests a link to human breast cancer.

Scene 8 | Placing People in Harm’s Way—a reading (44 sec)

Steingraber reads a passage from her book Living Downstream, stating that while some people dismiss the link between cancer and environmental contamination as unprovable, others believe it is our responsibility to investigate despite the scientific limitations.

Scene 9 | Sandra’s Work (1 min, 34 sec)

At home in upstate New York, Steingraber describes the surprise she felt when she first learned that proven carcinogens are still being manufactured and sold. She then explains her current work as a science writer, describing herself as someone who puts jigsaw puzzles together.
Scene 10 | WWII, Chemicals, and Rachel Carson (3 min, 23 sec)

Steingraber describes the impact of World War II on chemical production: chemicals were manufactured for use during the war and then repurposed for use at home without adequate safety testing. In archival footage, we see the spraying and fogging of pesticides in large quantities. Rachel Carson (a biologist and the author of *Silent Spring*) describes her concerns about these chemicals in footage from the 1960s. Steingraber explains that she has taken up Carson’s call for a close examination of the links between environment and health.

Scene 11 | Sandra’s Congressional Briefing (2 min, 32 sec)

Steingraber speaks about the power of knowledge and the importance of exercising our right to know. In Washington, DC, she briefs congressional staffers on Capitol Hill, calling for an open public conversation about cancer and the environment.

Scene 12 | Wall of Stars (1 min, 27 sec)

Using the Wall of Stars (part of the World War II Memorial in Washington, DC) as a visual metaphor, Steingraber tells us that every year over 600,000 people die of cancer in the US and Canada.

Scene 13 | Sandra Runs to Know the Land (1 min, 44 sec)

As Steingraber runs through the streets and parks of Washington, DC, she describes her ritual of running in every city she visits. Running helps her to know the land. Steingraber also describes her other habit, which is to search the Toxics Release Inventory (www.epa.gov/tri/) for the city she is visiting. As the sun sets, data for selected carcinogens released in the US and Canada appear in the evening sky. See also “Environmental Amnesia” by Sandra Steingraber in the May/June 2008 issue of *Orion* magazine.

Scene 14 | PCBs (2 min, 3 sec)

Steingraber introduces polychlorinated biphenyls (PCBs), a group of industrial compounds classified as persistent organic pollutants. PCBs can even be found in remote locations such as the White Mountains of New Hampshire. Scientists now know that these chemicals travel by evaporating, moving northward, and returning to earth—and then repeating the same process again and again.

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Scene 15 | PCBs, Beluga Whales, and Stéphane Lair, PhD (2 min, 43 sec)


Lair, veterinary professor at the University of Montreal, explains his autopsy study of beluga whales from the St. Lawrence River and the high incidence of cancer he has found. Lair shares his hypothesis that polycyclic aromatic hydrocarbons (PAHs) are interacting with PCBs to cause cancer in this population of whales.

Scene 16 | You Have Become a Cancer Patient—a reading (43 sec)


Steingraber reads a passage from her book Living Downstream, describing the experience of becoming a cancer patient.

Scene 17 | The Morning of Sandra's Test (4 min, 58 sec)

Scene 14 in the one-hour version. Page 266 in the book.

At home in upstate New York, Steingraber shares breakfast with her family. In an interview, she reflects on the uncertainty created in her life by bladder cancer and shares her anxiety about her upcoming cancer screening test. She then goes for a run to help alleviate the anxiety.

Scene 18 | Sandra Visits Her Doctor (4 min, 52 sec)

Scene 15 in the one-hour version. Page xv in the book.

Steingraber undergoes a cystoscope—the screening test for bladder cancer. Her doctor indicates that the exam shows no reason for concern, and Steingraber returns home to celebrate the news with her husband.

Scene 19 | Children's Vulnerability to Chemicals (1 min, 3 sec)


Steingraber describes children's increased vulnerability to chemicals. She then explains that early life exposure to atrazine can alter the development of the mammary tissue in lab animals.

Scene 20 | Atrazine, Rats, and Linda Birnbaum, PhD (2 min, 40 sec)


Birnbaum, director of the National Institute of Environmental Health Sciences, describes her study of atrazine in lab rats. When a rat fetus is exposed to atrazine, the chemical has major effects on the structure of the breast. Studies have shown that when exposed to a second chemical, these rats have a higher cancer rate.
Scene 21 | Uncertainty as an Excuse—a reading (44 sec)

Steingraber reads a passage from her book *Living Downstream*, calling for precaution and outlining her concern “that uncertainty is too often parlayed into an excuse to do nothing.”

Scene 22 | Sandra and Her Cousin, John Maurer (3 min, 53 sec)

Steingraber has lunch with her cousin and his family on their corn farm in central Illinois. After lunch, Steingraber and Maurer discuss his use of atrazine and the importance of being careful with this herbicide. Driving away from the farm, Steingraber expresses her respect and admiration for her cousin, but also shares her opinion that “no one can be careful enough with a chemical like atrazine.”

Scene 23 | Sandra Speaks about Breast Milk (2 min, 50 sec)
Scene 19 in the one-hour version. Page 237 in the first edition of the book.3

Steingraber gives a speech to a group of farmers about the health benefits and chemical contamination of breast milk. She describes the process of contamination as a form of toxic trespass and explains her view that chemical-free milk is the right of every baby. She ends by saying, “What we love, we must protect.” See also *Having Faith: An Ecologist’s Journey to Motherhood* by Sandra Steingraber.4

Scene 24 | How Chemicals Can Contribute to Cancer (1 min, 2 sec)

Steingraber describes the creation of a cancer cell as a multi-step process that occurs over a long period of time. She explains that chemicals can contribute at any point during the process. Steingraber likens the role of genes to the keys of a piano, and the environment to the fingers of the pianist.

Scene 25 | PCBs, Non-Hodgkin Lymphoma, and John Spinelli, PhD (3 min, 34 sec)

Spinelli, senior scientist at the BC Cancer Agency, describes his study of PCBs and non-Hodgkin lymphoma, a cancer of the immune system. Spinelli’s study indicates that at the time of testing, individuals with this form of cancer had higher levels of PCBs in their blood.

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Scene 26 | PCB Cleanup (1 min, 46 sec)

Steingraber describes the ongoing PCB cleanup conducted by the US Environmental Protection Agency in Buzzards Bay in New Bedford Harbor, Massachusetts. As Steingraber explains, PCBs were banned when we had only an indication of harm, and we now have much more evidence telling us the decision was the right one.

Scene 27 | The Event of Diagnosis—a reading (42 sec)

Steingraber reads a passage from her book *Living Downstream*, describing the event of a cancer diagnosis as “a mixture of photographic recall and amnesia.”

Scene 28 | Sandra’s Test Results (2 min, 41 sec)

While vacationing with her family on Cape Cod, Steingraber describes a recent phone call she received from her doctor’s office. The cells that were collected during her cystoscope had been analyzed in the cytology lab and appeared to be abnormal.

Scene 29 | Rachel Carson Testifies before the Senate (59 sec)

Steingraber describes the hearings that were held by the US Senate after *Silent Spring* was published. In archival footage and photographs, we see Carson testifying before the Senate Committee. Steingraber tells us Carson was dying of breast cancer at the time and explains Carson’s decision to remain silent about her disease.

Scene 30 | Sandra and George Woodwell, PhD (2 min, 49 sec)

Steingraber speaks with Woodwell, founder and director emeritus of Woods Hole Research Center on Cape Cod. Steingraber tells us that Woodwell’s work contributed to the US government’s decision to ban DDT, opening the way for a banning of PCBs. They speak about the duty of scientists to bring their findings into the public realm.

Scene 31 | Sandra Speaks about the Abolition of Carcinogens (3 min, 44 sec)

Steingraber speaks at a black-tie event at the Abraham Lincoln Presidential Museum in Springfield, Illinois before an audience of wealthy, powerful, and uninterested people. There, she presents cancer
prevention as a human rights issue and compares the abolition of slavery to the abolition of cancer-causing chemicals. Steingraber declares the need for us to become carcinogen abolitionists. She later expresses her frustration at the silence that still surrounds the topic of environmentally caused cancer. See also Raising Elijah: Protecting Our Children in an Age of Environmental Crisis by Sandra Steingraber.  

Scene 32 | Sandra’s Watchful Waiting (1 min, 30 sec)  
*Not in the one-hour version.*  
Pages xi and 52 in the book.  

While running, Steingraber reflects on her most recent series of tests. She explains that cancer patients and survivors often live in periods of “watchful waiting.” This is a time of ambiguity, while waiting for test results, having scans done, and going to see more doctors. Often, it is also a time of secrecy and silence.

Scene 33 | Rachel Carson’s Death (1 min, 19 sec)  
*Scene 25 in the one-hour version.*  
Chapter 2 and page 278 in the book.  

Steingraber explains that she feels she is speaking for many people who have died. In archival footage, we see Carson testifying before the US Senate. Carson is describing the right to live free of poisons as a basic human right. Steingraber tells us that the legacy of these hearings was the formation of the Environmental Protection Agency. These speeches were the last that Carson would give before her death.

Scene 34 | Sandra Speaks about the Environmental Human Rights Movement (6 min, 23 sec)  
*Scene 26 in the one-hour version.*  
Page xi in the book.  

Steingraber speaks to a crowd of thousands about her most recent test results. She goes on to describe the growing environmental human rights movement, comparing it to two iconic social movements of the past: feminism and abolitionism. Steingraber says she hopes her children will find our current chemicals policies “unthinkable.” She receives a standing ovation. See also “3 Bets” by Sandra Steingraber in the May/June 2009 issue of Orion magazine.  

Scene 35 | A Fighting Spirit (1 min, 48 sec)  
*Scene 27 in the one-hour version.*  
Page 117 in the book.  

Backstage after Steingraber’s speech, a young cancer survivor shares her experiences and feelings with Steingraber. Later, while cycling with her family, Steingraber reflects on the fighting spirit that cancer patients bring to the disease. She argues passionately for us to bring the same fighting spirit to cancer prevention.

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Scene 36 | End Credits (2 min, 11 sec)

Scene 28 in the one-hour version.
The following questions have been designed for in-class discussions, quizzes, or assignments. While some are answered by the film, others are designed to encourage analysis and extrapolation beyond the scope of the film itself.

**General Questions**

- If you were to summarize the film for someone who hasn’t seen it, what would you choose as the most important and compelling pieces to share?

- As the old saying goes, “an ounce of prevention is worth a pound of cure.” But Sandra Steingraber claims that when the topic is cancer, the elusive quest for a cure receives far more respect and attention than preventing the disease in the first place. Do you agree? If so, why do you think this is the case?

- What are Steingraber’s concerns about synthetic (man-made) chemicals?

- How did synthetic chemicals become part of our everyday lives?

- When chemicals are released into the environment, where do they go?

- What is Steingraber’s main argument, and how is this argument presented in the film? In your opinion, do Steingraber and filmmaker Chanda Chevannes argue their point successfully? Why or why not?

- In her book, Steingraber carefully lays out a vast array of evidence to make her case that synthetic chemicals are contributing to human cancer. While the author does use emotion in her work, the driving force of the book is logic. In your opinion, what drives Chevannes’ film? Logic or emotion? What is the effect of this choice on you as a viewer? If you were the filmmaker, what would you have done differently?

- What are the important metaphors used in the film? Consider not only the words spoken by Steingraber, but also the images and sounds used by Chevannes and her crew.

- Before seeing this film, what were your thoughts about the causes of cancer? Where did these ideas come from? Has your perspective changed?

- Filmmaker Chevannes says, “Steingraber’s book changed the way I saw our world and our use of chemicals in it.” Did the film change the way you see chemicals, cancer, the world, or our bodies? If so, how?
• Throughout the film, Steingraber alludes to human rights movements of the past. This is an attempt to inspire the audience to see environmental health as the next great human rights struggle. But many, including Steingraber, would also say that the issue of environmental health is intrinsically linked to other human rights issues. Do you agree or disagree? In what way can environmentalism be linked to feminism? To civil rights? To anti-poverty movements?

• Chevannes has said that each of her films has ultimately focused on an issue of relevance and importance to women. Do you see Living Downstream as a women's film? A feminist film? An example of women's cinema? Why or why not?

• What questions did the film raise for you? Where could you look for answers?

• In her essay “The Public Story of Cancer,” Steingraber says that “the public story of cancer is a hopeful one.”¹ Is this how you feel after watching the film? Why or why not? What might Steingraber have meant by this? (The full text of this essay has been reproduced as an optional reading on page 179 of this guide.)

• How does your local environment (school, town, or city) compare to some of the places profiled in the film? Do you have environmental health concerns about your community? If so, what are they, and how could you work with others to address them?

• In the afterword of the second edition of her book, Steingraber writes, “I believe we are musicians in a human orchestra. It is time now to play the Save the World Symphony. It is a vast orchestral piece, and you are but one musician. You are not required to play a solo. But you are required to figure out what instrument you hold and play it as well as you can.” What does this statement mean to you? Does this message come through in the film itself, and if so, how?

• After watching the film, are you more or less inclined to take action to address the issue of environmental health? Why? If you are more inclined, what first steps could you take?

Scene 1 | The Parable—a reading (1 min, 25 sec)

Scene 1 in the one-hour version.

• Reading from her book, Steingraber opens the film with this parable, which gives the book and film their shared name. What is the general meaning of this parable?

There was once a village along a river. The people who lived here were very kind. These residents, according to parable, began noticing increasing numbers of drowning people caught in the river's swift current. And so they went to work devising ever more elaborate technologies to resuscitate them. So preoccupied were these heroic villagers with rescue and treatment that they never thought to look upstream to see who was pushing the victims in. This film is a walk up that river, the river of human cancer.²

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² Sandra Steingraber in Living Downstream [film], directed by Chanda Chevannes, The People’s Picture company, 2010.
• What is Steingraber saying about cancer treatment versus cancer prevention? Do you agree or disagree?
• In your opinion, how does this scene set the tone and style for what follows in the film?

**Scene 2 | Introducing Sandra Steingraber, PhD (1 min, 25 sec)**

*Scene 2 in the one-hour version.*

• How did Steingraber’s identity as a biology student influence the way in which she approached her diagnosis?
• Steingraber observed a disconnect between the knowledge of the scientific community and the conversations between medical professionals and their patients. In your opinion, what are some reasons for this disconnect?
• What do you think is the effect of this disconnect on individual patients and on society as a whole?
• Health-care professionals are tasked with treating disease. In your opinion, do they also have a responsibility to be knowledgeable about the causes of disease? Why or why not?

**Scene 3 | Sandra and Her Mother (3 min, 40 sec)**

*Scene 3 in the one-hour version.*

• What do we learn in this scene about Steingraber’s family and their experience of cancer?
• If Steingraber had not known she was adopted, what might she have assumed about the cause of her cancer? Instead, what insight did she gain about the things that families share?
• Why might Chevannes have chosen to place this scene at the beginning of the film?
• This scene contains the first use of the word *silence* in the film—which is a theme that runs through the documentary. How do you suspect Steingraber’s family used silence to deal with cancer? Do you think this a common reaction? (feature-length version only)
• In the past, there was a great deal of shame and stigma associated with a cancer diagnosis. This was especially true of breast cancer. What are some possible reasons for this?
• In her book, Steingraber cites a study that found cancer death among adopted people to be more closely related to cancer death in their adopted parents than to that in their biological families.3 What does this tell us about the causes of cancer? Does this result surprise you? Why or why not?

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Scene 4 | A Possible Cancer Cluster (3 min, 12 sec)

Scene 4 in the one-hour version.

- Why does Steingraber refer to the public health investigation in Normandale as “primitive”? What could the public health department have done differently to ensure that the study produced more accurate—and possibly, more useful—results?
- Steingraber mentions two other cancer cluster investigations (on Long Island, New York, and Cape Cod, Massachusetts). What is she suggesting about the possible role of poverty and social status in the Normandale investigation?
- Could the socioeconomic position of Normandale residents have made them more susceptible to cancer and environmental carcinogens? If so, how?
- Steingraber has said that Chevannes captured the way she (Steingraber) sees the world—by lingering on small details and textures, for example. In this scene, what does this technique communicate to you about the Normandale neighborhood and Steingraber’s view of it?
- Steingraber says that “a question of our age” is who gets to determine the degree of evidence required to change our use of toxic chemicals. In your opinion, who should be making this decision?
- Who should be responsible for conducting the research and gathering the evidence on the toxicity of chemicals (government, industry, universities)? Who should pay for this research? Why? Who is conducting and paying for the research now?
- What are the key differences between cancer risk at the individual level and cancer risk at the population level? Why is it important to make this distinction?
- What does the term public health mean? What role do public health departments currently play in our communities and what role do you think they should play?

Scene 5 | Chemicals Travel (1 min, 20 sec)

Scene 5 in the one-hour version.

- How is Pekin similar to and dissimilar from the places you have called home?
- Steingraber says that, when thinking about her hometown, she always asks, “Where is all this stuff going?” What does this question suggest about how the chemicals produced in places like Pekin affect the wider world? What might she also be saying about the chemical demands of the global marketplace and the consequences for places like Pekin and those who live there?
- This scene marks the beginning of a second storyline in the film—one that follows the chemicals as they travel through the environment. What is the significance of this storyline and why might Chevannes have chosen to communicate information about toxic chemicals through the story of their movement through the environment?
Scene 6 | Atrazine (53 sec)
*Scene 6 in the one-hour version.*
- What is atrazine?
- How does atrazine work?
- Why is it significant that atrazine dissolves in water?

Scene 7 | Atrazine, Frogs, and Tyrone Hayes, PhD (4 min, 27 sec)
*Scene 7 in the one-hour version.*
- According to Hayes, why are frogs useful in the study of environmental contamination?
- In Hayes’ research, what effect has atrazine had on some populations of frogs?
- What are the similarities between frogs and humans, according to Hayes?
- What are the benefits of using atrazine? What are the potential risks? How would you decide whether the benefits make the risks acceptable?
- Researchers like Hayes are used in the film to communicate scientific information. But the filmmaker also treats them as characters, with unique personalities and temperaments. Provide an example of a moment in this scene that communicates something to you about Hayes’ personality, and explain how this moment influenced your understanding of his work.

Scene 8 | Placing People in Harm’s Way—a reading (44 sec)
*Not in the one-hour version.*
- Do you agree that “the links between cancer and environmental contamination are unproven and unprovable”? Or do you believe that we are “obliged to investigate”? Why? Are the two positions mutually exclusive?
- Why is it difficult to prove a causal link between cancer and the environment? In your opinion, how should society act in the face of scientific uncertainty? Why?
- Steingraber believes that the people who claim the link between cancer and the environment is unprovable do so in order to dismiss the issue. Why do you think they would want to do this?
- From your own experience, are there other techniques people use to dismiss the issue of environmentally caused cancer? What other important issues are dismissed?

Scene 9 | Sandra’s Work (1 min, 34 sec)
*Scene 8 in the one-hour version.*
- Steingraber recalls her surprise when she first learned that proven carcinogens are still being manufactured and sold. Based on the film, what does Steingraber think should be done differently?
• Steingraber describes herself as “somebody who spends her days putting jigsaw puzzles together.” What skills does one need to assemble data and make them understandable for the general public? (feature-length version only)

• Steingraber talks about the experience of seeing all the arrows of evidence pointing in the same direction. In what direction does Steingraber believe they are pointing? Do you agree?

**Scene 10 | WWII, Chemicals, and Rachel Carson (3 min, 23 sec)**

*Scene 9 in the one-hour version.*

• When did our large-scale use of synthetic chemicals begin? Why?

• What are some of the problems with allowing chemicals to be manufactured and sold without first conducting safety testing?

• Who was Rachel Carson, and what was she trying to achieve? Was she successful?

• Is it significant that *Silent Spring*—the groundbreaking 1962 book about the health hazards of pesticides—was written by a woman? Why or why not? How might Carson's identity as a woman have affected the way her message was received by the public, the media, other scientists, and those who held political power?

• The interview clips of Carson and Robert White-Stevens, PhD (the industry-funded scientist interviewed in a lab setting) represent the arguments still taking place between environmentalists and industry today. What stake does each side have in the debate? In your opinion, who is “winning,” and why?

• How has our society’s use of chemicals changed since Carson’s time? How has your family’s use of chemicals changed during your own lifetime? Where would you go to learn more about the trends in our collective use of chemicals?

• At public screenings of the film, some audience members have reacted to the archival footage of pesticide sprayings with audible gasps, despite already being familiar with this history. What does this say about the potential impact of visual imagery? How does this relate to your experience of the scene?

**Scene 11 | Sandra’s Congressional Briefing (2 min, 32 sec)**

*Scene 10 in the one-hour version.*

• Steingraber speaks about the importance of sharing knowledge, because “knowledge is power.” Why might some people resist learning about this issue or sharing what they have learned with others? What are the potential consequences of this resistance?

• What are some other issues that people would rather not learn about? Why might this be?

• Steingraber refers to the AIDS activist slogan “Silence = Death.” How is this slogan relevant to the environmental links to cancer? Is there a fair comparison to be made between HIV prevention and cancer prevention? If so, what?
• Steingraber says, “Finding ways to prevent cancer and not just racing for its cure is an imperative need.” What comment is Steingraber making here about mainstream cancer research and activism? Do you agree with Steingraber’s stance?

**Scene 12 | Wall of Stars (1 min, 27 sec)**

*Scene 11 in the one-hour version.*

• How many people die of cancer every year in the United States and Canada combined?
• How does this number compare to the number of American soldiers who died in World War II?
• Why might Steingraber and Chevannes have chosen to make this comparison?

**Scene 13 | Sandra Runs to Know the Land (1 min, 44 sec)**

*Not in the one-hour version.*

• As Steingraber runs through the streets and parks of Washington, DC, she describes her habit of running in every city she visits. Why does she do this, and what else does she do to learn about the places she visits?
• This scene is the first of three in which Steingraber is shown running. Why might Chevannes have chosen running as a recurring motif in the film?
• The numbers that appear in the sky represent the industrial releases of select carcinogens tracked by the US and Canadian governments. What strikes you about these numbers?
• Find out more about the chemical releases in your area using the US Toxics Release Inventory (www.epa.gov/tri) or the Canadian National Pollutant Release Inventory (www.cc.gc.ca/inrp-npri/default.asp?lang=en) to search by your zip or postal code. What did you learn from this exercise?

**Scene 14 | PCBs (2 min, 3 sec)**

*Scene 12 in the one-hour version.*

• Why was the discovery of PCBs in the White Mountains of New Hampshire so surprising?
• What is global distillation?
• Through global distillation, people as far north as the Arctic have been exposed to foreign chemicals like PCBs and DDT. What are the human rights implications of this?
• *Environmental justice* is a term used to describe the social movement that aims to protect individuals and communities disproportionately exposed to environmental health hazards. In addition to those who live in the Arctic, what other populations of people might be exposed to a higher burden of chemicals, and why?
Scene 15 | PCBs, Beluga Whales, and Stéphane Lair, PhD (2 min, 43 sec)

*Scene 13 in the one-hour version.*

- What is unique about the population of beluga whales discussed in Lair’s study?
- What chemicals are these beluga whales exposed to, and how might these chemicals be working to create cancer?
- Lair says, “You have to ask yourself: Could that also happen to us?” What do you think? What differences and similarities between animals and humans might make this a complicated question to answer?

Scene 16 | You Have Become a Cancer Patient—a reading (43 sec)

*Not in the one-hour version.*

- What is Steingraber trying to communicate about the experience of being a cancer patient?
- How does this voice-over inform your understanding of the upcoming scene about Steingraber’s annual cancer screening?
- Steingraber was diagnosed with bladder cancer at the age of twenty, between her sophomore and junior years of college. If you were diagnosed with cancer at that age, how would it affect your life?

Scene 17 | The Morning of Sandra’s Test (4 min, 58 sec)

*Scene 14 in the one-hour version.*

- How does the personal impact of cancer, as Steingraber describes it, compare to that of cancer patients and survivors you have known personally?
- Steingraber says, “I would not be able to say with certainty that the cause of my disease was any one chemical.” And yet, in her research, Steingraber found a bladder carcinogen in the drinking water of her hometown of Pekin, so it is reasonable to assume that she was exposed to this chemical. Despite the evidence, why is it still impossible to conclude that a specific chemical caused her cancer?
- In your opinion, how might the difficulties in linking specific individual cancers to specific environmental causes hamper our ability to work for prevention?
- Steingraber is shown drinking tap water in this scene. What questions does this raise for you as a viewer? Why might the filmmaker have chosen to use this footage in combination with Steingraber speaking about the cause of her cancer?
- What does Steingraber’s conversation with her husband reveal about her thoughts and feelings regarding her annual checkups?
- This scene was crafted to create a claustrophobic and anxious feeling in the audience. Considering the photography, editing, and sound design of the scene, identify specific elements that might have been intended to work toward this goal. In your opinion, were Chevannes and her crew successful in creating the desired effect?
Scene 18 | Sandra Visits Her Doctor (4 min, 52 sec)

*Scene 15 in the one-hour version.*

- In this scene, we hear that bladder cancer—like breast cancer—can recur at any time. How does this information make you feel about cancer? Does it change the way you understand the impact of cancer on Steingraber’s personal and professional lives?

- The portion of this scene in the examination room was shot using a style known as *cinema vérité* (a French term meaning “cinema of truth”). This style uses a fly-on-the-wall approach and eschews voice-over and music as means of communicating information or emotion. What is the effect of this technique in this scene? How does it compare to Chevannes’ style throughout most of the rest of the film?

- In Steingraber’s conversation with her husband at the end of the day, she emphasizes the word *normal*. Why might this word be particularly powerful for a cancer survivor? What does it say about Steingraber’s early experience of the disease?

Scene 19 | Children’s Vulnerability to Chemicals (1 min, 3 sec)

*Scene 16 in the one-hour version (significantly abbreviated).*

- Why are children more vulnerable to toxic chemicals, according to Steingraber? (feature-length film only)

- What other subpopulations might be more vulnerable to toxic chemicals than the general population as a whole, and why? (feature-length film only; for a more comprehensive discussion of individual vulnerability, see also the mini doc *Who Is Most Vulnerable?*

Scene 20 | Atrazine, Rats, and Linda Birnbaum, PhD (2 min, 40 sec)

*Scene 17 in the one-hour version.*

- What were the key findings in Birnbaum’s study of lab rats exposed to atrazine?

- Why are we more vulnerable to toxic chemicals early in life?

- Toxicologists used to believe that toxicity was determined only by how much of a chemical one was exposed to (often described as *the dose makes the poison*). Today, toxicologists know that when one is exposed to the chemical is also important (*the timing makes the poison*). How is this new understanding illustrated by Birnbaum’s findings?

- This scene features Birnbaum, a female scientist studying mammary gland development in female rats. What creative choices did Chevannes make to highlight gender in this scene? What other scenes similarly emphasize gender? In your opinion, is gender significant in the film as a whole? Why?

- A 161 lb (73 kg) adult male is considered to be the standard test subject for evaluating toxicological research. What are potential problems with using this as our standard?
Scene 21 | Uncertainty as an Excuse—a reading (44 sec)
Not in the one-hour version.

- Do you share Steingraber’s concern that “uncertainty is too often parlayed into an excuse to do nothing”? Why or why not?
- Based on Steingraber’s work, what type of action do you think she is calling for?

Scene 22 | Sandra and Her Cousin, John Maurer (3 min, 53 sec)
Scene 18 in the one-hour version.

- How did the filmmaker choose to portray Maurer and his family? How did these choices inform your interpretation of the scene?
- Maurer explains his careful use of atrazine, but afterward, Steingraber shares her opinion that “no one can be careful enough with a chemical like atrazine.” How might these two people have come to such different conclusions?
- How do differing perspectives affect the ability to work for change in the use of atrazine and other toxic chemicals?

Scene 23 | Sandra Speaks about Breast Milk (2 min, 50 sec)
Scene 19 in the one-hour version.

- How does Steingraber feel about making this speech?
- What health benefits of breast milk does Steingraber describe?
- What chemicals does Steingraber name as having been found in breast milk samples? What does this mean for her farming audience?
- Steingraber explains that breast milk is the most chemically contaminated human food on the planet—an aspect of breast milk not often discussed. How does this information change the way you see breast milk?
- When Steingraber first declared her intention to address this issue in her book Having Faith, she was surprised to receive letters from breastfeeding advocates asking her not to make this information public. What might the motivation for these appeals have been? What other groups might wish to keep this information quiet? Why?
- Biomagnification is a process by which poisons concentrate as they move up the food chain. Breastfed infants are at the top of the food chain and are therefore exposed to more contaminants than anyone else. Steingraber sees this as a human rights issue. Do you agree? Why or why not?
- How could the use of formula over breast milk further contribute to the ongoing contamination of both breast milk and formula?
Scene 24 | How Chemicals Can Contribute to Cancer (1 min, 2 sec)

*Not in the one-hour version.*

- What does Steingraber’s description of the creation of a cancer cell reveal about the potential role of chemicals in cancer creation?
- Steingraber refers to the “old 1950s’ idea of DNA as this big computer that sits in our cells and ... controls everything,” but this “old” idea is still common in our modern society. Why do you think that is?
- What comparison does Steingraber use to describe the interaction between genes and the environment? How does this comparison help us understand the ways genes and the environment could work together to cause cancer?
- How might a better understanding of gene-environment interaction motivate us to increase scientific research into environmental health? How might it motivate us toward changing our chemicals policies and laws?

Scene 25 | PCBs, Non-Hodgkin Lymphoma, and John Spinelli, PhD (3 min, 34 sec)

*Not in the one-hour version.*

- What is non-Hodgkin lymphoma?
- According to Spinelli, how might PCBs be causing non-Hodgkin lymphoma, and how does this clash with our traditional understanding of the role of carcinogens?
- The other scientists in the film were studying animals in the field and in the lab. Spinelli’s study (known as an epidemiological cohort study) focuses on a human population with a specific disease. What can we learn from this study? What can’t we learn?
- Why are studies on lab animals, wildlife, and humans all important to our understanding of cancer causation?

Scene 26 | PCB Cleanup (1 min, 46 sec)

*Scene 20 in the one-hour version.*

- What makes Buzzards Bay unique in terms of PCB contamination, and how long will its cleanup take?
- Steingraber tells us that when PCBs were banned, we didn’t yet know for sure if they were harmful to human health. What larger point is she making?
- What lesson does Steingraber want us to learn, as a society, from the story of PCBs?
- How many other synthetic chemicals are “out there”? How do you feel about this information?
- This scene marks the end of the second storyline, in which chemicals travel through the environment. Why might the filmmaker have chosen to end this storyline with a PCB cleanup? What does this scene tell us about the journeys of some synthetic chemicals?
Scene 27 | The Event of Diagnosis—a reading (42 sec)

How does Steingraber’s description of the experience of cancer diagnosis prepare you for the next scene about her test results?

Have you (or someone you know) had an experience that helps you to relate to what Steingraber describes?

This scene contains the last of five readings from Steingraber’s book that appear throughout the feature-length film (in scenes 1, 8, 16, 21, and 27). Each occurrence of a reading signifies a shift back to the main storyline. Why might Chevannes have chosen this construction? Does it help or hinder your ability to follow the narrative of the film, and why?

Scene 28 | Sandra’s Test Results (2 min, 41 sec)

Steingraber describes a recent phone call from her doctor’s office. How was this scene foreshadowed in her doctor’s visit and her conversation with her husband in scene 18?

This scene is primarily composed of one long interview clip, with a single edit. Why do you think Chevannes and her editor chose this technique?

After receiving the test results, why does Steingraber still not know what path she is on?

Scene 29 | Rachel Carson Testifies before the Senate (59 sec)

In this scene, Steingraber reveals that Rachel Carson was struggling with breast cancer during the US Senate hearings after *Silent Spring* was published. What is the significance of this information to Carson’s story?

In the past, cancer patients often kept their diagnoses secret. What reasons did they have for doing this? What other issues might have influenced Carson’s decision to keep her disease a secret?

What are the reasons (if any) for cancer patients to keep their diagnoses secret today? In your opinion, is silence a viable option? Why or why not? What might be the impact of silence today—for individuals and their families, but also for the larger society?

Scene 30 | Sandra and George Woodwell, PhD (2 min, 49 sec)

Why is Woodwell an important figure in the environmental movement? (feature-length film only) Why is he an important figure in this film?

Steingraber believes the anonymity of victims of environmentally caused cancer is part of the reason why action on toxic chemicals has been so slow. Do you agree? If we could link specific victims to specific chemicals, do you think there would be more political will to ban these
The scientific community has a duty to work for the public interest. Do you agree or disagree, and why? Should scientists also be advocates?

In your opinion, is it important for members of the general public to know more about science than most individuals in the US and Canada do now? How might a better understanding of science affect our understanding of the world around us? Our decision making?

In order to highlight themes and to create a more coherent narrative, documentary filmmakers often choose to arrange scenes in a different order than they occurred in reality. For example, this scene occurred approximately four months after the scene that follows it. Why might Chevannes have chosen to arrange the scenes in this order? Does knowing that the filmmaker played with the timeline of events affect your trust in the veracity of the film? Why or why not?

Scene 31 | Sandra Speaks about the Abolition of Carcinogens (3 min, 44 sec)

Steingraber compares the abolition of cancer-causing chemicals to the abolition of slavery in the US in the 1800s. In your opinion, is this a compelling comparison? Is it a fair one? Why or why not?

The environmental justice movement emerged out of the knowledge that visible and ethnic minorities are more often victims of environmental contamination than their white counterparts. For example, toxic waste dumps in the US have been intentionally sited in black communities. Knowing this, what do you think of the comparison that Steingraber makes between slavery and cancer prevention?

Steingraber compares the banning of PCBs in the 1970s to a potential ban of atrazine in the near future. What are the similarities and differences between these two chemicals? Why might a ban on atrazine today be more difficult to enact than the ban on PCBs was more than three decades ago?

The audience members listening to Steingraber’s speech are visibly uncomfortable, bored, or annoyed. Why might they react this way? Could another approach have been more effective with this audience? Why might the filmmaker have chosen to include this reaction?

Personally, what is your typical reaction when you first learn difficult information, such as the information presented in this film? How do you decide what to ignore and what to act on?

In the lead-up to the congressional briefing in scene 11, Steingraber says, “Knowledge is power.” But in this scene, those in positions of power are resisting the knowledge. What do you feel are the different types of power at play in issues of environmental health?

Steingraber says, “Cancer is a serial killer.” Is this an accurate statement or hyperbole? Do you believe we are responding to cancer the way we would to a serial killer? Why or why not?
Scene 32 | Sandra’s Watchful Waiting (1 min, 30 sec)

*Not in the one-hour version.*

- Steingraber reflects on her most recent series of tests, and describes herself to be in a period of “watchful waiting.” What does this term mean? In addition to cancer patients, what other types of people might find themselves in a period of watchful waiting?
- For Steingraber, why is being vague and cheerful during these periods personally useful? What effect might it have in the long run?
- This scene was filmed during sunrise. Why might Chevannes and her director of photography have chosen this time of day for filming? What impact does the time of day have on the scene—narratively, emotionally, and aesthetically?

Scene 33 | Rachel Carson’s Death (1 min, 19 sec)

*Scene 25 in the one-hour version.*

- We hear that Rachel Carson died of breast cancer shortly after she testified before the US Senate. Steingraber says, “This was her last best shot at getting this information out to the public.” In your opinion, how successful was Carson?
- According to an article on the US Environmental Protection Agency’s own website, the EPA came into existence because of *Silent Spring*.4 Could a book have that kind of power today? Could a film? Why or why not? Do you know of any other books (or films) that have had a significant social impact?
- In her testimony, Carson cites “the right of the citizen to be secure in his own home against the intrusion of poisons applied by other persons.” This is an allusion to Article 3 of the Universal Declaration of Human Rights: “Everyone has the right to life, liberty and security of person.” Do you agree with Carson that freedom from toxic exposures should be a basic human right? Why or why not?

Scene 34 | Sandra Speaks about the Environmental Human Rights Movement (6 min, 23 sec)

*Scene 26 in the one-hour version.*

- Steingraber speaks to a crowd of thousands about the growing environmental human rights movement. What do you feel are the similarities and the differences between the environmental movement and other historical social movements? What lessons might environmental health activists learn from feminists, abolitionists, and other social activists?
- In the lead-up to this speech, Steingraber says that all speeches are important to her and she gives the example of thirteen people in a church basement. This could be seen as a comment on the value of individuals working at the grassroots of a movement. What roles have small groups of individuals played in social movements of the past? What role are they playing now in environmental health? (feature-length film only)

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• Steingraber quotes Audre Lorde, saying, “Your silence will not protect you.” What does she mean by this? What types of silence does this final speech attempt to break?

• Steingraber’s experience of watchful waiting runs through the film. Here, Steingraber’s speech further speaks to this experience, yet does not provide any sense of closure. Why might Chevannes and Steingraber have chosen to end this part of the story on an ambiguous note? What challenges—both creative and practical—might this choice have presented?

• Throughout the film, Chevannes and her director of photography chose to use camera movement to create a more energetic feeling in selected scenes. In this scene—the climax of the film—there is a lot of camera movement during Steingraber’s speech. What technical difficulties might have been presented by this choice? Does this technique have the desired impact on you as a viewer? Why or why not?

• Steingraber credits feminism with her ability to speak personally about her cancer diagnosis, unlike Carson. In what way might the feminist movement have been important in this shift?

• Is there an issue within the broader topic of environmental health that you feel compelled to share with others? If so, what methods could you use to “speak” about this issue?

Scene 35 | A Fighting Spirit (1 min, 48 sec)

Scene 27 in the one-hour version.

• Backstage, a young cancer survivor meets Steingraber. What do you think is the significance of this moment for both women? What is its significance for you as a viewer?

• Steingraber tells the woman, “I never tell people what I think they should do.” Why might this be? Is it fair to point out social problems without providing solutions? Is this approach helpful to those who are trying to figure out a way to make change? Why or why not?

• How does Steingraber’s comment to the cancer survivor contrast with a lot of the messaging of the environmental movement? How is it reflected in Steingraber’s own demeanor? How would the film be different if Steingraber had prescribed specific advice to this woman?

• In this scene, Steingraber also reflects on the fighting spirit that cancer patients bring to the disease and argues passionately for us to bring the same fighting spirit to cancer prevention. In your opinion, is it possible to move out of a reactive, treatment-focused crisis mode and into a more proactive, forward-looking preventative mode, while maintaining the same level of energy, spirit, and commitment that currently exists in the cancer movement? Why or why not?

• As illustrated by this scene, Steingraber maintains a hopeful outlook on the issue of environmental health. Why would this be useful to her in her work? How might this be difficult to do?

• Do you feel hopeful? Why or why not? How might your emotions help—or hinder—your ability to learn more or work for change?
Expository Writing
Essay Comparing the Two Storylines of the Film

The film by Chanda Chevannes features two main storylines: Sandra Steingraber’s personal story and the scientific story of synthetic chemicals in our environment and our bodies. Write an essay comparing the filmmaker’s treatment of both storylines and appraising how successfully each was told. Possible questions for consideration include the following: (1) Which storyline carries more weight in the film and why? (2) What purpose does each storyline serve? (3) How does Chevannes establish the different storylines and signal to the audience that we are moving from one to the other? (4) What complications does moving between these two stories present and how does the filmmaker try to minimize them? (5) What other things could Chevannes have done to make the storytelling more successful?

Creative Writing
Monologue about a “Great” Moment in the Film

Chevannes has said, “A colleague once told me that there are only five or six great moments in any film, and everything else in the film should simply be the track for getting to those moments. Anything else is irrelevant.” With this idea in mind, select the moment in the film that elicited the strongest response from you (positive or negative). Write a monologue in the voice of the filmmaker explaining why this was one of the “great moments” and what “track” she laid to get there. Express your ideas in terms of story; character; themes; and filmmaking techniques such as cinematography, sound design, music, and narration.

Scientific Analysis
Chart Examining Filmmaker’s Representation of an Original Study

Select one of the scientific studies discussed in the film. Find the original study in the peer-reviewed literature. Compare the filmmaker’s presentation of the study with the scientist’s original paper. Create a chart presenting the key differences between the two and assessing whether these differences change how you understand the research—and possibly, the film.

Lab/Field Research
Field Report on Water Sample Collection and Analysis

Agricultural and manufacturing industries not only release synthetic chemicals into the environment, but they also release unnaturally large quantities of naturally occurring chemicals, such as nitrates
and phosphates. Research the industrial and agricultural practices in your area and select a local river, stream, lake, or pond for testing. Using Vernier probes or a simple water testing kit, test the water at key locations for dissolved oxygen, phosphate levels, and nitrites and nitrates. Compare your results to the locations of manufacturing facilities, agricultural areas, or other potential sources of pollutants. If resources permit, conduct macro-invertebrate testing at these same locations, using collection nets and identification charts to note what life is present in the water samples. This will help confirm whether the chemicals for which you are testing are in fact affecting the biological processes and biotic communities of your area. Aquatic macro-invertebrates are very sensitive to water quality and can provide a good measure of pollutant load integrated over time. Write a detailed field report outlining your methodology, results, observations, and conclusions.

Possible resources:

- Water testing kits (item #68571M00) can be purchased in the US from www.wardsci.com or in Canada from http://boreal.com.
- Macro-invertebrate testing protocols can be found at http://water.epa.gov/scitech/monitoring/rsl/bioassessment/ch07b.cfm.

Oral Presentation

In-Class Screening of and Commentary on a Single Scene

Research the filmmaking process undertaken for Living Downstream. Then select a scene in the film that you believe encapsulates the filmmaker’s intentions for the film. Play that scene for your class while providing a running commentary explaining why you chose the scene. Highlight some key creative and technical choices (including cinematography, editing, sound design, and musical score) and relate these choices to the findings of your research.

Possible resources:

- Commentary Tracks, Bonus Features Menu, Living Downstream Educational DVD
- Adventures in Outreach, by Chanda Chevannes www.livingdownstream.com/blogs/chanda
- “Media Coverage,” Living Downstream at www.livingdownstream.com/media_coverage

Multimedia Project

Podcast Interviews about Careers in Environmental Health

Living Downstream features individuals in diverse disciplines (including writing, toxicology, epidemiology, medicine, agriculture, ecology, and community engagement) who are all doing work in environmental health. Identify three distinct careers linked to environmental health that interest you, and for each career record an interview with one person working in this field. Possible interview questions might include the following: (1) Which academic subjects prepare you for this career? (2) What types of employment opportunities exist? (3) What monetary compensation and nonmonetary benefits (like travel opportunities, name recognition, or contributing to the public good) are available?
(4) What is a typical day like in this line of work? (5) What do you enjoy most about this work? Edit the interviews into a series of video podcasts or audio podcasts with images. Share the podcasts online with your classmates and the wider school community.

Community Engagement

Public Film Screening

Decide whether you would like to hold a screening of *Living Downstream* or another documentary film focusing on an environmental issue. Determine your goal for the screening (e.g., raising community awareness, beginning a discussion about environmental health, or launching a long-term environmental project) and who your audience will be. Decide how you will track and measure whether you have achieved this goal. Plan your event; include ways to help audience members follow up by taking action on the issue of environmental health, if they wish. Keep a log of the planning work and your decisions. Submit this log with a brief self-evaluation after the event. Be sure to include a statement of the initial goal and whether it was achieved. Highlight your accomplishments and the lessons you learned from the experience.
THE BOOK

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Living Downstream

THE BOOK | SYNOPSIS

Title: Living Downstream: An Ecologist's Personal Investigation of Cancer and the Environment
Copyright: 1997, 2010 by Sandra Steingraber
Publisher: Da Capo Press
Number of Pages: 290 (plus 89 pages of further resources and detailed source notes)

When Sandra Steingraber was diagnosed with bladder cancer at the age of twenty, she asked, Why me? As a biology major, she felt compelled to search for an answer in medical libraries. This led to an early interest in the connection between her environment and her health. Years later, with the help of a postdoctoral fellowship from Harvard University, Steingraber undertook a four-year investigation into the links between synthetic chemicals and human cancer. During this time, she went back to her hometown of Pekin, Illinois, in search of her ecological roots. This work became the basis for her acclaimed book, Living Downstream.

Initially published in 1997, Living Downstream was the first book to bring together toxics-release data—finally made available under right-to-know laws—and newly released cancer registry data. Steingraber is also the first to trace with such compelling precision the entire web of connections between our bodies and the ecological world in which we eat, drink, breathe, and work.

Living Downstream has won praise from international media, including The Washington Post, Publishers Weekly, The Lancet, and The Times (London). Over the years it has been used enthusiastically by educators, health-care professionals, and activists.

Since the book's original publication, the scientific evidence has been growing, and so, to coincide with the documentary adaptation, Da Capo Press released the second edition of the book in April 2010. In this expanded edition, Steingraber shows that investing in green energy helps prevent cancer, since synthetic chemicals linked to cancer come mostly from petroleum and coal. Saving the planet thus becomes a matter of saving ourselves. The updated science in the second edition also strengthens the case for banning poisons now pervasive in our air, our food, our water, and our bodies.

Ecologist, author, and cancer survivor Sandra Steingraber, PhD, is an internationally recognized authority on environmental links to cancer and human health. For more information on Steingraber's work, visit http://steingraber.com. For information on ordering Living Downstream: An Ecologist's Personal Investigation of Cancer and the Environment, see page 271.
A second edition of *Living Downstream* was published in 2010 to coincide with the release of the documentary film adaptation. Those who are familiar with the first edition will see a range of differences in the second edition, depending on the academic lens through which the work is viewed. The most significant changes will be noted by those teaching and studying liberal arts, English, and science.

**Liberal Arts**

Liberal arts instructors and students will note a shift in Steingraber’s emphasis. She often explains that by the time she was writing the second edition, many of her readers already understood the scientific evidence and were asking for ideas on how to create change. Therefore, in this edition, Steingraber includes more political analysis, opinion, and action ideas in response to her readers’ desire for this information.

**English**

English instructors and students will note a shift in Steingraber’s writing style, given her evolution as a writer and the growing impatience she feels with the slow rate at which policy change is occurring. They will see differences in the way Steingraber’s sentences are constructed and information is communicated, often with a greater sense of urgency. Steingraber has also added new scenes in the book, inspired by scenes from the documentary, which she was reviewing while updating the book.

**Science**

Science instructors and students will note Steingraber’s identification of six new “trends that have emerged in our understanding of the environment’s contribution to cancer,”¹ as follows:

1. a growing acknowledgement that cancer causation is complex
2. an emerging awareness of the importance of epigenetics
3. a mounting appreciation for the role of endocrine disruption
4. an expanding recognition that the timing makes the poison
5. a recognition that . . . [c]hemical mixtures need attention
6. a shift toward embracing the precautionary principle as a normative guide to environmental decision making.²

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2 Quoted from pages xviii (point 1), xix (points 2 and 3) and xx (points 4, 5, and 6) of Steingraber, *Living Downstream*, 2nd ed.
In addition, Steingraber places new emphasis on our reliance on fossil fuels. She argues that the problems of environmental cancers and climate change are intertwined, because the vast majority of chemical carcinogens are derived from petroleum and coal, the US petrochemical industry is responsible for a high proportion of the toxic releases in North America, and the process of mining and burning coal for energy is another significant source of toxic releases.

Just as the first edition of *Living Downstream* inspired the film, Steingraber has said that the film inspired this new second edition. Readers and viewers will enjoy the creative and topical connections between these works.
Foreword to the Second Edition

Steingraber summarizes what has happened in the years between the publication of the first edition (1997) and the second edition (2010) of *Living Downstream*. She describes her experience of watchful waiting, the process of making the film adaptation, and the latest scientific developments in the field of environmental cancer research. These developments are then outlined in “six clear trends that have emerged in our understanding of the environment’s contribution to cancer.” Steingraber goes on to explain her personal and professional reasons for feeling hopeful, including the following two facts: First, we can do something about the environment’s contribution to human cancer (unlike our genes, which we cannot change). Second, the synthetic chemicals linked to cancer are largely derived from petroleum and coal; therefore investments in green energy can also be seen as investments in cancer prevention. The foreword concludes with the story of the denormalization of smoking and a passionate call for the same precautionary approach to other known and suspected carcinogens.

Chapter 1 | Trace Amounts

Steingraber introduces us to her home state of Illinois. She paints a picture of a flat agricultural state devoted to growing mostly corn and soybeans. We read about the agricultural and industrial chemicals used here and about the changes these chemicals have wrought. Steingraber also introduces us to Rachel Carson. Carson’s best-selling book, *Silent Spring*, was published in 1962 and reveals the evidence against pesticides that was available to her fifty years ago. With this broad context established, Steingraber then delves more specifically into three chemicals: DDT, PCBs, and atrazine. She explains the scientific research exploring the relationship between these chemicals and breast cancer, and the maddening problems facing scientists who are working to establish causal links. Altogether, Steingraber unveils a complex and emerging scientific picture. She ends this chapter by asking why so much evidence linking cancer and the environment “is still considered ‘preliminary.’”

Chapter 2 | Silence

Steingraber immerses us in the theme of silence. She describes the silence of the scientific community in the 1950s and 1960s regarding the potential harm caused by pesticides, and we read more about the publication of *Silent Spring*, which effectively broke this silence. Steingraber also explores the personal silences we keep related to cancer, primarily through telling the story of Carson’s struggle with breast cancer. Throughout the chapter, Steingraber describes her own friendship with Jeannie Marshall—a woman undergoing treatment for a recurrence of a rare cancer of the spinal cord.
Chapter 3 | Time

Steingraber focuses on the role of cancer registries in compiling cancer statistics and on the importance of tracking cancer incidence and mortality over time. Steingraber takes a close look at the incidence rates for breast cancer in the US—their rise from the 1950s until the late 1990s, their subsequent decline, and their current stabilization—and examines four possible reasons for this pattern. She then goes on to describe three lines of evidence linking cancer incidence to environmental causes: (1) rising cancer incidence among children, (2) the increase in cancer incidence among successive generations of adults, and (3) cancers that show rapid rates of increase through the lens of non-Hodgkin lymphoma (a cancer of the immune system). Steingraber also tells the story of Jeannie Marshall’s death from cancer.

Chapter 4 | Space

Steingraber discusses the geographic distribution of cancer. Beginning in her hometown of Pekin, Illinois, Steingraber describes a suspected cancer cluster in the industrialized subdivision of Normandale. Speaking broadly, she explains that immigrants adopt the cancer rates of their new countries; that workers in a variety of occupations have higher rates of some cancers than the general population; and that those who live closer to agriculture, industry, and toxic waste dumps also have higher rates of certain cancers. Steingraber provides a detailed explanation of the challenges facing investigations into cancer clusters and concludes by comparing the comprehensive studies conducted in Long Island, New York, and Cape Cod, Massachusetts, to the disappointing study conducted in Normandale.

Chapter 5 | War

Steingraber focuses on World War II and how it “changed chemistry and physics forever.” She explains that many new chemicals that were quickly developed for urgent wartime purposes were never properly tested for safety. Even once the war was over, no safety testing was conducted, despite the repurposing of these same chemicals for personal and home-based uses. Steingraber then defines the terms organic and synthetic and explains how chemicals can interfere with the systems of the human body. She discusses the flaws of US chemicals regulation policies, the Toxics Release Inventory, and right-to-know laws. As potential models for the reform of American policy, Steingraber points to the European policy known as REACH, the international agreement called the Stockholm Convention on Persistent Organic Pollutants, and Canadian bylaws against the nonessential uses of pesticides. In this chapter, Steingraber also writes about her adoptive father, who was a teenaged combatant in Naples, Italy, during World War II.

Chapter 6 | Animals

Steingraber discusses what we can learn from animal studies—in the wild and in the lab. She describes the use of laboratory rodents for bioassay studies, the challenge this approach presents for testing all the chemicals on the market, and the promise of new techniques like high-throughput testing. The effects of edosulfan and atrazine on lab rats are presented, as well as the high levels of cancer found in
beluga whales from the St. Lawrence estuary and in various cold-blooded vertebrates. In this chapter, Steingraber also tells the personal story behind a breast cancer cell line called MCF-7, often used by researchers, as well as the story of her own bladder cancer diagnosis at age twenty.

**Chapter 7 | Earth**
Steingraber describes the current American agricultural system. She explains the shift that has occurred since the early 1960s through the farming of vast monocultures, which require conventional farmers to rely heavily on chemical pesticides and fertilizers. In Steingraber’s home state of Illinois, these monocultures are usually corn and soybean fields. Steingraber goes on to discuss the health problems created by this type of farming: declining levels of nutrition, rising levels of obesity, and the risks of synthetic fertilizers and chemical herbicides such as atrazine. She lays out an argument for the diversification of farmland and the benefits and solutions provided by organic agriculture. To illustrate the changes in the agricultural system that have occurred in the past few decades, Steingraber outlines the trajectory of her family’s farming practices, beginning on her grandparents’ farm when her mother was a child and ending on her cousin John’s present-day farm.

**Chapter 8 | Air**
Steingraber focuses on air as a vessel for toxic chemicals. She explains the process of global distillation, which deposits chemicals far from their source. She outlines the challenges of studying airborne carcinogens and then focuses on findings that link air pollution to cancers that are not related to smoking. In relation to solutions, she tells the story of the eighteenth-century miasma theory and its improvements to public health. Steingraber’s personal story in this chapter begins with the airy landscapes of Illinois and ends with a car ride with her two nephews, one of whom is asthmatic.

**Chapter 9 | Water**
Steingraber examines the chemical contamination of water, beginning with the Illinois River and ending with the Sankoty Aquifer. Steingraber recounts her personal knowledge of both, as she grew up alongside the river and drank the groundwater from the aquifer. In discussing these water bodies and others, she addresses the regulation of public drinking water, stories of waterborne volatile organic compounds (including the contamination of drinking water on the Camp Lejeune military base in North Carolina), and the carcinogenicity of chlorinated water. She also relays how we are exposed to contaminants in water by three routes: ingestion, inhalation, and absorption. Throughout the chapter, Steingraber paints a vivid picture of the history of Illinois’ water bodies—from their Ice Age creation to the engineering of the Chicago Sanitary & Ship Canal.

**Chapter 10 | Fire**
Steingraber tells the personal story of a battle over the proposed site of a trash incinerator, close to her family’s farm in Illinois. The scientific story she tells revolves around dioxins and furans—chemicals that are highly potent at incredibly low levels. She demystifies “state-of-the-art” incineration by
explaining the associated physics and chemistry. She writes that dioxins have been linked to problems with “the immune system, reproduction, and infant development.” The most poisonous form of dioxin, TCDD, has been linked to cancers of the mouth, nose, lung, skin, adrenal gland, thyroid gland, and lymphatic system. The chapter ends by revealing that the family farm—which was saved from the incinerator siting many years ago—is now in the process of being converted to an organic operation.

Chapter 11 | Our Bodies, Inscribed

Steingraber takes us into the human body, exploring our cells and tissues and describing our bodies as “living scrolls.” She explains body burden and biomonitoring. Then, through a discussion of cancer creation and growth, Steingraber presents some of the pathways by which chemicals can create cancer. These are many, including the mutation of DNA, creation of adducts that cause replication errors, immunosuppression, endocrine disruption, chronic inflammation, and abnormal epigenetic regulation. Steingraber also walks us through the three stages of cancer growth: initiation, promotion, and progression. Altogether, her description of the complexity of cancer causation makes it clear why no safe dose of a carcinogen can be established and why similar exposures pose different risks to different people. Here, Steingraber also shares stories of the cancer in her adoptive family, with a focus on her mother’s breast cancer diagnosis in 1974.

Chapter 12 | Ecological Roots

Steingraber considers the recent focus on genetics and lifestyle as the main causes of cancer. Here she argues that we should be paying more attention to environmental links to cancer. Her scientific rationale includes the following topics: epigenetic drift, the modest role of family history in predicting cancer, the complexity of cancer causation, and how an emphasis on lifestyle encourages people to see cancer as the responsibility of individuals alone. Steingraber touches on the genetic mutations and chemicals associated with bladder cancer and asks why powerful bladder carcinogens “continue to be manufactured, imported, used, and released into the environment.” Steingraber ends this chapter by discussing Rachel Carson’s final legacy, by explaining the precautionary principle, and by outlining three steps for working for the prevention of environmental cancers.

Afterword

Steingraber emphasizes the need to take a precautionary approach, using her current perspective as a mother to illustrate this position. She then encourages her readers to join the Save the World Symphony by playing their own role in the environmental health movement. Before ending with the full text of the Wingspread Statement on the Precautionary Principle, she reminds us that “the environment is not just something else to worry about. It is connected to all the things we already worry about—our children, our health, our homeland—and love with all our hearts.”
The following questions have been designed for in-class discussions, quizzes, or assignments on *Living Downstream: An Ecologist's Personal Investigation of Science and the Environment* by Sandra Steingraber. Instructors may choose to have students read the full book, selected chapters, or any of the excerpts found on pages 101, 103, 143, and 145 of this guide. While some of these questions are answered by the book itself, others are designed to stimulate analysis and extrapolation beyond the scope of the book.

**General Questions**

- Steingraber says that argument is the engine that drives *Living Downstream* and that each of the twelve chapters lays out a different line of evidence to support a single argument. What is Steingraber’s main thesis for the book? For each chapter? In your opinion, does she make her case?

- Looking at the passages in the book in which Steingraber considers the counterarguments to her conclusions, do you believe she has honestly considered alternative explanations or is her presentation biased? Is she?

- Steingraber’s book is organized like a funnel: in scale, it moves from the macro to the micro. Beginning with ecosystems, she first sweeps across historical time trends and worldwide cancer maps, then moves into the smaller world of animals and tissues, and finally explores the minute machinery of individual cells. By contrast, most biology textbooks are organized in the opposite direction: from early chapters on the subcellular to final chapters on ecosystems. Why do you think Steingraber chose to turn traditional biological presentation around, beginning in a place that is more typically the end?

- This book aims to translate scientific data for a general audience. What techniques does Steingraber use to make the data compelling and comprehensible? In your opinion, is she successful?

- Aristotle described three main rhetorical styles: *ethos* (an appeal based on the character or reputation of the author), *logos* (an appeal based on logic or reason), and *pathos* (an appeal based on emotion). Find examples in the book of each of these three styles and consider the impact of each. Which form does Steingraber use the most, which is most effective for you as a reader, and is their use convincing to you?

- In *Living Downstream*, Steingraber interweaves scientific data with personal stories. How does this technique influence your reading of the book?
• Examine Steingraber’s narrative voice in this book. In addition to being the narrator, she is a character in her own book, just like the other people she describes. Give examples of words and phrases that help you—as the reader—establish a relationship with her as a character. Is she a reliable narrator? Why or why not?

• Steingraber is a published poet as well as a scientist. Look for sentences where her prose turns poetic. What other creative styles and techniques can you identify in the writing? What is the effect of these techniques?

• Steingraber’s publisher calls this book a memoir. What else might you call it (e.g., personal narrative, science writing, nature writing, creative nonfiction)? Why?

Foreword to the Second Edition

• What does Steingraber’s present-day story of watchful waiting tell us about her experiences as a bladder cancer survivor (page xi–xii)? Why might she have chosen to open the second edition of the book with these scenes?

• Why were the questions of Steingraber’s diagnosing physician significant (page xii)? What does Steingraber mean when she says “bladder cancer is considered a quintessential environmental cancer” (page xii)?

• Steingraber outlines three tasks created for her by the making of a documentary adaptation of this book (pages xv–xvii). What were these three tasks, and why might she have chosen to describe them for the reader?

• What are the “six clear trends” that have emerged since the first edition of the book, and why are these trends significant (pages xviii–xxi)?

• Why does Steingraber say that she is hopeful? Do you share her hope (pages xxi–xxii)?

• Steingraber explains that synthetic chemicals and toxic emissions are closely related to fossil fuels. How does this affect your understanding of the issues of environmental health and climate change?

• Why does Steingraber tell the story of public policies related to smoking? What larger point do you think she is trying to make (pages xxiii–xxiv and xxv–xxvi)?

Chapter 1 | Trace Amounts

• Why do you think Steingraber begins her book in rural central Illinois? What narrative and literary techniques does she use to connect her audience to a sense of place (pages 1–4)?

• What does Steingraber emphasize in her discussion of synthetic pesticides and industrial chemicals in Illinois (pages 4–6)? How does this emphasis ensure that all readers feel touched by the subject matter?

• Rachel Carson used the phrase “the harmless aspect of the familiar” when writing about
chemical pesticides like DDT. What did she mean by this phrase? Do you believe that this is still an issue for us today? Why or why not?

• What was most shocking for Steingraber as she read Carson's *Silent Spring* and then again when she reviewed the scientific literature that preceded it (pages 8–9)?

• What challenges have scientific researchers faced while studying the potential links between synthetic chemicals and breast cancer (pages 10–15)?

• What are the key findings, described by Steingraber, linking DDT, PCBs, and atrazine to breast cancer? What sets atrazine apart from the others (pages 10–15)?

• Steingraber expresses her desire to explore “the industrial and agricultural transformations” into which she was born (page 7). What industrial or agricultural transformations have occurred during your lifetime? How might these transformations have affected your personal chemical exposures?

• Steingraber asks “why so much silence still surrounds questions about cancer’s connection to the environment and why so much scientific inquiry into this issue is still considered ‘preliminary’” (page 15). What are your thoughts on this?

Chapter 2 | Silence

• How did Steingraber’s description of reading Carson’s archived papers (pages 17–18), as well as the subsequent references to Carson’s personal letters, influence your reading of this chapter?

• What are the three forms of silence addressed through Carson’s public work (pages 18–21)?

• In this chapter, Steingraber weaves descriptions of three individuals’ cancer experiences: those of Rachel Carson, Jeannie Marshall, and herself (pages 21–33). What do you think she is trying to communicate with this approach, and how does it relate to her argument?

• What two kinds of silence did Carson create in her private life (pages 27–28)? What third type of silence was evident in the media’s portrayal of her final days (page 29)? How are these silences contrasted by Steingraber’s approach to writing *Living Downstream*?

• What five lines of evidence linking cancer to environmental causes did Carson lay out in *Silent Spring* (pages 30–32)?

• What are the reasons for scientific uncertainty about the environment’s contribution to cancer (pages 32–33)?

• According to Steingraber, in what way did early environmental activism influence Carson and lead to the publication of *Silent Spring* (pages 33–34)? How do you think activism can help or hinder the progress of science? Of public policy?

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Chapter 3 | Time

- In this chapter, Steingraber alternates between statistics and story. How did this approach affect your understanding of the scientific information presented?
- What did Steingraber learn about data collection and interpretation through her compilation of species inventories in a Minnesota forest (pages 38–39)?
- In Steingraber’s description of the rise, fall, and stabilization of breast cancer incidence in the US, which details point to possible environmental causes (pages 39–42)?
- What does Steingraber mean when she says that she is “writing in a moving stream of data” (page 42)?
- What are the problems with tracking cancer incidence (pages 39–44)? What are the problems with tracking cancer mortality (pages 44–46)? In your opinion, which method is more accurate and why?
- In the 1950s, how many Americans were expected to be diagnosed with cancer (page 47)? According to data in the book, how many Americans would be diagnosed with cancer at the time of its publication (page 47)?
- Steingraber states that “the environment keeps falling off the cancer screen” and describes the history of the Illinois Health and Hazardous Substances Act as an illustration of this (page 49). Why might the cancer registry have received funding while the hazardous substances registry did not? What point is Steingraber trying to make about the politics of cancer and the environment, and do you agree with her?
- What three lines of evidence supporting the belief that some cancers have environmental roots does Steingraber outline (page 53)? Provide statistical examples for each (pages 45–48 and 51–57).

Chapter 4 | Space

- How does Steingraber use the story of Normandale as both a creative and an expository device in this chapter?
- On a global scale, what is the most obvious link between geography and cancer incidence (pages 60–62)?
- What do studies of immigrants reveal about the relationship between cancer and environment (pages 62–63)?
- How does evidence linking cancer incidence to certain occupations inform the study of cancer causation beyond the workplace (pages 65–68)?
- By 2009, how many contaminated sites had been identified for cleanup in the US (page 69)? Why is evidence suggesting links between cancer and hazardous waste sites sometimes considered preliminary (pages 70–71)? What is Steingraber’s personal response to this type of uncertainty (page 71)?
• What four problems with cancer cluster studies are highlighted by Steingraber (pages 74–76)?
• What factors differentiate the residents of Normandale, Illinois, from those of Long Island and Cape Cod (pages 86–87)? How might these differences have played a role in the approach to their potential cancer clusters?

Chapter 5 | War
• In *Silent Spring*, what three points did Carson make about World War II (page 90–91)?
• Steingraber writes, “The terms *organic* and *synthetic* are slippery ones.” Why (pages 92–94)?
• From what substances are synthetic organic compounds derived? How does this information help to explain why synthetic organic compounds are “biologically active” (pages 93–95)? How does this knowledge influence your perception of these chemicals?
• How was World War II “a catalyst for the transformation from a carbohydrate-based economy to a petrochemical-based economy” (pages 99–101)?
• What is the Toxic Substances Control Act and what are its deficiencies (pages 101–103)?
• What is the Toxics Release Inventory (TRI) and what are its deficiencies (pages 104–105)? Despite these shortcomings, what are the positive consequences of its creation (pages 105–106)?
• Steingraber says she cried when she first read through the TRI for her home county (page 111). If you live in the US, visit the TRI (www.epa.gov/tri) to enter your zip code. If you live in Canada, visit the National Pollutant Release Inventory (www.ec.gc.ca/inrp-npri/default.asp?lang=en) to enter your postal code. What is your personal reaction to this information?
• What is Steingraber referring to when she says, “Amid a flood of information, an absence of knowledge. Amid a thousand computer-generated words, a silence spreads out” (page 113)?
• What do you think Steingraber hopes to communicate by linking synthetic chemicals to the petroleum from which they were derived? (pages 116–117)
• What three initiatives does Steingraber identify as models for US policy reform (pages 117–120)? For the US, Canada, and Europe, what else do you think should be done? Do you think there is a limit to the level of reform that is realistic, and if so, what is that limit?
• What is green chemistry? According to Steingraber, what three things are preventing its implementation on a large scale (pages 120–122)?
• Of the chemicals featured in this chapter, describe one that captured your attention and explain why.

Chapter 6 | Animals
• How does the beginning of this chapter engage the reader, while hinting at the chapter’s broader context (page 123)?
• Why is it significant that small quantities of different estrogenic chemicals can act together
Living Downstream ~ In the Classroom

(page 124)?

• Where did the MCF-7 cancer cell line come from (pages 125–127)? How does Steingraber’s decision to tell this story fit with her overall approach to writing *Living Downstream*?

• What are the problems with using animals to screen chemicals for carcinogenicity (pages 127–128, 130, and 133–134)? What are some alternatives being explored (pages 128–129)?

• What is a DNA adduct, and how does it relate to cancer formation (pages 137–138)?

• Steingraber quotes a conservationist as saying, “Do you think you are somehow immune and that it is only the beluga whale that is being affected?” (page 139). What do you think she is trying to emphasize by juxtaposing the scientific data with this quote?

• Why do you think Steingraber chose to discuss the details of her own cancer in a chapter on animals (pages 133–137 and 140–141)?

Chapter 7 | Earth

• How are Steingraber’s family farming stories relevant to the ideas discussed in this chapter (pages 143–144)?

• What changes have occurred in American agriculture since *Silent Spring* was published in 1962 (pages 144–146)?

• Why do you think Steingraber gives such a detailed description of corn and soybean fields (pages 146–149)?

• What has been happening to US obesity rates and the cost of food (pages 151–152)? How does the obesity epidemic relate to the environment and cancer (pages 152–154)?

• What are the various ways in which atrazine may be interfering with our biological processes (pages 156–159)?

• What are the two main arguments in favor of conventional (nonorganic) agriculture, and what does Steingraber say in her examination of them (pages 161–165)?

• How does Steingraber’s last family farming story (pages 168–169) contrast with the first (pages 143–144)?

Chapter 8 | Air

• What is the Arctic Paradox and how is it related to global distillation (pages 172–175)?

• What are three ways that “air can evade the rigors of scientific analysis” (pages 175–177)?

• Provide three examples of evidence that suggests a link between lung cancer and air pollution (pages 179–180).

• This chapter names two chemicals that are not carcinogens themselves but are implicated in cancer development (pages 177–178 and 181). Summarize the findings for both.

• What is the miasma theory, and, according to Steingraber, what public health lessons can it teach us (pages 183–185)?
Chapter 9 | Water

- What is the Chicago Sanitary & Ship Canal, and what effect did it have on the Illinois River (page 189)?
- Why does Steingraber say that she is “a natural historian of ghosts” (page 191)?
- What does the term *maximum contaminant levels* mean (page 191)? How is the US system for regulating contaminants in public water supplies flawed (pages 191–194)?
- Besides through our drinking water, how else do the contaminants in water enter our bodies (p. 194)? How does this especially relate to volatile organics (pages 194–196)?
- In the discussion of drinking water contamination at Camp Lejeune, Steingraber asks, “Is this report an honest appraisal of the limits of science? Or is it an excuse to turn a blind eye?” (page 199). What do you think? Why do you think these types of questions arise so often in the investigation of environmental links to cancer?
- What complex public health issues are raised by the link between cancer and water chlorination (pages 201–206)?
- Why do you think Steingraber devotes so much of this chapter to the history of water in Illinois?

Chapter 10 | Fire

- Steingraber calls dioxin “the most potent carcinogen ever known.” How does this relate to how emissions are recorded (page 216) and how research is conducted (page 224)?
- What two problems do incinerators present that landfills do not (pages 217–220)?
- What are the effects of incinerator emissions on agriculture (page 223)?
- Steingraber identifies three sets of arguments and counterarguments shared by the incinerator battles she describes. How do these resonate with your personal thoughts regarding the environmental links to cancer (page 228–230)?
- What alternative to incineration is gaining momentum, and how has the EPA shown its support (page 235)?
- From the information presented on dioxin, identify the three findings or facts that most surprised you and explain why.
- Steingraber describes listening to an orchestral piece while standing on a proposed incinerator site and weaves references to the music into a stream of thoughts (page 234–236). What do you think she is trying to achieve through this style of description?

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Chapter 11 | Our Bodies, Inscribed

- What is biomonitoring, and why is it important (page 240–243)? What are its limitations (page 243)?
- What three traits are cancer cells known for (pages 245–246)?
- Summarize the pathways to cancer formation described by Steingraber (pages 246–247).
- What are the three overlapping stages in the making of a cancer cell (pages 247–250)?
- What are the social implications of the biological possibilities of carcinogens (page 250)?
- What are epigenetics (p. 252)? Why is understanding epigenetic regulation important for cancer research (pages 252–253)?
- What are genotoxic and epigenetic biomarkers, and how do they compare to biomonitoring (pages 253–256)?
- Why is the cancer history of Steingraber's family and the fact that she is adopted relevant to her argument (pages 256–257)?

Chapter 12 | Ecological Roots

- According to Steingraber, what can we learn about cancer causation from studies of identical twins (pages 262–263)?
- Why does Steingraber believe we are wrong to focus so much cancer research on genetics (pages 263–265)?
- Why do you think Steingraber describes so much of the known science about bladder cancer (pages 266–268)? What do we still need to learn (pages 268–270)? What do you think should be done while science is amassing the missing evidence?
- What is wrong with public education campaigns that only encourage people to protect themselves from cancer by adopting healthy lifestyles (pages 270–275)?
- According to Steingraber, what has blinded US public health agencies to the role of the environment in cancer causation (pages 275–278)? How do you think this problem could be corrected?
- Steingraber says that asserting your right to know about carcinogens in the environment is a three-part process (page 278). What are the three parts she outlines (pages 278–283)?
- Why might a search for our ecological roots be important? Would you personally ever undertake such a search? Why or why not?
- Steingraber asserts that “we do not all bear equal risks when carcinogens are allowed to circulate within our environment.” What evidence does she give to support this statement (pages 280–281)? Can you think of other ways in which certain individuals might shoulder more of the burden?
- How does Steingraber reframe the statistical argument being made by those who dismiss
environmental concerns? In your opinion, does this new perspective strengthen her argument (pages 280–281)? Why or why not?

- What do you feel about Steingraber’s bold statement that “the 33,600 deaths can be seen as homicides” (page 281)?

- What is the precautionary principle (pages 281–283)? What would be the benefits and drawbacks if your country were to implement it as part of its chemical regulations?

- What three principles does Steingraber advocate in order to reduce the number of chemical carcinogens in our environment (pages 282–283)? In your opinion, would implementing these principles work on a large scale? Why or why not?

Afterword

- Why might Steingraber have chosen to discuss the precautionary principle from her present-day vantage point as a mother (pages 287–289)? Does framing her argument this way strengthen her case for its public policy implementation? Why or why not?

- What does Steingraber mean when she describes the Save the World Symphony (page 289)? Does this description have the impact on you that you believe she intended? If so, what instrument do you believe you hold, and has the book convinced you to “play” it?

- In your opinion, what are the strengths and weaknesses of the Wingspread Statement on the Precautionary Principle (pages 289–290)?
Living Downstream

Expository Writing
Essay on Literary Techniques Used by Steingraber

Sandra Steingraber uses a broad range of literary techniques in Living Downstream. For example, she has said, “I use meter and rhythmical patterns in my prose—as well as in spoken word—to create mood and change pace. When I want to create a sense of momentum or suspense, I rely on good old-fashioned iambic, Shakespearean rhythms. When I want the reader to slow down—like when I’m ready to make a big point—I might pile up a bunch of accented syllables, which are hard to read quickly.” Identify three literary techniques used by Steingraber and write an essay describing how they are used, where they are used, and to what effect. Discuss whether the use of these techniques seems appropriate for the subject matter and whether you believe an alternative technique would have been more effective. Some potential techniques to discuss include foreshadowing, flashback, pathetic fallacy, metaphor, symbolism, and rhythm.

Creative Writing
Personal Storytelling on Environmental Health

Steingraber has said that she included her personal story as a bladder cancer patient in Living Downstream as a way to help her readers see that every data point in the scientific research represents a human life. Using a similar approach, tell your personal story in a new way that reflects your connection to—or opinion on—an environmental health issue. Write a personal essay, poem, monologue, or short story about something that has happened to you or to someone you know. Some possibilities to consider include the following: tell your family history through the chemical policy changes that have occurred over the past five decades, tell the story of your hometown through an environmental transformation that has occurred since you were born (such as industrialization, creation of new real estate developments, reclamation of natural spaces, cleanup of a toxic site, conversion of a local farm into an organic operation), or tell the story of the journey taken by your food to get to your plate today. Include a blend of personal storytelling and factual information on the environmental health issue in question.

Scientific Analysis
Pamphlet about Steingraber’s Presentation of Scientific Evidence

Select a topic of interest discussed in the book, such as the health risks associated with dioxin, the evidence linking DDT to cancer, or the statement that bladder cancer is a “quintessential environmental
cancer”. Conduct a review of the scientific literature on your chosen topic and assess the author’s presentation of it, based on the available research. Was Steingraber’s presentation reflective of the literature? In addition to the conclusions of the researchers, be sure to take into account the quality and design of the studies. Create a pamphlet for the general public outlining your assessment and the factors you considered when making it.

Lab/Field Research

*Poster Analyzing Your Ecological Roots*

Steingraber has described her writing of *Living Downstream* as a search for her ecological roots. Using public data and personal experiences, she explored her home state of Illinois. Select a place that is part of your own ecological roots (a local park, an industrial street, a school campus, etc.). Using publicly available information, such as historical documents, geological surveys, government websites, and scientific studies, and your own data collection, which could include interviews with members of your community; plant or animal species inventories; and soil, water, and air sample testing, attempt to answer one of the following questions: (1) what changes have occurred in the past fifty years, (2) what are the major impacts on the ecological system today, or (3) what are the emerging issues in this area? Be sure to research both the natural ecosystems and the impact of human processes on these biological communities. Create a scientific poster presentation that reports the information you have discovered about your chosen location.

Possible resources:

- Information on creating a strong scientific poster can be found at [www.writing.engr.psu.edu/posters.html](http://www.writing.engr.psu.edu/posters.html).
- Information on industrial toxic releases in the US can be found at [www.epa.gov/tri](http://www.epa.gov/tri).

Oral Presentation

*Reading and Analysis of an Excerpt from Living Downstream*

Decide which idea, fact, or story in *Living Downstream* had the greatest impact on you as a reader. Select a brief excerpt from the book that is representative of your topic. Conduct research to learn more background information on your chosen topic. Prepare and deliver an oral presentation to your classmates in which you do the following: (1) read the excerpt aloud, (2) explain what caught your interest and why, and (3) provide new and interesting information on the topic that was not included in the book.

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Multimedia Project

*Visualization of Steingraber’s Main Arguments*

In chapter two, Steingraber identifies the five lines of evidence Rachel Carson laid out in *Silent Spring*. Drawing on this overview for inspiration, identify the main arguments Steingraber makes in *Living Downstream*. Create a dynamic visual representation of these arguments, with clear explanations of each one.

Community Engagement

*Book Club on Environmentally Themed Books*

Organize a book club at your school to read and discuss environmentally themed books. In preparation for each meeting, read the book, create a list of discussion questions, and conduct some research into potential actions an average reader could take on the issue described in the book. Keep a record of your preparations, the themes and ideas discussed during the meetings, the reactions of the participants to these meetings, and whether anyone indicated an interest in taking further action on the issue. At the end of three months, write a report outlining your work, the challenges you faced, and the achievements you made.
**Living Downstream**

**The Book | Assignments Comparing Book and Film**

**Expository Writing**

*Essay Comparing and Contrasting Steingraber’s and Chevannes’ Techniques*

Sandra Steingraber has said, “Everything in nature is a landscape—from the genes that stud a single chromosome to the interior anatomy of a whale to the ozone layer that rings the stratosphere. And I want to write about these places so vividly that you feel like you are right there, in that place.” Chanda Chevannes’ documentary adaptation of Steingraber’s book also makes use of landscapes in an attempt to translate this aspect of Steingraber’s work. Write an essay comparing and contrasting the techniques used in each medium to build the audience’s emotive connection with nature.

**Creative Writing**

*Short Story or Film Outline Exploring a Complex Issue*

“The best writing stays in the reader’s mind for life,” says Steingraber. “I believe that imagery and storytelling are profoundly related to memory. So I paint pictures with words and create stories populated with characters that—I hope—readers come to care about and remember.” Similarly, filmmaker Chevannes used strong imagery and character-driven storytelling in her documentary adaptation. Using these same tools of imagery, character, and storytelling, write either a short story or a film outline that aims to illuminate a complex issue or problem for the general public. At the end of your story or outline, provide a one-page justification for your creative choices, comparing and contrasting them with those made by Steingraber and/or Chevannes.

**Scientific Analysis**

*Outline of the Science Featured in Your Documentary Adaptation*

Both the book and the film represent the piecing together of information from a variety of scientific studies. The book features dozens of studies and is informed by hundreds more. Meanwhile, the film features only a small selection of scientific studies. Consider the differences in the presentation of the scientific research in each work. Putting yourself in the position of the filmmaker, review some of Steingraber’s original source material and determine which parts of the scientific literature you would include in your own film adaptation of her work. Write a brief outline of the science you would include and how you would present it, explaining its value to the communication of Steingraber’s work, message, and story.
Oral Presentation

Personal Essay and Adapted Speech about the Environment

Scene 35 in the feature-length film presents a portion of a speech delivered by Steingraber to the Bioneers Conference in San Rafael, California. Subsequently, the full text of the speech was published, with some modifications, in Orion magazine under the title “3 Bets.” After that, a portion of the text was adapted for the foreword of the second edition of Living Downstream. Review these three presentations of the same information, and assess how each piece has been adapted for its new format and to make a new point. Using what you have learned, write a personal essay about your relationship with the environment and then adapt it into a speech. Deliver the speech before your class, and submit the text of both the essay and the speech to your instructor. Provide a brief written analysis of the changes you chose to make in adapting the essay into a speech, explaining why you chose them.

Multimedia Project

Storyboards of a Previously Unadapted Portion of Steingraber’s Book

Steingraber is the narrator of both the book and the film. But the personal stories told within these works are very different. Select a chapter or excerpt from the book that is not represented in the film and imagine how you might adapt it for the screen. Create a series of storyboards reflecting your vision as the filmmaker. Present your storyboards to your peers and instructor, discussing what challenges you faced and what you learned about the differences between filmmaking and writing.

Community Engagement

Public Event to Educate about Cancer and the Environment

Living Downstream, both the book and the film, are designed to educate the public about the links between synthetic chemicals and cancer incidence. But the author and filmmaker also hoped to inspire their audiences toward action. Drawing on the information contained in both works, design an event to educate the public on some aspect of cancer and the environment. Possible activities might include a workshop, an audio-visual presentation, a debate, a theatrical performance, or an environmental expo. Set a goal for your activity, plan the schedule in detail, invite participants, and create an evaluation scheme to determine your success. At the end of the activity, write a brief report, including the results of your evaluation and the lessons learned.

The Mini Docs

The five mini docs were created with educational audiences in mind. Using new footage, interviews, and graphics from *Living Downstream*, these short documentaries further examine some of the key concepts raised in the film. The mini docs are available in the bonus features section of the Educational DVD. The pages that follow contain synopses, discussion questions, and resource lists for each of the mini docs.

*Why Talk about Chemical Destruction?* (5 min, 10 sec) ........................................ PAGE 81

*What Causes Cancer?* (3 min, 30 sec) .................................................................. PAGE 83

*Who Is Most Vulnerable?* (6 min) ................................................................. PAGE 85

*What Is the Precautionary Principle?* (6 min, 46 sec) .......................... PAGE 87

*What Can We Do?* (5 min, 10 sec) ................................................................. PAGE 89
SYNOPSIS

Sandra Steingraber, PhD, describes her personal connection to the Illinois River while simultaneously outlining the chemical destruction of this ecosystem. Her reflection on the river evolves into her thoughts on why it is necessary to talk about such destruction. (5 min, 10 sec)

DISCUSSION QUESTIONS

The following questions have been designed for in-class discussions, quizzes, or assignments. While some questions are answered by the mini doc, others are designed to provoke analysis and extrapolation beyond the scope of the piece itself.

• Why did Sandra Steingraber’s parents consider the Illinois River a dangerous place? Why does Steingraber consider it dangerous now? In your experience, which perspective of danger is more common in our society, and why?
• What industrial activities happen along the river? How have these activities affected the river’s ecology?
• Why is talking about the chemical destruction of our environment so important? Is talking about it enough?
• According to Steingraber, what are the similarities and differences between biology and poetry? Do you agree?
• Steingraber feels at once connected to and disconnected from the Illinois River. Why?
• How do Steingraber’s feelings about her home compare to your feelings about your home? Do you have similar knowledge of the place where you grew up, or of where you live now? Why or why not? How might this knowledge inform the way see your home? The way you live your life?
RESOURCE LIST

*Lake Effect: Two Sisters and a Town's Toxic Legacy*
By Nancy A. Nichols, Island Press, 2010

A personal story set on the edge of Lake Michigan in Waukegan, Illinois. Written by a journalist who was diagnosed with pancreatic cancer and whose sister died of ovarian cancer, this book is an investigation into whether the town's industrial surroundings might have led to the sisters’ illnesses.

*Raising Elijah: Protecting Our Children in an Age of Environmental Crisis*
By Sandra Steingraber, Da Capo, 2011

A funny and touching book written from Steingraber’s perspective as an ecologist and the mother of two young children. This memoir, both personal and scientific, is a celebration of the author’s children’s lives and a search for ways to protect them—and all children—from the toxic, climate-threatened world they inhabit.

*Refuge: An Unnatural History of Family and Place*
By Terry Tempest Williams, Vintage, 1992

A memoir detailing the author’s experience of her mother’s death from cancer and the flooding of the Bear River Migratory Bird Refuge. This personal narrative speaks to environmental, family, and women’s issues.

*Silent Spring*
By Rachel Carson, Houghton Mifflin, 1962

This seminal and groundbreaking book has been credited with inspiring the creation of the US Environmental Protection Agency, leading to the ban of several harmful pesticides including DDT, and launching the modern environmental movement. Written by biologist and nature writer Rachel Carson, it presents a careful scientific investigation into the dangers of pesticide use in the United States.

*When Smoke Ran Like Water: Tales of Environmental Deception and the Battle against Pollution*
By Devra Davis, Basic Books, 2002

A memoir written by a leading cancer epidemiologist, documenting the author’s struggles against environmental contamination. Beginning with the toxic fog that forced the relocation of the residents of her hometown of Denora, Pennsylvania, Davis takes us through a personal and scientific argument for stronger protections of environmental health.
LIVING DOWNSTREAM

MINI DOC | WHAT CAUSES CANCER?

SYNOPSIS

Sandra Steingraber, PhD, and Richard Clapp, DSc, MPH, explain the complexity of cancer causation. While discussing the interplay of multiple causes in the formation of a tumor, they address the commonly held misconception that environmentally caused cancers are rare. (3 min, 30 sec)

DISCUSSION QUESTIONS

The following questions have been designed for in-class discussions, quizzes, or assignments. While some questions are answered by the mini doc, others are designed to provoke analysis and extrapolation beyond the scope of the piece itself.

• According to Steingraber, how many contributing factors can any one cancer have?
• How does Steingraber quickly disprove the idea that environment and lifestyle are separate considerations? What does the image of a triangle suggest about the interplay between genes, lifestyle, and environment in cancer causation?
• The 1981 study discussed in this piece—authored by respected British epidemiologists Sir Richard Doll, DSc, MD, and Sir Richard Peto, MSc—aimed to summarize the proportion of cancer deaths attributable to any one cause. According to Steingraber and Clapp, what is the science telling us now? In your opinion, why is this significant?
• Why does Clapp believe the attempt to attribute each cancer death to a single cause is misleading? Do you agree? Why or why not?
• The original calculations from the Doll and Peto study are still in use by respected organizations like the American Cancer Society (ACS). Why might this be?
• How does the ACS’ position on the environment’s links to cancer compare to the stance taken by the Canadian Cancer Society? Assuming that both organizations have access to the same scientific data, what might explain the vast differences in their positions?
RESOURCE LIST


A frequently cited article that attempts to quantify the percentage of cancer deaths attributable to various risk factors, such as smoking, diet, and occupational exposures. The authors state that occupational cancers account for 4% of the total cancer mortality in the US, while pollution accounts for 2%. Full text available at [www.ncbi.nlm.nih.gov/pubmed/7017215](http://www.ncbi.nlm.nih.gov/pubmed/7017215).

“Environmental and Occupational Causes of Cancer Revisited”

A scientific article presenting a detailed look at past and current views of cancer causation. The authors argue that “it is not only pointless, but also counterproductive, to attempt to assign certain exposures a specific quantitative causal percentage.” Full text available at [www.ohcow.memberlodge.com/resources/Documents/cancerrevisited.pdf](http://www.ohcow.memberlodge.com/resources/Documents/cancerrevisited.pdf).

“A Bridge to Somewhere—Responding to the President’s Cancer Panel Report (Part 3)”
By Sandra Steingraber, *Sandra’s Weekly Essays* at [www.livingdownstream.com](http://www.livingdownstream.com), July 2010

An essay in Steingraber’s series about environmental health. This piece examines the public reaction to the US President’s Cancer Panel report on the environmental links to cancer. It explains that the report is a critique of Doll and Peto’s conclusion that the environmental contribution to cancer causation is small and reflects on the “two opposing narratives” that are currently vying for public support. Full text available at [www.livingdownstream.com/essays/bridge_somewhere_part3](http://www.livingdownstream.com/essays/bridge_somewhere_part3); this essay also appeared in *The Huffington Post*. 
**LIVING DOWNSTREAM**

**MINI DOC | WHO IS MOST VULNERABLE?**

**SYNOPSIS**

In a speech at the Abraham Lincoln Presidential Museum (as seen in scene 31 of the feature-length film), Sandra Steingraber, PhD, proclaims that cancer prevention is a human rights issue because some individuals are more vulnerable to toxic chemicals than others. Before a closing excerpt from this same speech, we see the names of vulnerable populations currently known to scientists and hear Steingraber’s explanation of each. (6 min)

**DISCUSSION QUESTIONS**

The following questions have been designed for in-class discussions, quizzes, or assignments. While some questions are answered by the mini doc, others are designed to provoke analysis and extrapolation beyond the scope of the piece itself.

- According to Steingraber, what populations of individuals are more vulnerable to toxic chemicals, and why?
- Do you accept the notion that people at different stages of development might be more susceptible to chemical assault? Why or why not?
- What occupations were named as those with higher rates of some cancers? Did any of these surprise you? Why or why not? How can workers pass their exposure on to others?
- Do you believe that low-income families and racial minorities are sometimes exposed to chemical carcinogens because of their lower socioeconomic status or because they are members of minority groups? Why or why not?
- How did this mini doc clarify the concept of cancer prevention and chemical regulation as a matter of human rights? Having more information, do you agree with this argument? Why or why not?
- If society were to accept a human rights perspective on environmental health, how might this change what chemicals we tolerate in our environment?
RESOURCE LIST

“Children’s Vulnerability to Toxic Chemicals: A Challenge and Opportunity to Strengthen Health and Environmental Policy”
A scholarly article that first reviews the evidence for children’s increased vulnerability to toxic chemicals and then provides policy recommendations based on the current scientific knowledge. The authors are recognized experts in the field of public health. Full text available at [http://content.healthaffairs.org/content/early/2011/05/02/hlthaff.2011.0151.full](http://content.healthaffairs.org/content/early/2011/05/02/hlthaff.2011.0151.full).

*Dumping in Dixie: Race, Class, and Environmental Quality*
By Robert D. Bullard, Westview, 2000 (3rd edition)
A book written by the sociologist and environmental justice activist considered to be the father of environmental justice. First published in 1990, this book tells the stories of five African American communities as they struggle for their environmental civil rights. It is considered a historic and essential book for scholars of environmental justice.

*Having Faith: An Ecologist’s Journey to Motherhood*
By Sandra Steingraber, Berkley Publishing Group, 2003
A book written in the form of a month-by-month memoir. It covers the time period from the author’s realization she is pregnant to childbirth and into her newborn daughter’s first months of life. Woven into the personal stories is an exploration of a range of scientific discoveries about genetics, embryonic development, and mothers’ health—as well as the alarming extent to which environmental hazards threaten each stage of fetal and infant development.

*Workplace Roulette: Gambling With Cancer*
By Matthew Firth, James Brophy, and Margaret Keith, Between the Lines, 1997
A book written by Canadian health and safety specialists. It examines the occupational causes of cancer through case studies and provides a human rights analysis.
**Living Downstream**

**Mini Doc | What Is the Precautionary Principle?**

**Synopsis**

Sandra Steingraber, PhD, and Richard Clapp, DSc, MPH, outline the core tenets of the precautionary principle: even if some cause and effect relationships are not fully established, when an activity raises threats of harm protective measures should be taken. (6 min, 46 sec)

**Discussion Questions**

The following questions have been designed for in-class discussions, quizzes, or assignments. While some questions are answered by the mini doc, others are designed to provoke analysis and extrapolation beyond the scope of the piece itself.

- What is the precautionary principle?
- Why is trying to prove connections between environmental exposures and cancer so difficult?
- What do scientists look for in order to find clues of a link between chemicals and cancer?
- What is ecological fallacy?
- Approximately how much did cancer incidence increase from 1950 to 2000? According to Clapp, what is the cause of this increase? Do you agree?
- According to Steingraber, what three things do we know about the area where she grew up? What is the implied connection between these three things?
- What are the different meanings of the term conservative? In what ways are scientists expected to practice conservatism? What is the value of this? What are the potential drawbacks?
- In what other way does Steingraber practice conservatism as a mother? How do you practice this type of conservatism in your life? How do we currently practice it collectively as a society?
- How would a precautionary approach to toxic chemicals translate into public policy? Do we currently take a precautionary approach to other public health problems?
RESOURCE LIST

Late Lessons from Early Warnings: The Precautionary Principle 1896–2000
Edited by Paul Harremoës et al., European Environment Agency, 2001

A detailed report based on many case studies in which there were early warnings about hazardous activities. Identified by a range of experts, the case studies were analyzed to determine whether—and if so, in what way—the early warning information was used to reduce or eliminate the hazards. Then, in consultation with the European Environment Agency’s Scientific Committee, the editorial team summarized these analyses into twelve late lessons. The case studies cover a lot of ground, from the decline of fish stocks to mad cow disease and from PCBs to radiation. Full text available at www.kea.europa.eu/publications/environmental_issue_report_2001_22.

“Precautionary Principle,” Science and Environmental Health Network
www.sehn.org/precaution.html

A webpage providing detailed information on the precautionary principle, including an extensive collection of articles, reports, and other publications. The organization’s webpage on the Wingspread Conference on the Precautionary Principle, at www.sehn.org/wing.html, might also be of interest.

Precautionary Tools for Reshaping Environmental Policy
Edited by Nancy Myers and Carolyn Raffensperger, MIT Press, 2006

A book that—in the words of the publisher—“describes the analytical and ethical bases of the precautionary principle as well as practical options for implementing it.” Complete with case studies and hands-on materials, this is a useful guide for citizens and policymakers alike. Myers and Raffensperger are employees of the Science and Environmental Health Network, a nonprofit organization whose work focuses heavily on the precautionary principle.
**LIVING DOWNSTREAM**

**MINI DOC | WHAT CAN WE DO?**

**SYNOPSIS**

Sandra Steingraber, PhD, expresses her belief that individuals and communities should decide for themselves what action they will take to preserve environmental health—not only as consumers but also as citizens. Using an analogy of a human orchestra, Steingraber then encourages each of us to determine what instrument we hold and what role we can play, based on our personal interests and skills. (5 min, 10 sec)

**DISCUSSION QUESTIONS**

The following questions have been designed for in-class discussions, quizzes, or assignments. While some questions are answered by the mini doc, others are designed to provoke analysis and extrapolation beyond the scope of the piece itself.

- According to Steingraber, what has been the significant change in public reaction to her presentations since *Living Downstream*’s first publication?
- How does Steingraber see her role? What does she believe is the role of the communities she visits?
- What does Steingraber believe we need to do to make social and political change? How easy or difficult do you think this would be? Does Steingraber inspire you to try?
- Why does Steingraber use the metaphor of an orchestra? Do you feel this metaphor is appropriate and accurate? If so, what instrument do you hold?
- What specific examples does Steingraber give for how we can make change in our individual lives? Do these examples change the way you view the problem and the possibilities for solving it? Why or why not?

**RESOURCE LIST**

*Break Through: Why We Can’t Leave Saving the Planet to Environmentalists*
By Ted Nordhaus and Michael Shellenberger, Houghton Mifflin, 2007

A book arguing that environmentalists have focused too much on problems and not enough on solutions. It also argues that the public and the politicians will begin working to solve environmental
issues only once these issues have been framed within the larger contexts of health, society, and human progress. Shellenberger and Nordhaus are career environmentalists and founders of the Breakthrough Institute, a public policy think tank focusing on energy and climate challenges.

**Cancer: 101 Solutions to a Preventable Epidemic**  

An informative and practical book, conveniently divided into two parts. Part one provides detailed information for the general public about the public health problem of cancer. Part two provides comprehensive solutions with a heavy focus on actions that can be taken to create large-scale change in our communities. Dauncey and Armstrong are self-described environmental health activists and Wordsworth is an environmental researcher and writer.

**Gardening Eden: How Creation Care Will Change Your Faith, Your Life, and Our World**  
By Michael Abbaté, WaterBrook Press, 2009

A book that attempts to bridge the divide between Christians and environmentalists by making a faith-based case for “spiritual environmentalism.” The first part lays out Abbaté’s argument for the responsibility Christians have to care for God’s creation. The second part provides some practical ideas for how people of faith can enact their spiritual values through this creation care. Abbaté is a landscape architect, city planner, and evangelical Christian.

**EcoMind: Changing the Way We Think, to Create the World We Want**  
By Frances Moore Lappé, Nation Books, 2011

A book that coalesces research from a range of fields, including anthropology and neuroscience, to argue that the biggest environmental challenge is—in the words of the publisher—“our faulty way of thinking.” Lappé is the cofounder of the Small Planet Institute, which works to increase understanding of the root causes of global social and environmental problems.

**Shopping Our Way to Safety: How We Changed from Protecting the Environment to Protecting Ourselves**  
By Andrew Szasz, University of Minnesota Press, 2007

A book that examines Americans’ reactions to the health threats of toxic substances in food, air, water, and consumer products. Szasz, the former chair of the sociology department at the University of California, Santa Cruz, describes how we attempt to purchase products that make us safe as individuals rather than pushing for policy change that makes us collectively safer. He concludes that these individual consumer actions end up making us less safe—both as individuals and as communities.
"As educators, we look for what will inspire students’ curiosity and imagination—we look for stories. A creative work, such as a film or a book, becomes a storyteller in the classroom. Through the lives of the people portrayed, it can open students’ eyes to a landscape of new knowledge and ideas. They learn from the content, and compare themselves to the characters. In the best of worlds, students will consider how they might apply this new knowledge to their lives."

~ Sandra Steingraber

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Lesson 1
The History and Regulation of Synthetic Chemicals

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OVERVIEW

LEARNING OBJECTIVES

• to explore the invention and repurposing of synthetic chemicals during and following the Second World War, respectively
• to consider and understand some of the implications of synthetic chemical use for human and environmental health
• to examine and compare contemporary approaches to chemical regulation in the United States, Canada, and the European Union

ADDITIONAL TOPICS COVERED

Rachel Carson’s *Silent Spring*, DDT, phenoxy herbicides, organochlorines

SUBJECT AREAS

biology, chemistry, ecology/environmental science, environmental studies, ethics, geography, health, history, human rights, political science, public health, science and technology studies, sociology, women's studies

*bold*  lesson is highly relevant
*regular*  lesson is moderately relevant
Lesson Plan

Introduction

1. Initiate discussion among students about synthetic chemicals and human health, using questions such as the following:
   - What are synthetic chemicals? What roles do they play in our lives?
   - How do you think synthetic chemicals became such a prominent part of our lives?
   - What do you know about how synthetic chemicals are regulated and tested for safety?

2. Introduce the film.

3. Instruct students to make note of key ideas as they watch the film, such as the following:
   - key events in the history of synthetic chemicals
   - key people in the history of synthetic chemicals
   - information about the regulation of synthetic chemicals in the past and present
   - topics of ongoing public debate regarding synthetic chemicals
   - Sandra Steingraber's main arguments about the human health risks presented by synthetic chemicals

Screening

4. Screen the film.
   - Option 1: Living Downstream Feature-Length Film (85 min)
   - Option 2: Living Downstream One-Hour Version (55 min)

5. Screen one or more of the following bonus features from the Educational DVD (now or at any point during the lesson) to enhance class discussion:
   - scene compilation “Rachel Carson and Our Chemicals Policy” (16 min, 27 sec)
   - scene compilation “Atrazine” (12 min, 56 sec)
   - scene compilation “PCBs” (11 min, 8 sec)
   - mini doc What Causes Cancer? (3 min, 30 sec)
**POST-SCREENING DISCUSSION**

6. Review with students the contents of the film, using questions such as the following:

**Q:** How many synthetic chemicals are “out there” (i.e., registered for use in the United States)?
**A:** Approximately 80,000.

*Scene 26 in the feature-length film. Scene 20 in the one-hour version.*

**Q:** According to Steingraber, when did large-scale production and use of synthetic chemicals begin?
**A:** Large-scale production and use began following World War II.

*Scene 10 in the feature-length film. Scene 9 in the one-hour version.*

**Q:** Why did the use of synthetic chemicals begin after World War II?
**A:** Chemical manufacturers had a surplus of their products remaining when the war ended. In order to continue selling synthetic chemicals, these manufacturers created domestic uses for their products and marketed them to the general public.

*Scene 10 in the feature-length film. Scene 9 in the one-hour version.*

**Q:** What concerns did Rachel Carson raise about some synthetic chemical pesticides?
**A:** Carson’s concerns were that (1) the public was hearing about only the benefits of pesticides, (2) there was no legislation mandating that pesticides be tested for safety, (3) we did not know the effects of a lifetime of chemical exposures (including the effects on unborn babies), and (4) people’s right to security was being violated by the intrusion of poisons into their homes.

*Scenes 10 and 33 in the feature-length film. Scenes 9 and 25 in the one-hour version.*

**Q:** What effect did Carson’s book, *Silent Spring*, have on US chemicals regulation?
**A:** *Silent Spring* inspired the US Senate to hold hearings about pesticides. Feature-length film only: The hearings led to the creation of the US Environmental Protection Agency, and Carson’s work also contributed to the banning of chemicals like DDT and PCBs.

*Scenes 30 and 33 in the feature-length film. Scenes 23 and 25 in the one-hour version.*

**Q:** When synthetic chemicals came into widespread use after World War II, what kind of safety testing was required?
**A:** None (neither in the United States nor in Canada).

*Scene 10 in the feature-length film. Scene 9 in the one-hour version.*

**Q:** Why does Steingraber say that farmers cannot self-regulate the environmental impact of the atrazine they use (i.e., “Nobody can be careful enough with a chemical like atrazine”)?
**A:** Atrazine is water soluble and travels vast distances in the rain, regardless of where and how it is used by the farmer.

*Scenes 6 and 22 in the feature-length film. Scenes 6 and 18 in the one-hour version.*
Q: According to Steingraber, how much evidence of harm is currently available for atrazine, compared to the evidence of harm available for PCBs when they were banned?
A: Considerably more evidence is available for atrazine.

Scene 31 in the feature-length film. Scene 24 in the one-hour version.

Q: What does Steingraber call the “question of our age”?
A: Who gets to decide the amount of causal evidence required for change (e.g., those producing the chemicals, those being exposed, etc.)?

Scene 4 in the feature-length film. Scene 4 in the one-hour version.

7. Discuss the broader topics and issues with students to move beyond the scope of the film, using questions such as the following:

Q: Synthetic chemicals are a big part of our daily lives. In your opinion, what are the benefits of these chemicals? What are the drawbacks?
A: Some benefits include (1) the ability to farm large monocultures with little labor, (2) the ability to make inexpensive synthetic materials (e.g., plastics and fabrics), and (3) the ability to create materials (such as vinyl siding) that are almost indestructible.
Some drawbacks include (1) the potential health risks posed by toxic chemicals (e.g., scientific evidence links some synthetic chemicals to a range of illnesses, including cancer, asthma, autism, learning disabilities, allergies, dementia, and neurological disorders), (2) the inability of the environment to process and break down some synthetic chemicals, and (3) the depletion of nonrenewable resources to create feedstocks for these chemicals (about 90% of synthetic chemicals are derived from coal and petroleum).

Q: What might we have done before synthetic chemicals were commonplace?
A: More natural materials were used in manufacturing (including linoleum flooring instead of vinyl, Chilean saltpeter instead of fertilizer, and Japanese nylon instead of synthetic nylon). More labor-intensive farming practices were used to suppress weeds. Fewer material goods were purchased, used, and accumulated.

Q: In your opinion, is it significant that Rachel Carson—a woman who would later die of breast cancer—was the scientist who wrote a book to inform the public about the potential dangers of synthetic pesticides? Why or why not? How might a scientist’s gender, race, class, and personal history play a role in the decisions he or she makes about the work to be undertaken? What role might these factors play in the way the scientific community and the general public receive this work?
Q: Regulation of synthetic chemicals, in the US and Canada, began in the 1970s. Some of these regulations apply only to “new” chemicals introduced into the marketplace, and many experts believe they are not thorough enough. What might be the logistical, social, and political challenges in mandating the testing of the thousands of “old” chemicals that were already on the market when chemicals regulations took effect? Why might it be difficult for scientists to more thoroughly test the toxicity of chemicals, new or old? How do you think we should act in the face of these challenges?

A: Mandating the testing of old chemicals would be challenging because (1) testing the toxicity of tens of thousands of chemicals would be incredibly expensive and time consuming; (2) chemical manufacturers often exert political pressure to avoid having to test their products; and (3) these chemicals have been in use for so long that the public often assumes they must be safe and as a result, does not exert pressure to have the testing done. Thoroughly testing the toxicity of chemicals, new or old, would be difficult because (1) real-world chemical mixtures and interactions are difficult to isolate, (2) people have different levels of vulnerability to toxic chemicals, and (3) it is often unclear whether a human being would respond in the same way as do the test subjects in cell or animal assay studies.

TIP For a comprehensive list of discussion questions about the film see page 33. For discussion questions about the mini docs, see the mini docs section, beginning on page 79.

CONCLUSION/EXTENSION

8. Conclude or extend the lesson.

- Option 1: Conclude the lesson by making links to the other topics covered by the course.
- Option 2: Extend the lesson by introducing the readings, assignments, and/or additional materials, beginning on page 100.
Lesson Plan Extensions

The optional activities and materials that follow have been designed for instructors and students who wish to delve more deeply into the history and the regulation of synthetic chemicals. They may be used together or individually for a range of purposes, including in-class discussions, quizzes, or assignments. When used together, these items may be introduced in any order.

Reading and Discussion

“Chapter 5: War” from Living Downstream, by Sandra Steingraber

For a chapter description, see page 60 of this guide.

For suggested discussion questions, see page 67 of this guide.

Alternate Readings and Discussions

(If Living Downstream, by Sandra Steingraber is unavailable for student use.)

Excerpt from Living Downstream on the history of synthetic chemicals on page 101 of this guide

For suggested discussion questions and answers, see page 107.

Excerpt from Living Downstream on the regulation of synthetic chemicals on page 103 of this guide

For suggested discussion questions and answers, see page 109.

Assignments

Assignments on the history of synthetic chemicals on page 111

Assignments on the regulation of synthetic chemicals on page 115

Additional Materials

Info sheet on the regulation of synthetic chemicals on page 119

Resource list on the history of synthetic chemicals on page 125

Resource list on the regulation of synthetic chemicals on page 127
“When Silent Spring was published, the victory days of the Second World War had not yet reached their twentieth anniversary. Compared to Carson’s generation, those of us born after World War II are not as aware of the domestic changes wrought by this war. We have inherited its many inventions—as well as the waste produced in their manufacture—but we do not have a keen sense of their origins. In seeking explanations for the unprecedented cancer rates among our ranks, we need to examine them.”

~ from Living Downstream, page 91

First synthesized in 1874, DDT languished without purpose until drafted into World War II, and it proved its mettle by halting a typhus epidemic in Naples. My father arrived in this occupied city not long after. According to his wartime account, Naples lay in ruins, its people hungry, dirty, and in great despair. Little wonder they were also vulnerable to typhus. DDT’s ability to annihilate the insect carriers of this disease—fleas, lice, and mites—must have seemed miraculous. Shortly thereafter, DDT was loaded onto American bombers and sprayed over the Pacific Islands to control mosquitoes. War production of DDT soon exceeded military requirements, and by 1945, the U.S. government allowed the surplus to be released for general civilian use.

As documented by historians, this decision marked a profound change in purpose. It is one thing to fumigate war refugees falling ill from insect-borne epidemics and quite another to douse the food supply of an entire nation not at risk for such diseases. It is one thing to rain insecticide over war zones ravaged by malaria and quite another to drench suburban Long Island. The skillful advertising that accompanied this transformation advocated a whole new approach to the insect world. Various insect species—some, mere nuisances—were recast in the public’s imagination as deadly fiends to be rooted out at all cost. Cohabitation was no longer acceptable. In demonizing the home front’s new enemy, one cartoon ad even went so far as to place Adolf Hitler’s head on the body of a beetle.

Synthetic pesticide use thus began in the United States in the 1940s. Two other chemicals participated in this debut: parathion and the phenoxy herbicides 2,4-D and 2,4,5-T. Parathion—and its sibling malathion—belong to a group of synthetic chemicals called organophosphates, which are created by surrounding phosphate molecules with various carbon chains and rings. Like the chlorinated pesticides,
they attack an insect’s nervous system, but they do so by interfering with the chemical receptor molecules between the nerve cells rather than by affecting the conduction of electricity, which is DDT’s mode of action. Like the chlorinated pesticides, organophosphate poisons played a starring role during the war—but as villain rather than hero. Developed by a German company as a nerve gas, members of the first generation of organophosphate poisons were tested on prisoners in the concentration camps of Auschwitz.

By contrast, the phenoxy herbicides were an Allied weapon. . . . They were mobilized in the 1940s with the goal of destroying enemy crops. Another American invention—the atomic bomb—ended that war before field testing could yield to fullscale chemical warfare. Twenty more years would pass before 2,4-D and 2,4,5-T would reenter combat—this time in Vietnam’s rainforests under the nom de guerre Agent Orange. In the meantime, they were introduced into U.S. agriculture for weed control and into forestry for shrub control. By 1960, 2,4-D accounted for half of all U.S. herbicide production. The hoe was fast on its way to becoming obsolete.

Ecologist, author, and cancer survivor, Sandra Steingraber, PhD is an internationally recognized authority on the environmental links to cancer and human health. For more information on Steingraber’s work, visit http://steingraber.com.
THE REGULATION OF SYNTHETIC CHEMICALS

EXCERPT FROM LIVING DOWNSTREAM, BY SANDRA STEINGRABER

“In the fall of 2009, the EPA’s [US Environmental Protection Agency] director, Lisa Jackson, conceded that the thirty-three-year-old federal law governing the manufacture of hazardous substances had failed to protect public health. She announced her intent to reform it. However this turns out, it is safe to say that, legally speaking, all of us born before 2010 entered this world under the protection of an environmental law that is now understood to be ineffective. It seems worth understanding the origins of this law, the Toxic Substances Control Act (TSCA), and the reasons for its impotency.”

~ from Living Downstream, page 101

The rapid birthrate of petrochemicals began in 1945 and soon swamped the ability of government to oversee their production, use, and disposal. By 1976, sixty-two thousand synthetic chemicals were in commercial use. How many of these were carcinogens? No one knew. No testing was required for chemicals to enter the marketplace. In that year, Congress passed the TSCA, which mandated the review of new chemicals and put the EPA in charge of their appraisal. Pre-existing chemicals were not covered by the new rules. Let me put a finer point on this: the entire standing inventory of sixty-two thousand was exempt from testing.

And, as of this writing, they still are. They still are. Of the eighty thousand or so chemicals now believed to be circulating (no one knows for sure), only 2 percent of them (this is the General Accounting Office’s best guess) have been thoroughly assessed for toxicity. The only possible conclusion is that many chemical carcinogens remain unidentified, unmonitored, and at large. Here, then, is a deeply underacknowledged truth: most chemicals in commerce have never been vetted. We know nothing about them. Too often, this unknowingness is paraphrased as “there is no evidence for harm.” And this in turn is sometimes translated as “the chemical is harmless.” Lack of knowledge about safety becomes an implicit endorsement of safety.

TSCA has other down-the-rabbit-hole quirks. For one, the law does not precisely require the testing of new chemicals, either. Instead, it requires manufacturers to divulge what they know about the risks of any new chemical they propose to commercialize. This allows for regulations based on comparisons: the structure of a newly synthesized molecule is compared to the structures of previously synthesized molecules, and then regulators make an estimate of risk. In other words, the assessment of new chemicals involves on-paper modeling and does not require independent, hands-on science at a lab.

bench somewhere. Second, concerning the regulation of pre-existing chemicals, TSCA compels the EPA to balance economic benefits of any chemical against its health risks. EPA may only regulate chemicals that present risks that are “unreasonable.”

But with no baseline data on toxicity, it’s impossible to know which chemicals are behaving unreasonably. And needless to say, petrochemical industry representatives and breast cancer advocates view the scales for weighing costs and benefits very differently. [from Living Downstream, pages 101–102]

Here is where the nascent struggle to divest our economy from its crippling dependencies on petroleum meets the long-standing but equally fervent struggle to lessen the burden of cancer. These are not separate tasks. Shared by each is the need to draft a new chemicals policy. . . . We need policies that compel nonchemical methods of pest control. In Canada, these exist. Ontario and Quebec, as well as 152 cities across the rest of Canada, now prohibit the use of pesticides for cosmetic reasons. Within these provinces and municipalities, using synthetic pesticides to improve the appearance of lawns and gardens is now illegal. [from Living Downstream, page 117]

Meanwhile, across the Atlantic, the European Union has reconfigured its entire chemicals policy. Adopted by the EU Parliament in 2006, the new legislation is called REACH—Registration, Evaluation, Authorisation and Restriction of Chemicals—and its seeds were planted in 1998 when the governments of the EU member states renounced the previous policy as unable to protect people and the environment. REACH requires that producers and importers of chemicals disclose toxicity data in order for their products to enter or remain on the market. No data, no market. And the same rules apply for new and old chemicals alike, including the sixty-two thousand chemicals exempted under U.S. law. This provision rescues chemicals regulation from the inertias of the U.S. system. In the United States, the burden of demonstrating that a chemical is dangerous falls to the government. In Europe, the obligation is shifted to industry to demonstrate a chemical is safe, and the government is left with a freer hand to restrict chemicals and compel substitutions of toxic chemicals with safer ones. Over the next decade, thousands of chemicals will have to be registered in Europe. With so many substances requiring basic testing under REACH, the law also stimulates the development of new methods to rapidly screen chemicals for toxicity. . . . More critically, the swift identification of hazardous chemicals and their replacement with safer alternatives should lower human exposures to cancer-causing substances.

Also inspiring is the Stockholm Convention on Persistent Organic Pollutants, a United Nations treaty that became international law in 2004. This treaty aims to eliminate worldwide production and use of synthetic organic chemicals that are inherently toxic and remain intact in the environment for a long time. Within the family of persistent organic pollutants are many carcinogenic organochlorines. As we have seen, these chemicals travel globally, siphon their way up the food chain, and disrupt hormone systems. No nation can manage them alone. At this writing, twenty-one chemicals are listed
under the Stockholm Convention. They include many of the pesticides Rachel Carson warned about—aldrin, dieldrin, chlordane, heptachlor, lindane, mirex, and toxaphene. DDT is targeted for eventual elimination, with recognition that some countries will continue to use it for malaria protection. Testosterone-depleting PCBs are on the list, and provisions within the treaty support efforts around the world to identify and contain its remaining stockpiles.

All three of these initiatives—Canada’s provincial bans on cosmetic pesticides, the new European chemicals policy, and the global Stockholm Convention—deserve the praise and support of cancer advocates. They also offer us ideas for policies we may wish to replicate or build on here at home. [from Living Downstream, pages 119–120]
The following questions are for use with the excerpt from *Living Downstream* by Sandra Steingraber found on page 101 of this guide.

**Q:** What role did advertising play in the introduction of synthetic pesticides for civilian use? What does this tell you about the power of advertising at the time? Do you think advertising has as much power today?

**A:** Advertising depicted chemical pesticides as modern inventions—safe for use at home on one hand and deadly to pests on the other. The ads often played on the themes of war and battle common at the time, which elicited patriotic feelings among many Americans (and Canadians). The ads shaped the public’s perception of pesticides and encouraged their liberal use.

**Q:** In describing the rapid increase in the use of chemical herbicides during the 1940s and 1950s, Steingraber writes, “The hoe was fast on its way to becoming obsolete.” What is she saying about the impact that synthetic pesticides had on agricultural labor?

**A:** When chemical pesticides are used in agriculture, there is less need for human labor. This marked a large change in farming practices and led to the creation of monocultures, which in turn led to the need for more pesticides.

**Q:** Of the chemical pesticides described in this excerpt, which one captured your attention the most, and why? Was there a piece of information that was most surprising to you?
The Regulation of Synthetic Chemicals

Discussion Questions for Excerpt from Living Downstream

The following questions are for use with the excerpt from Living Downstream by Sandra Steingraber found on page 103 of this guide.

Q: What is the Toxic Substances Control Act (TSCA), and what are its deficiencies?
A: TSCA is a US federal law passed by Congress in 1976 to govern the manufacture of hazardous substances and empowering the US Environmental Protection Agency (EPA) to conduct this appraisal. Its deficiencies include that (1) the 62,000 chemicals in existence prior to 1976 were exempted from testing, (2) laboratory testing of new chemicals is not required; instead manufacturers are required to provide information about any known risks of the new chemicals, and (3) the EPA can regulate pre-existing chemicals only if the risks are deemed to be “unreasonable.”

Q: What three initiatives does Steingraber identify as models for US policy reform? In your opinion, are these models an option in the United States? Why or why not?
A: The three initiatives identified are (1) Canada’s provincial and municipal pesticide bylaws, (2) the European Union’s REACH Regulation, and (3) the global Stockholm Convention.

Q: For the US, Canada, and/or Europe what else do you think should be done? Do you think there is a limit to the level of reform that is realistic, and if so, what is that limit?
THE HISTORY OF SYNTHETIC CHEMICALS

ASSIGNMENTS

Expository Writing
Essay on Military Operations and Environmental Health Issues

In chapter five of Living Downstream, Steingraber describes the wartime origins of synthetic chemical production and the subsequent domestic use of these products in the United States. Today, global warfare continues to have significant environmental health impacts. Research one environmental health concern of your choice that is related to historical military operations. Some possibilities include (1) suspected cancer clusters among military personnel who lived on the same base or worked with the same toxic materials, (2) environmental health concerns of civilians living in former warzones, or (3) the contamination of northern communities by neighboring military bases that are now closed. Write an essay summarizing your findings.

Creative Writing
Journal Entries on the History of a Synthetic Chemical

Imagine you were alive during the time when an existing toxic chemical was first synthesized, used, or marketed, and that you played a role in one of these events. Maybe you were a chemist developing phenoxy herbicides for use during World War II, or perhaps you were a mayor advocating for the spraying of DDT in your city. Research the history of your chosen chemical. Write five historically accurate journal entries documenting your fictional role in society’s use of this chemical.

Scientific Analysis
Poster on the Potential Health Risks of a Chemical

Both Rachel Carson and Sandra Steingraber have been praised for their ability to write about complicated science in a way that engages the general public and presents a convincing argument. Choose a synthetic chemical suspected of having human health impacts. Conduct a review of the scientific literature on the potential health risks of this chemical. Translate your findings for the general public by creating a poster that clearly assesses the evidence on your chosen chemical.

Lab/Field Research
Ames Test on Common Household Products

Following the Second World War, the US and Canadian governments permitted the domestic use of many synthetic chemicals that had previously been employed for military purposes (such as plastics, fertilizers, and pesticides) without any requirements for safety testing. Over time, our capacity for
toxicity testing has continued to improve. One rudimentary test for mutagenicity, developed in the 1970s, is the Ames Test.¹ This relatively simple biological assay can be used to identify substances that alter the structure of DNA. Create a list of the products you use in your daily life, such as cosmetics, personal care products, and cleaners. Conduct the Ames Test on a selection of these products to check for mutagenicity. Record and analyze your results, summarizing your findings in a lab report or PowerPoint presentation. If conducting the Ames Test is not possible, research the mutagenicity and other potential toxic effects of these products using publicly available databases and write a research report on your findings.

Potential resources:

- For protocols on conducting the Ames Test, see [www.bio.davidson.edu/people/macampbell/Pubs/Spot_Overlay.pdf](http://www.bio.davidson.edu/people/macampbell/Pubs/Spot_Overlay.pdf).
- Databases on toxic chemicals include the following:
  - EWG's Skin Deep Cosmetics Database at [www.ewg.org/skindeep](http://www.ewg.org/skindeep)
  - The CHE Toxicant and Disease Database at [www.healthandenvironment.org/tddb](http://www.healthandenvironment.org/tddb)

**Oral Presentation**

*Conversation between Carson and a Critic about the Scientific Research*

Identify Carson’s key arguments on the potential damage caused by pesticides, as presented in *Silent Spring*. Review the commentary (by scientists, industry representatives, and the public) that emerged in the media after the book’s publication. Identify which of Carson’s arguments still hold up today. With a partner, enact a fictional conversation between Carson and one of her critics to present the scientific information of the time. Follow with a class discussion that engages your fellow students in contemplating whether the current science strengthens Carson’s arguments, weakens them, or creates greater uncertainty.

**Multimedia Project**

*1950s-era Advertisement Opposing Synthetic Chemicals*

Imagine that you work in the creative department of an advertising agency on Madison Avenue in the 1950s and your client is an individual or organization that opposes the use of synthetic chemicals. Research this time period, including the characteristics of the ads of the time, the attitudes and behaviors of consumers, and the available scientific data. Create an ad that attempts to sell your client’s position to your 1950s audience. In addition to the ad you have created, your multimedia project should include a selection of historical ads from your research and a clear justification of the decisions you made with respect to both form and content.

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¹ This test is a good starting point for evaluating the safety of a substance; however, it is important to note that substances that are mutagenic are not always carcinogenic. Additionally, scientists now know that substances not classified as carcinogens may still contribute to the creation of cancer through other means, such as immunosuppression.
Community Engagement

Informal Conversations on False Assumptions about Synthetic Chemicals

Many individuals believe that common myths and false assumptions about the history of synthetic chemicals are the greatest obstacles to policy reform. For example, common incorrect assumptions include that all chemicals have been thoroughly evaluated for toxicity before being registered for the market and that chemicals were created to address a specific need and are currently used only for that intended purpose. Identify five false assumptions about the history of synthetic chemicals you believe to be commonly held in your community. Speak informally with your friends, family, and neighbors, observing how easy or difficult it is to correct these assumptions. Write a report outlining what you have learned, the outcome of your conversations, and whether you agree that our common myths and false assumptions are a hindrance to chemicals policy reform.
The Regulation of Synthetic Chemicals

Assignments

Expository Writing
Essay Comparing National Chemicals Policies

Research and write an essay comparing one of your country’s chemicals policies (e.g., pesticides policy, cosmetics policy, industrial chemicals policy) to the equivalent policy of another country. In your essay address the following questions: What are the similarities and differences between the two regulatory systems? What can each country learn from the other? Are there regulations that neither government has implemented that would be useful?

Creative Writing
Short Story about an Industry Leader Who Stops Use of Toxic Chemicals

For more than sixty years, the agricultural and manufacturing industries have been built around the use of synthetic chemicals, many of which are potentially harmful to human health. Select and research an industry that manufactures or uses toxic chemicals. Write a short fictional story about a leader in that industry who stops all use of toxic chemicals—either by choice or in response to government regulations, consumer pressure, or another external factor. Drawing on your research, ensure your story addresses the following questions: What problems preceded the end of the use of toxic chemicals in this industry? What problems might arise in this industry once toxic chemicals are no longer used? What kinds of changes would be necessary for long-term sustainability of the industry? Possible industries to write about include oil and gas, pulp and paper, plastics, medical suppliers, cosmetics, or household cleaners.

Scientific Analysis
Chart or Graph Comparing Evidence of Harm for Two Toxic Chemicals

In scene 31 of Living Downstream, Steingraber says, “There is more troubling evidence for a link between atrazine and human cancer, based on the evidence we have right now, than there was for PCBs in the 1970s when they were outlawed.” Might this be true of other chemicals? Select two toxic chemicals, one that has been banned by your government and one that activists are campaigning to have banned. Review the studies on these two chemicals. For the banned chemical, be sure to use only the evidence known before the ban was enacted, and compare the evidence of harm that led to the ban with the evidence of harm currently available for the chemical that has not been banned. Create a chart or graph to summarize your findings.
Lab/Field Research

Funding Proposal for a Study on a Controversial Chemical

In the US and Canada, the current rules for regulating toxic chemicals are very complex, taking into account a range of factors including the available scientific evidence, economics, feasibility, and the overall benefit derived from the product. Select a chemical whose safety has been called into question, but is still currently in use in your community, state/province, or country. Read literature reviews of studies conducted on this chemical. Based on this research, identify the scientific questions that still need to be answered about the chemical and design a study that would attempt to answer one of these questions. Once you have designed your study, determine (1) how much time it would take to conduct the study, (2) how much it would cost, and (3) where the results might be published. Assuming the role of a professional scientist, write a funding proposal that outlines your study design (including your answers to the above questions), what you hope the study would prove, and why this work would be a valuable addition to the body of scientific knowledge on your chemical. As an optional extension, the entire class might play the role of a funding body (US National Institutes of Health, US Environmental Protection Agency, Health Canada, etc.), reviewing all the proposals and debating which one most merits funding.

Oral Presentation

In-Class Debates about the Regulation of Synthetic Chemicals

In teams, prepare and hold one or several in-class debates about the regulation of synthetic chemicals. Some possible resolutions are “Be it resolved that toxic chemicals be abolished” or “Be it resolved that chemical manufacturers be compelled to thoroughly test their new products for toxicity before these chemicals can be sold to the public.” For each debate, research both sides of the resolution in advance. After each debate, as a group, identify strong points made by each team and elaborate on these points given the research you have conducted.

Multimedia Project

Visual Depiction of the Laws Governing Toxic Substances

The laws, associated regulations, and government agencies regulating the production, use, and disposal of toxic substances are complex. Overlapping jurisdictions, different laws from different levels of government, and a density of language and information make understanding the regulation of synthetic chemicals incredibly difficult for the general public. Select one toxic substance or geographic region and research all the laws that apply to that topic. Create an engaging visual depiction of the various governing laws, explaining their content, implementation, and scope. This visual representation could take the form of a series of diagrams, charts, or graphs; a PowerPoint presentation; or an animation.

Possible resources:

- For examples of complex issues simplified through visual depictions, see the following:
  - Mini doc What Causes Cancer? on the Living Downstream Educational DVD
Community Engagement

Statement on a Proposed Piece of Environmental Legislation

In the United States and Canada, synthetic chemicals are regulated by collections of laws that are frequently debated and occasionally revised at various levels of government. Choose and research a piece of pending environmental legislation at your municipal, state/provincial, or federal level of government. Identify the environmental issue targeted, the goal of the bill, the main players on each side of the debate, and their respective arguments. Once you have a good understanding of the issue, write a formal statement identifying your stance on the proposed legislation and outlining your reasoning. This statement should be in a form typically used by concerned citizens addressing their government, such as a deputation, testimony, letter, petition, etc. If you feel strongly about this issue, take it a step further by sending your statement to the appropriate government representative, scheduling a meeting to speak with your representative personally, or adding your name to the list of potential speakers if a public meeting is planned. If you choose to do this, consider sharing what you have learned about the process with your classmates through a brief article or an informal presentation.
Today, most developed countries have laws in place to regulate hazardous substances, including many synthetic chemicals. However, rather than having one act for all of these chemicals, countries usually create laws for different categories of chemicals (e.g., general industrial chemicals, chemicals in consumer products, ingredients in cosmetics, synthetic pesticides). Below you will find an overview of some of the most significant laws in the United States, Canada, and the European Union.

**UNITED STATES**

**Toxic Substances Control Act**

Adopted in 1976, the Toxic Substances Control Act (TSCA) gives the US Environmental Protection Agency (EPA) the authority to regulate industrial chemicals that present an unreasonable risk of injury to human health or the environment. Under TSCA, the EPA keeps an inventory of chemicals in commerce, which is now estimated at 83,000 chemicals. The act requires manufacturers to notify the EPA through a pre-manufacture notice when they intend to introduce new chemicals onto the market. It also makes manufacturers responsible for the safety of their chemicals, but does not require safety data to be submitted to the EPA—putting no demand on companies to collect these data from the outset. Under TSCA, the EPA has broad powers to require testing and labeling and to ban or restrict chemicals. However, since TSCA’s inception over thirty-five years ago, restrictions have been placed on only five substances. In 1989, the EPA banned most asbestos-containing products under Section 6 of TSCA, but when the asbestos industry challenged the ban, the US Court of Appeals overturned it. Because of the Court’s decision, the EPA has since used other sections of TSCA and negotiated voluntary agreements with manufacturers and importers to limit or phase out such toxic chemicals as polybrominated diphenyl ethers and perfluorinated chemicals.

**Federal Food, Drug, and Cosmetic Act**

The Federal Food, Drug, and Cosmetic Act was originally passed in 1938, and subsequently led to the creation of the US Food and Drug Administration (FDA). The FDA regulates food, drugs, cosmetics, and personal care products. In the case of cosmetics and personal care products, manufacturers are responsible for the safety of their products, but there is no requirement for the chemicals in these products to be tested or approved before they are marketed. The act restricts very few chemicals from being used in cosmetics and personal care products; to date, only eleven chemicals have been restricted. Many known and suspected carcinogens are allowed as ingredients or are created as a byproduct of manufacturing processes.
Consumer Product Safety Act

This umbrella legislation, passed in 1972, is intended to protect citizens from unreasonable risk of injury resulting from consumer products. Within this act, manufacturers and importers are responsible for ensuring the safety of the products they produce or sell, yet there is no requirement for pre-market testing. The Consumer Product Safety Commission (CPSC), established as a consequence of this act, has the power to create voluntary standards and safety guidelines, to order recalls of products that present a significant hazard, and to ban products by regulation when a voluntary standard is not workable. The CPSC’s main focus has been to minimize injuries from hazardous products rather than to restrict toxic chemicals. However, the CPSC has restricted toxic chemicals in a few cases, such as lead in paint and in children’s jewelry, chlorofluorocarbons in self-pressurized containers, and asbestos in patching compounds (a full list of these restrictions can be found in the US Code of Federal Regulations). The CPSC is also responsible for three other laws, including the Federal Hazardous Substances Act, which mandates the labeling of household products that have hazardous or toxic properties.

Federal Insecticide, Fungicide, and Rodenticide Act

Enacted in 1947, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) governs the registration, use, sale, and distribution of pesticides in the United States. Under FIFRA, the EPA has the authority to register pesticides and to mandate labeling, testing, and other regulatory requirements in order to prevent unreasonable adverse effects on human health or the environment. Pesticides are approved based on an assessment of risk, by weighing the effects on human health and the environment against the economic benefits of use. Although safety data must be provided when pesticides are registered, the requirements are usually limited to short-term impacts rather than long-term effects.

State Regulations

Because federal statutes such as TSCA are currently too weak to ban or restrict chemicals of concern, many American states have taken the initiative to pass their own laws regulating specific toxic chemicals or categories of chemicals. An example is the California Safe Cosmetics Act, which requires manufacturers to provide the California Department of Public Health with a list of all cosmetic products that contain any ingredients known or suspected to cause cancer, birth defects, or other reproductive harm. Another example is the state of Washington’s Children’s Safe Products Act passed in 2008. It requires companies that manufacture children’s products to report any use of sixty-six chemicals that have been identified as posing a risk to children.
Canada

Canadian Environmental Protection Act

Revised in 1999 to control the use and release of toxic chemicals more effectively, the Canadian Environmental Protection Act (CEPA) required the government of Canada to screen and categorize the 23,000 chemicals in use within a specific timeframe. After chemicals were ranked according to health and environmental criteria, the government introduced the Chemicals Management Plan to assess and manage the chemicals designated as the highest priority. If a chemical is found to be a risk to human health or the environment, the government may restrict it or propose that it be designated as toxic under the act. Chemicals designated as toxic are added to the Toxic Substances List, and the government must then develop a management plan for controlling their use and release. Thus far, the Toxic Substances List contains only about 120 chemicals, although more chemicals are being added as they are assessed. For many of the chemicals on the list, the management plans do not impose strict controls. For new chemicals being introduced onto the Canadian market, CEPA requires companies to notify the government and provide safety data. However, these data generally describe short-term rather than chronic effects.

Food and Drugs Act and Cosmetic Regulations

The Food and Drugs Act, enacted in 1985, applies to food, drugs, cosmetics, and therapeutic devices. It contains a general provision prohibiting the sale of a cosmetic product containing a substance that may injure the user. Revised in 2006, the Cosmetic Regulations of the Food and Drugs Act require specific labeling for only three chemicals in cosmetics: coal tar dyes, mercury, and phenylenediamine. However, Health Canada also maintains a Cosmetic Ingredient Hotlist of over 500 ingredients that are prohibited or restricted in cosmetic products manufactured or for sale in Canada. Although these ingredients are prohibited or restricted because of their risk to human health, the government does not provide the public with information on its enforcement policies or on whether manufacturers and distributors follow the hotlist restrictions. Furthermore, the hotlist does not include all toxic chemicals.

Canada Consumer Product Safety Act

In 2011, the Canada Consumer Product Safety Act replaced the earlier Hazardous Products Act. The purpose of the new act is to protect the public by addressing or preventing danger to human health and safety caused by consumer products. It establishes provisions, new to Canada, that have been in place in the US for a number of years. These include mandatory reporting by companies that become aware that their products could cause injury or death, and the granting of power to Health Canada to order recalls of dangerous products and require product testing. Although primarily focused on the safety of products themselves, the act can also apply to toxic chemicals in products. Regulations under this act include restrictions on lead in children's jewelry and in paint used for children's toys.
Pest Control Products Act

Revised in 2002 and coming into force in 2006, the Pest Control Products Act (PCPA) covers all pest control products sold or used in Canada. The PCPA requires that pest control products be registered for use and that applicants wanting to introduce new pesticides onto the market show that the pesticide is effective and that the health and environmental risks are acceptable. The Pest Management Regulatory Agency (PMRA) administers the PCPA and is responsible for registering pesticides. If the PMRA has no concerns about human exposure or environmental harm from a product, it can be registered and directions for appropriate use shown on the label. Although the government has improved its approval procedures, many highly toxic pesticides registered before these procedures were in place would not meet the current safety standards. Even now, pesticides known to persist in the environment or accumulate in living organisms may still be approved for use if they are shown to be effective and acceptably safe.

Provincial and Municipal Regulations

In Canada, as in the US, initiatives regulating toxic chemicals have also been put in place at both provincial and municipal levels of government. For example, several provinces and many municipalities have passed legislation restricting the cosmetic use of pesticides on lawns and gardens. In Toronto, the Environmental Reporting and Disclosure Bylaw requires companies to report on their use of twenty-five chemicals of concern. The program accompanying the bylaw, called ChemTRAC, is designed to reduce toxics used and emitted in the city.

European Union

Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation

Coming into force in 2007, the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation was developed in response to rising concerns over the link between toxic chemicals and risks to human health and to mounting evidence about the ineffectiveness of existing laws. REACH introduced a comprehensive chemicals management program that applies to all countries in the European Union. It requires that all chemicals in use be registered, with basic data submitted to the European Chemicals Agency within a specified timeframe. It also established an evaluation program so that chemicals identified as substances of very high concern will be thoroughly assessed to determine whether they pose a risk to human health and the environment. If chemicals are deemed to be of very high concern, they may be used only with authorization (special permits). In addition, REACH provides a procedure for restricting chemicals and incorporates restrictions on about 100 chemicals that were previously restricted under older EU legislation. One criticism of REACH is that substitution should be required for any chemical of very high concern, rather than the current practice of allowing companies to continue to use them with special permits.
**Cosmetics Directive**

Adopted in 1976 and revised in 2004, the Cosmetics Directive requires that companies provide notification to governments when a new cosmetic product is placed on the market. However, pre-market testing and the submission of safety data are not required. The responsibility for the product's safety lies with the manufacturers and importers, rather than the government. The 2004 revisions, however, do prohibit the use of any substance in cosmetics that is known or likely to be carcinogenic, mutagenic, or toxic to reproduction, as listed by the EU.

**General Product Safety Directive**

Adopted in 1992 and in effect for all countries in the EU in 2004, this overarching legislation is intended to ensure product safety. It makes product manufacturers and distributors responsible for consumer safety and requires them to notify their national governments if they are aware of a risk to consumers. Like US and Canadian product safety legislation, it focuses primarily on acute hazards resulting from defective or dangerous products, and it gives the EU emergency powers to call for an immediate ban or recall of dangerous products. This provision was used to address toxic chemicals in products in 1999 when six phthalates were temporarily banned from children's toys. In the EU, other directives have also been used to address toxic chemicals in consumer products, such as the Restriction of Hazardous Substances Directive (RoHS), which came into effect in 2003. RoHS eliminated lead, mercury, cadmium, hexavalent chromium, and most brominated flame-retardants from new electrical and electronic equipment.


In 2011, a new European regulation on pesticides replaced the previous regulation. It sets criteria for the approval of pesticides and establishes a list of pesticides (know in the regulation as plant protection products) that are authorized for use. The regulation includes a new provision that no approvals will be given for pesticides that are carcinogens, mutagens, endocrine disruptors, toxic to reproduction, or very persistent in the environment, unless there is very little human exposure. It also establishes a procedure for substituting safer pesticides for more harmful ones. However, the regulation applies only to pesticides coming onto the market and does not affect hazardous pesticides already in use until their authorizations expire.
The History of Synthetic Chemicals

Resource List

Chemicals and Chemistry

Cathedrals of Science: The Personalities and Rivalries That Made Modern Chemistry
By Patrick Coffey, Oxford University Press, 2008
A book about the study of chemistry from 1880 to 1950, told through the work and lives of talented chemists.

Chemical Abstracts Service (CAS)
http://cas.org
A website, maintained by a division of the American Chemical Society, that provides a detailed source of chemical information worldwide. CAS databases have, to date, catalogued over 68,000,000 organic and inorganic substances

Chemical Heritage Foundation
www.chemheritage.org
A website for the Chemical Heritage Foundation (an independent American nonprofit organization concerned with the history of chemistry). Includes a section on environmental chemistry, featuring scientists such as Rachel Carson (author of Silent Spring) and Kathleen Taylor (one of the inventors of the catalytic converter, which reduces automobile tailpipe emissions).

Crucibles: The Story of Chemistry from Ancient Alchemy to Nuclear Fission
By Bernard Jaffe, Dover Publications, 1976
A classic book that leads the reader through the stories of scientists whose discoveries impacted the science of chemistry.

The Joy of Chemistry: The Amazing Science of Familiar Things
By Cathy Cobb and Monty L. Fetterolf, Prometheus Books, 2005
A book written by two chemistry teachers. It covers a range of topics, including general, organic, inorganic, analytical, and biochemistry. Intended as a challenge to “the perception of chemistry as too
difficult to bother with and too clinical to be any fun,” the book contains numerous experiments and focuses on real-world examples.

**RACHEL CARSON**

**“The Birth of EPA”**
By Jack Lewis, in *EPA Journal*, November 1985

An essay about Rachel Carson’s influence on the creation of the US Environmental Protection Agency. It compares the role of *Silent Spring* in environmentalism with that of *Uncle Tom’s Cabin* in abolitionism. Full text available at [www2.epa.gov/aboutepa/birth-epa](http://www2.epa.gov/aboutepa/birth-epa).

**Courage for the Earth: Writers, Scientists and Activists Celebrate the Life and Writing of Rachel Carson**
Edited by Peter Matthiessen, Houghton Mifflin, 2007

A collection of a dozen essays paying tribute to Rachel Carson, published 100 years after her birth. Authors include Al Gore, Linda Lear, and Terry Tempest Williams. Also included is an essay by Sandra Steingraber, “*Silent Spring*: A Father-Daughter Dance.”

**The Life and Legacy of Rachel Carson**
[www.rachelcarson.org](http://www.rachelcarson.org)

A website written and maintained by Carson's biographer, Linda Lear. It provides detailed biographical information about Carson's life and work.

**Rachel Carson: Witness for Nature**
By Linda Lear, Henry Holt, 2009

A comprehensive biography, originally published in 1997, that tells the story of how Rachel Carson researched and wrote *Silent Spring*, how she defended it against industry critics, and how she died of breast cancer shortly thereafter.

**A Sense of Wonder**
Director Christopher Monger, Sense of Wonder Productions, 2008, 55 min

A dramatic film about the last year of Rachel Carson's life, adapted from the stage play of the same name. Kaiulani Lee, who plays Carson, wrote the stage play, wrote the screenplay, and was also the executive producer of the film.

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1 Front matter of book.
THE REGULATION OF SYNTHETIC CHEMICALS

RESOURCE LIST

US CHEMICALS REGULATIONS: GOVERNMENT RESOURCES

*Reducing Environmental Cancer Risk: What We Can Do Now*
By Susan H. Reuben for the President’s Cancer Panel, US Department of Health and Human Services, April 2010

A report outlining the findings of the US President’s Cancer Panel meetings during 2008 and 2009. The panel heard testimonies from forty-five experts, including Sandra Steingraber and Tyrone Hayes (both featured in *Living Downstream*). In a letter to President Obama included with the report, the panel members concluded, “The true burden of environmentally induced cancers has been grossly underestimated.” Full text available at http://deainfo.nci.nih.gov/advisory/pcp/annualReports/pcp08-09rpt/PCP_Report_08-09_508.pdf.

US Consumer Product Safety Commission
www.cpsc.gov

The official website of the American federal agency tasked with protecting the public from unreasonable health and safety risks from consumer products.

A webpage providing the text of the act.

US Environmental Protection Agency
www.epa.gov

The official website of the American federal agency tasked with protecting human health and the environment.

“*Federal Insecticide, Fungicide, Rodenticide Act (FIFRA),*” www.epa.gov/agriculture/lfra.html
A webpage giving an exhaustive outline of FIFRA.

“*Toxic Substances Control Act (TSCA),*” www.epa.gov/agriculture/lsca.html
A webpage outlining the Toxic Substances Control Act (TSCA) and the authority it grants to the agency.
“Toxics Release Inventory,” [www.epa.gov/tri](http://www.epa.gov/tri)
A database of industry-reported releases of more than 650 toxic substances in the United States. The site has mapping features and is searchable by chemical, facility, and zip code.

US Food and Drug Administration
[www.fda.gov](http://www.fda.gov)
The official website of the American federal agency that regulates food, drugs, medical products, and cosmetics.


US CHEMICALS REGULATIONS: COMMUNITY RESOURCES

The Chemicals Policy & Science Initiative
[www.chemicalspolicy.org/home.php](http://www.chemicalspolicy.org/home.php)
The website for an initiative developed by the Lowell Center for Sustainable Production at the University of Massachusetts Lowell. Among other goals, the initiative strives to “significantly advance the dialog around chemicals policy reform in the US; assist in the development of sustainable chemicals management outside the US; [and] encourage the development and use of safer alternatives by creating and promoting a comprehensive framework for alternatives assessment.”

Exposed: The Toxic Chemistry of Everyday Products and What’s at Stake for American Power
By Mark Schapiro, Chelsea Green Publishing, 2007
A book that begins with an investigation into the toxic products being sold in consumer products and ends with an analysis of the global power shift that Schapiro believes is occurring as the result of American producers’ inability to compete with safer, healthier products from Europe.

The Louisville Charter for Safer Chemicals
[www.louisvillecharter.org](http://www.louisvillecharter.org)
A website explaining a 2004 charter developed by a coalition of individuals and groups in Louisville, Kentucky. The charter outlines six fundamental reforms to chemicals policies that are required in order to protect human health and the environment: (1) require safer substitutes and solutions; (2) phase out persistent, bioaccumulative, or highly toxic chemicals; (3) give the public and workers the full right to
know and participate; (4) act on early warnings; (5) require comprehensive safety data for all chemicals; and (6) take immediate action to protect communities and workers.¹

**Pesticide Action Network North America**  
[www.panna.org](http://www.panna.org)

A nonprofit organization that works to replace the use of hazardous pesticides with ecologically sound and socially just alternatives. The organization also maintains the PAN Pesticide Database ([www.pesticideinfo.org](http://www.pesticideinfo.org)), which provides information on pesticide toxicity and regulation.

**Safer States**  
[www.saferstates.com](http://www.saferstates.com)


**Safer Chemicals, Healthy Families**  
[www.saferchemicals.org](http://www.saferchemicals.org)

A coalition that bills itself as a “nationwide effort to pass smart federal policies that protect us from toxic chemicals.”² This website houses many informative resources, including legislative updates, case studies, factsheets, and health reports.

**CANADIAN CHEMICALS REGULATIONS: GOVERNMENT RESOURCES**

*“The Canadian Environmental Protection Act (CEPA 1999)”*  

A webpage summarizing “one of the most important environmental laws in Canada governing the assessment and management of chemical substances.”

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¹ The six reforms are quoted from *The Louisville Charter for Safer Chemicals: A Platform for Creating a Safe and Healthy Environment through Innovation*, retrieved from [www.louisvillecharter.org/thecharter.shtml](http://www.louisvillecharter.org/thecharter.shtml).

Environment Canada
www.ec.gc.ca

The official website of the Canadian federal department whose mandate is “protecting the environment, conserving the country’s natural heritage, and providing weather and meteorological information to keep Canadians informed and safe.”

A webpage containing exhaustive information and resources on CEPA, including a copy of the full act.

A summary of the purpose of the Domestic Substances List, a list created under the authority of CEPA.

Canada’s publicly accessible inventory of pollutant releases, disposals, and recycling transfers. (Note that, unlike the US EPA’s Toxic Releases Inventory (TRI), not all substances tracked by the NPRI are toxic.) This database is searchable by facility or postal code.

Health Canada
www.hc-sc.gc.ca

The official website of the Canadian federal department whose “goal is for Canada to be among the countries with the healthiest people in the world.”

A webpage containing the full text of the Food and Drugs Act and the Food and Drug Regulations, information on the regulatory process, and information on the Canadian Food Inspection Agency’s role.

A webpage containing information on the Canadian cosmetics regulatory system.

A webpage containing resources related to the legislation, including full text of the act, an outline of its key provisions, information on consumer and industry obligations, and an exhaustive list of links to further information.

A webpage containing information on the new Pest Control Products Act, including its transparency provisions, history and stronger post-registration control of pesticides.

**CANADIAN CHEMICALS REGULATIONS: COMMUNITY RESOURCES**

**Canadian Environmental Law Association**
[www.cela.ca](http://www.cela.ca)
A website offering numerous reports and papers on Canadian environmental regulations of all kinds.

A report comparing and contrasting European and Canadian environmental regulations.

**EU CHEMICALS REGULATIONS: GOVERNMENT RESOURCES**

**European Commission**
The official website of the European Commission, which is the “driving force in proposing legislation. . . administering and implementing EU policies, enforcing EU law . . . and negotiating in the international arena.”

“Cosmetics Directive,”
A webpage containing the full text of the directive, a summary, and a number of technical adaptations.

“Health and Consumers: Consumers,”
A webpage outlining various consumer product legislation, including the General Product Safety Directive.

A webpage containing a comprehensive overview of REACH.

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A webpage providing links to information on pesticides regulation in the European Union.

“Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS),”
A PDF file containing the full directive.

EU CHEMICALS REGULATIONS: COMMUNITY RESOURCES

Health and Environment Alliance (HEAL)
www.env-health.org
A nonprofit organization representing a coalition of over seventy European organizations. HEAL’s mission is to “demonstrate how policy changes can help protect health and enhance people’s quality of life.” HEAL monitors policy, runs advocacy campaigns, tracks research, encourages stakeholder participation and builds the capacity of individuals and organizations.

Women in Europe for a Common Future
www.wecf.eu
An international network of over 100 women’s, environmental, and health organizations implementing projects in forty countries and advocating globally for a healthy environment for all.

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Lesson 2
Cancer Prevention as a Human Rights Issue

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OVERVIEW

LEARNING OBJECTIVES

• to explore the full scientific and social arguments for a human rights approach to the regulation of synthetic chemicals
• to understand the basis of the precautionary principle and its application in cancer prevention

ADDITIONAL TOPICS COVERED

cancer causation, environmental justice, vulnerable populations

SUBJECT AREAS

biology, chemistry, ecology/environmental science, environmental studies, ethics, geography, health, history, human rights, political science, public health, science and technology studies, sociology, women's studies

bold  lesson is highly relevant
regular  lesson is moderately relevant
Lesson Plan

Introduction

1. Initiate discussion among students about the topic of cancer prevention and human rights, using questions such as the following:
   - What causes cancer?
   - Are we all equally at risk for developing illness and disease? What factors might influence an individual’s risk?
   - What is meant by prevention? What is the difference between primary, secondary, and tertiary prevention? Some individuals and groups have used the slogan “Early detection is the best form of prevention.” What do you think?

2. Introduce the film.

3. Instruct students to make note of key ideas as they watch the film, such as the following:
   - the number of people diagnosed with cancer every year in the US and Canada
   - examples of groups with higher exposures or greater vulnerabilities to synthetic chemicals
   - the challenges of showing causal links between chemicals and cancer
   - Steingraber’s human rights argument for preventing cancer by abolishing cancer-causing chemicals

Screening

4. Screen the film.
   - Option 1: Living Downstream feature-length film (85 min)
   - Option 2: Living Downstream one-hour version (55 min)

5. Screen the mini doc What Is the Precautionary Principle? (6 min, 46 sec) found in the bonus features of the Living Downstream Educational DVD.

6. Screen one or more of the following bonus features from the Educational DVD (now or at any point during the lesson) to enhance class discussion:
POST-SCREENING DISCUSSION

7. Review with students the content of the film, using questions such as the following:

Q: According to Steingraber, how many people in the US and Canada die of cancer every year?
A: More than 600,000.

Scene 12 in the feature-length film. Scene 11 in the one-hour version.

Q: Which human populations are at greater risk for developing cancer caused by toxic exposures?
A: The film discusses the following populations: the genetically susceptible, people living near industry, farmers’ children, and (in the feature-length film only) children in general. The mini doc *Who Is Most Vulnerable?* specifically explains the increased vulnerability of unborn babies, infants, children, adolescents, the elderly, occupationally exposed workers and their families, low-income families, racial minorities, cancer patients, and the genetically susceptible.

Throughout the feature-length film. Throughout the one-hour version.

See also the mini doc *Who Is Most Vulnerable?*

Q: Why does Steingraber say that cancer prevention is a human rights issue?
A: Steingraber says that cancer prevention is a human rights issue because synthetic chemicals discriminate against certain members of the population: those more vulnerable to toxic assault (e.g., unborn babies and children) and those at greater risk of exposure (e.g., people living near industry and workers occupationally exposed).

Scene 31 and throughout the feature-length film. Scene 24 and throughout the one-hour version.

Q: What other human rights movements does Steingraber discuss in the film, and why do you think she chooses to comment on them?
A: Steingraber names the AIDS movement, the abolition of slavery, and feminism. Possible reasons for mentioning them include (1) to align the issue of environmental health with other human rights issues; (2) to show that what was once only challenged by a few can later seem unthinkable by all; (3) to illustrate how significant changes are possible without destroying economies and the fabric of society; (4) to demonstrate how social movements often take a long time to achieve their goals; (5) to allude to the idea that, because they are also issues of social justice, environmental issues could be taken up by activists striving for
the rights of those facing discrimination based on race, gender, sexual orientation, etc.; and (6) to illustrate the importance of talking openly about delicate issues.

*Scenes 11, 31, and 34 in the feature-length film.*  *Scenes 10, 24, and 26 in the one-hour version.*

**Q:** Why does Steingraber believe that abolishing suspected cancer-causing chemicals is necessary to cancer prevention?

**A:** Ending production of chemical carcinogens is the only way to ensure that these chemicals do not find their way into our environment and our bodies.

*Throughout the feature-length film.*  *Throughout the one-hour version.*

**Q:** What are some of the scientific challenges in establishing conclusive links between cancer and chemicals, as outlined in the mini doc *What Is the Precautionary Principle?*

**A:** Scientific challenges include that (1) controlled experiments are not done on humans, so it's difficult to predict how a chemical will affect us; (2) it is an expensive and time-consuming process to follow people over a lifetime so that we can track any effects of a previous potential exposure; and (3) there are no unexposed control populations that we can use for comparison purposes.

**Q:** What are some of the additional challenges in establishing conclusive links, as alluded to in the film *Living Downstream?*

**A:** Additional challenges include that (1) we are exposed to many different chemicals and chemicals can interact with one another, creating new—and possibly synergistic—effects, (such as the possible effects in the bodies of the beluga whales that Dr. Stéphane Lair hypothesizes are being created by PCBs and PAHs) and (2) different individuals are exposed to different chemicals and different quantities of these chemicals, and we are also uniquely susceptible to toxic chemicals, due to past chemical exposures, genetics, age, and gender (as explained by Dr. Linda Birnbaum). Therefore, levels of susceptibility are difficult to predict.

*Scenes 15 and 20 of the feature-length film.*  *Scenes 13 and 17 of the one-hour version.*

**Q:** What is the precautionary principle?

**A:** The precautionary principle is the idea that an indication of harm, rather than absolute proof of harm, should be the trigger for taking protective action. It is defined in the mini doc as follows: “Even if some cause and effect relationships are not fully established, when an activity raises threats of harm protective measures should be taken.”

*See the mini doc What Is the Precautionary Principle?*

**Q:** How would full implementation of the precautionary principle address Steingraber's human rights-focused criticism of the current regulatory system?

**A:** If the precautionary principle were applied to the regulation of synthetic chemicals, the regulations would be based on protecting the most vulnerable members of our population without waiting for science to establish full proof of harm.

*See the mini doc What Is the Precautionary Principle?*
8. Discuss the broader topics and issues with students to move beyond the scope of the film, using questions such as the following:

**Q:** What counterarguments could be made to oppose Steingraber’s arguments? How do you personally weigh the facts presented by both sides?

**Q:** The publisher of Steingraber’s 1997 edition of *Living Downstream* has said that it “was the first book to bring together toxics-release data—finally made available under right-to-know laws—and newly released cancer registry data.” Why might this be significant, and how does it relate to the professional role Steingraber has established for herself?

**A:** It is significant because (1) the book was very timely, using all the most up-to-date information; (2) it translated publicly available information to make it more accessible to the public; (3) it offered a new interpretation of the toxics-release data and the cancer registry data by presenting the information together in one larger analysis; and (4) it used previously unavailable data in service of the public’s right to know.

This is related to Steingraber’s professional role because (1) she sees her work as building a bridge between the knowledge of the scientific community and that of the general public, and (2) it continues the work first begun by her role model, Rachel Carson, when she advocated for the public’s right to know fifty years ago.

**Q:** Our human rights include the right to security of person, the right to health, the right to life, and the right to freedom from discrimination. Thinking about the human rights arguments made by Steingraber and Carson, how might the release of toxic chemicals infringe on each of these rights?

**A:** Right to security of person: Toxic chemicals are released without our individual consent. They then trespass into our personal environments, homes, and bodies, threatening our personal security.

Right to health: Some toxic chemicals are known to cause cancer and other illnesses. Many others are suspected of causing cancer, contributing to its causation, or causing a range of other illnesses.

Right to life: Exposure to toxic chemicals will lead to the deaths of an unknown number of individuals.

Right to freedom from discrimination: Toxic chemicals affect some individuals and groups more than others. Therefore, they can be said to discriminate against certain groups, often referred to as vulnerable populations.

**Q:** While Steingraber and Carson present a human rights argument for the abolition of known and suspected cancer-causing chemicals, what human rights arguments could be made against their abolition?

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1 As cited in the Library of Congress bibliographic record, retrieved from [http://catdir.loc.gov/catdir/enhancements/fy0833/97008164-d.html](http://catdir.loc.gov/catdir/enhancements/fy0833/97008164-d.html).
A: Some human rights arguments against the banning of carcinogens are that (1) individuals in malaria-stricken nations have the right to health, which might include the right to use pesticides like DDT to prevent malaria; (2) individuals employed by the chemicals manufacturing companies have the right to work and to the free choice of employment; and (3) individuals experiencing poverty have the right to a standard of living adequate for the health and well-being of oneself and of one’s family, including access to food, which is often more affordable when grown on large monocultures using chemical pesticides and fertilizers.

**TIP** For a comprehensive list of discussion questions about the film see page 33. For discussion questions about the mini docs, see the mini docs section, beginning on page 79. Additional resources on the right to know and on counterarguments to the cancer-environment link can be found beginning on page 157.

**CONCLUSION/EXTENSION**

9. Conclude or extend the lesson.

- Option 1: Conclude the lesson by making links to the other topics covered by the course.
- Option 2: Extend the lesson by introducing the readings, assignments, and/or additional materials, beginning on page 141.
Lesson Plan Extensions

The optional activities and materials that follow have been designed for instructors and students who wish to delve more deeply into a human rights approach to synthetic chemicals and applying the precautionary principle to cancer prevention. They may be used together or individually for a range of purposes, including in-class discussions, quizzes, or assignments. When used together, these items may be introduced in any order.

Reading and Discussion

“Chapter 12: Ecological Roots” from Living Downstream, by Sandra Steingraber
For a chapter description, see page 62 of this guide.
For suggested discussion questions, see page 70 of this guide.

Alternate Readings and Discussions
(If Living Downstream, by Sandra Steingraber is unavailable for student use.)

Excerpt from Living Downstream on a human rights approach to synthetic chemicals on page 143 of this guide
For suggested discussion questions and answers, see page 147.
Excerpt from Living Downstream on applying the precautionary principle to cancer prevention on page 145 of this guide
For suggested discussion questions and answers, see page 149.

Assignments

Assignments on a human rights approach to synthetic chemicals on page 151
Assignments on applying the precautionary principle to cancer prevention on page 153

Additional Materials

Info sheet on the precautionary principle on page 155
Resource list on a human rights approach to synthetic chemicals on page 157
Resource list on applying the precautionary principle to cancer prevention on page 163
A HUMAN RIGHTS APPROACH TO SYNTHETIC CHEMICALS

EXCERPT FROM LIVING DOWNSTREAM, BY SANDRA STEINGRABER

“During the last year of her life, Rachel Carson discussed before a U.S. Senate subcommittee her emerging ideas about the relationship between environmental contamination and human rights. The problems addressed in Silent Spring, she asserted, were merely one piece of a larger story—namely, the threat to human health created by reckless pollution of the living world.”

~ from Living Downstream, page 278

[A human rights perspective] recognizes that the current system of regulating the use, release, and disposal of known and suspected carcinogens—rather than preventing their generation in the first place—is intolerable. So is the decision to allow untested chemicals free access to our bodies, until which time they are finally assessed for carcinogenic properties. Both practices show reckless disregard for human life.

A human rights view would also recognize that we do not all bear equal risks when carcinogens are allowed to circulate within our environment. Workers who manufacture carcinogens are exposed to higher levels, as are those who live near the chemical graveyards that serve as their final resting place. We know that toxic sites are disproportionately located in poor and minority communities. We know also that disparities in cancer rates exist between U.S. whites and U.S. blacks that cannot be explained by genetic differences. (To its credit, the American Cancer Society points this out.)

Moreover, people are not uniformly vulnerable to the effects of environmental carcinogens. Among those who may be affected more profoundly are infants, whose cellular signaling pathways are still under construction; adolescents, whose bodies are being resculpted by sex hormones; and the elderly, whose detoxifying mechanisms are less efficient. Individuals with genetic predispositions and those with significant prior exposures may also suffer more damage. Cancer may be a lottery, but we do not each of us hold equal chances of winning. When carcinogens are deliberately or accidentally introduced into the environment, some number of vulnerable persons are consigned to death. The impossibility of tabulating an exact body count does not alter this fact. From a human rights standpoint, these deaths must be made visible. Here is one way of doing that. Suppose we assume for the sake of argument that the 1981 estimate concerning the proportion of cancer deaths due to environmental exposures is absolutely accurate. That estimate, put forth by those who seek to dismiss environmental

concerns, remember, is 6 percent. (2 for pollution plus 4 for occupational exposures.) Six percent, as the American Cancer Society itself points out, means 33,600 people in the United States expire each year from cancers caused by involuntary exposures to toxic chemicals. All by itself, that would make environmentally caused cancer the eleventh leading cause of death in the United States. 33,600 is greater than the total annual number of homicides in the United States—a figure that is considered a matter of national shame. It exceeds the annual number of suicides—a figure so tragic that phone numbers for suicide prevention hotlines rightly appear on the covers of telephone books. 33,600 is far more than the number of women who die each year from hereditary breast cancer—an issue that launched multi-million-dollar research initiatives. It is more than ten times the number of nonsmokers estimated to die each year of lung cancer caused by exposure to secondhand smoke—a problem so serious it warranted sweeping changes in laws governing air quality in public spaces.

None of these 33,600 Americans will die quick, painless deaths. They will be amputated, irradiated, and dosed with chemotherapy. They will expire privately in hospitals and hospices and be buried quietly, at a rate of ninety-two funerals a day. Some of them will be children. Photographs of their dead bodies will not appear in newspapers. We will not know who most of them are. Their anonymity, however, does not moderate this violence. In 2007, 834,499,071 pounds of known or suspected carcinogens were released into our air, water, and soil by reporting industries. In this light, the 33,600 deaths can be seen as homicides.

Ecologist, author, and cancer survivor, Sandra Steingraber, PhD is an internationally recognized authority on the environmental links to cancer and human health. For more information on Steingraber's work, visit http://steingraber.com.
APPLYING THE PRECAUTIONARY PRINCIPLE TO CANCER PREVENTION

EXCERPT FROM LIVING DOWNSTREAM, BY SANDRA STEINGRABER

"After having carefully appraised the risks and losses that we have endured from chemical carcinogens, we can begin to imagine a future in which our right to an environment free of such substances is respected... The precautionary principle can assist us in this effort."

~ from Living Downstream, page 281

The idea behind the precautionary principle is that public and private interests should act to prevent harm before it occurs. It dictates that indication of harm, rather than proof of harm, should be the trigger for action—especially if delay may cause irreparable damage. As explained by the European Environment Agency, the point of anticipatory action is to prevent the construction of “pipelines of unstoppable consequences.” Actions taken to mitigate climate change involve this principle. Central to it is the recognition that we have an obligation to protect human life. By contrast, our current methods of regulation appear governed by what one researcher has called the reactionary approach: anyone may freely introduce new hazards into the environment, and then regulators wait until damage is proven before action is taken. It is a system tantamount to running an uncontrolled experiment using human subjects.

It is time now, we can insist, to run this experiment in reverse. (This is called an intervention study.) Let’s declare that the production of carcinogens and suspected carcinogens is the result of outmoded technologies and invest in green chemistry. Let’s aim for zero waste, eliminating the need to bury garbage over drinking water or light it on fire inside incinerators. Let’s invest in diversified, local, organic farming. This would yield five immediate benefits: decreased amounts of carcinogenic diesel exhaust created from the long-distance transport of food; decreased pesticide residues in our diets; decreased pesticides in our drinking water; decreased dependency on petroleum-based fertilizers, and an increase in access to healthy foods to fight obesity. Let’s invest in green energy sources and so reduce the air’s load of ultrafine particles, polycyclic aromatic hydrocarbons, and aromatic amines. Let’s end the fifty-year era of petrochemicals and coal. Then let’s see what happens to the cancer rates. And what happens to the cost of health care.

Embedded within the precautionary principle is the principle of reverse onus. This means that lack of harm, rather than harm, must be demonstrated. The reversal essentially shifts the burden of proof off

the shoulders of the public and onto those who produce, import, or use the substance in question. The principle of reverse onus requires that those who seek to introduce chemicals into our environment must first demonstrate that what they propose to do has been tested and no evidence of harm has been shown. This is already the standard we uphold for pharmaceuticals, and yet for most industrial chemicals, no firm requirement for advance demonstration of safety exists. Europe has already moved toward this standard in its own new toxics policy.

Finally, all activities with potential public health consequences should be guided by an alternatives assessment, which presumes that toxic substances will not be used as long as there is another way of accomplishing the task. This means choosing the least harmful way of solving problems—whether it is ridding fields of weeds, school cafeterias of cockroaches, dogs of fleas, woolens of stains, or drinking water of pathogens. Alternatives assessment can be aided by full cost accounting, which considers all the costs of each method, including costs that will be borne by future generations. Alternatives assessment moves us away from protracted, unwinnable debates over how to quantify the cancer risks from each individual carcinogen released into the environment and where to set legal maximum limits for their presence in air, food, water, workplace, and consumer goods. It looks toward the day when the availability of safer choices makes the deliberate and routine release of chemical carcinogens into the environment as unthinkable as the practice of slavery.

Ecologist, author, and cancer survivor, Sandra Steingraber, PhD is an internationally recognized authority on the environmental links to cancer and human health. For more information on Steingraber’s work, visit http://steingraber.com.
A HUMAN RIGHTS APPROACH TO SYNTHETIC CHEMICALS

DISCUSSION QUESTIONS FOR EXCERPT FROM LIVING DOWNSTREAM

The following suggested questions are for use with the excerpt from Living Downstream by Sandra Steingraber found on page 143 of this guide.

Q: Steingraber asserts that “we do not all bear equal risks when carcinogens are allowed to circulate within our environment.” What evidence does she give to support this statement? Can you think of other ways in which certain individuals might shoulder more of the burden?

A: We do not all bear equal risks because our exposures are not equal: (1) workers who manufacture carcinogens and those who live near toxic waste sites are exposed to higher levels; (2) toxic sites are disproportionately located in poor and minority communities; and (3) disparities in cancer rates exist between US whites and US blacks that cannot be explained by genetic differences. In addition, people are not uniformly vulnerable to the effects of environmental carcinogens; those most vulnerable include infants, adolescents, the elderly, and those with genetic predispositions or significant prior toxic exposures.

Q: How does Steingraber reframe the statistical argument being made by those who dismiss environmental concerns? In your opinion, how does this new perspective strengthen her argument?

A: Steingraber discusses the number of American lives (33,600) represented by the estimated 6% figure and then compares that to other annual mortality statistics, such as the number of lung cancer deaths caused by second-hand smoke, murders, and suicides.

Q: How do you feel about Steingraber’s bold statement that “the 33,600 deaths can be seen as homicides”? 
Applying the Precautionary Principle to Cancer Prevention

Discussion Questions for Excerpt from *Living Downstream*

The following suggested questions are for use with the excerpt from *Living Downstream* by Sandra Steingraber found on page 145 of this guide.

**Q:** What is the precautionary principle? What would be the benefits and drawbacks if your country were to implement it as part of its chemicals regulations?

**A:** The precautionary principle is the idea that public and private interests should act to prevent harm before it occurs. Potential benefits include (1) a reduction in human health problems believed to be associated with toxic chemicals, including cancer, reproductive problems, developmental problems, neurological disorders, asthma, etc.; (2) a reduction in the need for hazardous waste sites; (3) an incentive for industry to begin research and development on more products that are nontoxic; and (4) a decline in the cost of health care. Potential drawbacks include (1) the inability of some companies to transition, leading to the failure of these companies and a loss of jobs; (2) the necessary restructuring of several industries, including agriculture, manufacturing, and cosmetics; and (3) the loss of products on which we have become dependent for convenience.

**Q:** What three principles does Steingraber advocate in order to reduce the number of chemical carcinogens in our environment? In your opinion, would implementation of these principles work on a large scale? Why or why not?

**A:** Steingraber advocates for the implementation of the principle of reverse onus, alternatives assessment, and full cost accounting.

**Q:** The ideas outlined in this excerpt would require substantive changes in society’s approach, not only to the regulation of chemicals, but also to the ways in which we manufacture, use, and dispose of goods. In your opinion, what needs to happen in order for us—as individuals and communities—to be ready to make these changes?
A HUMAN RIGHTS APPROACH TO SYNTHETIC CHEMICALS

ASSIGNMENTS

Expository Writing
Persuasive Essay on the Right to Freedom from Carcinogens

Research national and international documents on human rights (e.g., the Universal Declaration of Human Rights, the US Constitution and Bill of Rights, the Canadian Charter of Rights and Freedoms) as well as national and international conventions, policies, and negotiations on toxic substances (e.g., the Stockholm Convention, the Rotterdam Convention). Then write a persuasive essay arguing for or against the recognition of freedom from carcinogenic chemicals as a human right.

Creative Writing
Journal Entries on Ecological Roots and Vulnerabilities

Sandra Steingraber says that her book *Living Downstream* is about her search for her ecological roots. Undertake a search for your own ecological roots, investigating the environment of the place where you grew up. What water bodies and landmasses exist there? What environmental degradation and pollution? What efforts at restoration or rehabilitation? Select one person from your hometown (e.g., yourself, a member of your immediate family, a close friend) and consider whether this person might be or have been more vulnerable than others to the surrounding environment, and why. What impact might these external factors have had on that person’s health, life, and well-being? Write a series of six journal entries from this individual’s perspective, incorporating a personal discussion of his or her ecological roots and considering the issues of vulnerability and justice.

Scientific Analysis
Poster on a Chemical’s Potential Developmental Effects

Select and research one toxic chemical that scientists believe has an effect on humans during a specific developmental stage. Create a poster illustrating the mechanisms by which this chemical is thought to be affecting human health.

Lab/Field Research
Map of Community Exposures to Industrial Pollutants

Individuals’ exposures to toxic chemicals vary significantly depending on where they live and work in relation to toxic sites (such as industrial facilities, agricultural areas, or toxic waste dumps). Based on this fact, Sandra Steingraber and others assert that toxic exposure is a human rights issue. Using
your country’s industrial toxics inventory, determine which toxic chemicals are being released by what industrial facilities in your community. Create a map that identifies the sites of highest contamination, medium contamination, and lowest contamination. Using the available census data, overlay that map with various population demographic factors, including age, minority status, socioeconomic status, etc. Are any human rights issues revealed by your results? Submit your maps with a brief report outlining your observations and recommendations.

Possible resources

- The US Toxics Release Inventory at [www.epa.gov/tri](http://www.epa.gov/tri)

**Oral Presentation**

*Speech on Environmental Health as a Human Right*

Many of the speeches that live the longest in our collective memory were on human rights. Research historic human rights speeches and using them as your inspiration, write your own speech casting environmental health as a human rights issue. Present this speech to your class.

**Multimedia Project**

*PSA on a Human Rights Approach to Synthetic Chemicals*

Create a public service announcement (PSA) for television, radio, or the internet that aims to educate viewers about one aspect of what it would mean to take a human rights approach to synthetic chemicals. Remember that PSAs often use a combination of emotion and fact, connecting with the audience using personal stories and attention-getting visuals.

**Community Engagement**

*Town Hall on Environmental Justice*

Many scholars and activists have pointed out that certain sectors of the population are disproportionately exposed to toxic chemicals, including racial and ethnic minorities, people of lower socioeconomic status, and those who are exposed to toxic chemicals in their workplaces. Research an environmental justice issue that has relevance for members of your community. Then hold a town-hall meeting to discuss the issue with others. Identify in advance the outcomes you desire from the meeting, and structure it accordingly. During the meeting, work with attendees to discuss and decide on any action they would like to take. Prepare minutes from the meeting to distribute to attendees and to provide to your instructor.
APPLYING THE PRECAUTIONARY PRINCIPLE TO CANCER PREVENTION

ASSIGNMENTS

Expository Writing

*Analytic Article on a Principle of Sustainability*

In chapter twelve of *Living Downstream*, Sandra Steingraber describes three principles of sustainability (the principle of reverse onus, alternatives assessment, and full cost accounting) in relation to cancer prevention. Select one of these concepts to research in greater detail. Using an approach similar to that of a journalist, conduct interviews with real sources on both sides of the issue and write an article analyzing whether the concept should be applied to cancer prevention.

Creative Writing

*Stage Play on the History of the Precautionary Principle*

Research the history of the precautionary principle to determine the following: How was it developed? How has it been previously applied—formally and informally? How might it be formally applied to the prevention of cancer? Write a one-act stage play or short film screenplay that presents a dramatic and historically accurate depiction (as either fiction or nonfiction) of what you have learned.

Scientific Analysis

*Diagram on Public Health Research and Policy Change*

In the eighteenth and nineteenth centuries, new discoveries in the field of public health often led to changes in public policy. Choose a researcher from this time period who made an important discovery that led to a new public health policy with a precautionary approach. Possible researchers include Percivall Pott, John Snow, and Ignaz Semmelweis. Create a visually arresting diagram that summarizes the researcher’s findings, the policy changes, and the ultimate effect on public health.

Lab/Field Research

*Lab Experiment Comparing Synthetic and Organic Fertilizers*

Organic farmers and gardeners are applying the precautionary principle to their agricultural practices by using a wide array of natural and nontoxic pest control and fertilization methods. Scientists and farmers have often debated the effectiveness and efficiency of these methods, as compared to the use of chemical pesticides and fertilizers. Select a crop or plant that has a history of successful cultivation in your region, with and without the use agricultural chemicals. Grow several plants in pots and conduct a controlled experiment, using different types of fertilizers on each group of pots (e.g., compare organic...
fertilization methods to a range of conventional store-bought fertilizers). On a weekly basis, collect observational data on each of the gardens (such as plant growth, plant health, etc.). Also analyze soil samples from the different gardens and the water runoff for the presence of living microorganisms, nitrates/nitrites, and phosphates. Write a lab report detailing your observations throughout the experiment and what conclusions you have been able to draw.

**Oral Presentation**

*Speech on Public Health Management of Infectious Disease*

Sandra Steingraber has previously compared the US health system’s approach to rabies prevention with its approach to cancer prevention. Drawing on this idea, prepare and deliver a speech in which you compare and contrast our society’s precautionary and proactive management of infectious diseases (e.g., rabies, swine flu, SARS, mad cow disease) with our society’s reactive management of other illnesses such as cancer, diabetes, asthma, and Parkinson’s. As part of your preparations, reflect on why differences might exist and capture these personal reflections in your oral presentation.

**Multimedia Project**

*Social Marketing Campaign for Precaution*

In chapter twelve of *Living Downstream* (page 282), Steingraber lists a range of ways we can implement the precautionary principle by running the “experiment in reverse.” Select the one which is of greatest interest to you and research the steps that society needs to take to achieve this vision. Design a dynamic social marketing campaign to encourage your audience to take these steps. Social marketing campaigns are incredibly diverse and may include social networking, a website, a blog, posters, pamphlets, word-of-mouth initiatives, a public service announcement, the use of spokespeople, t-shirts, events, text-messaging campaigns, and more.

**Community Engagement**

*Plan for Greening Your School*

Consider the environmental policies of your educational community. What is being done well, and where could improvements be made? With a focus on the environmental health benefits of precaution, create a plan for implementing changes that would make your school a greener and healthier place. Work with other groups or individuals who are well positioned to carry these improvements forward. With these partners, present your plan to the administration, student body, board of governors, or student council. Write a report about the challenges and successes of presenting your proposal.

Possible resources:

- Canadians for a Safe Learning Environment at [www.casle.ca](http://www.casle.ca)
- National Farm to School Network at [www.farmtoschool.org](http://www.farmtoschool.org)
- Healthy Building Network at [www.healthybuilding.net](http://www.healthybuilding.net)
- Second Nature at [www.secondnature.org](http://www.secondnature.org)
**The Precautionary Principle**

**Info Sheet**

“The Precautionary Principle does not tell us what we should do, but it does serve as a starting point for imagining a future where nontoxic alternatives . . . are embraced as the commonsense solution.”

~ Sandra Steingraber, *Living Downstream*

The idea of the precautionary principle has been expressed over time as “first, do no harm,” “better safe than sorry,” and “look before you leap.”

This idea became a formal principle of environmental policy in Germany in the 1970s when that country faced an ecological crisis. Rivers were heavily polluted, the Black Forest was dying, and marine mammals were disappearing from the North Sea. While toxic exposures seemed to be wreaking havoc on the natural world, it was hard to make clear causal links without decades of study. By the time cause-and-effect relationships could be scientifically proven, many species would be extinct and entire forests would be wiped out. The Germans used the *Vorsorgeprinzip* (literally “forecaring principle”) to take protective action while the science was still uncertain. Germany became an innovator in environmental technology and helped bring the precautionary principle into international agreements, such as the Second North Sea Treaty, the Convention on Biological Diversity, and the charter that formed the European Union.

In 1998, a group of scientists, philosophers, lawyers, and environmental activists met at Wingspread (headquarters of the Johnson Foundation) in Racine, Wisconsin, to discuss the precautionary principle—its meaning and its implementation. At the end of the conference, which was convened by the Science and Environmental Health Network, the following statement was written and signed by the participants. Sandra Steingraber, author of *Living Downstream*, was one of its signatories. The statement, reproduced in full below, has since helped to define the meaning of precaution to the environmental health movement.

**THE WINGSPEAD CONSENSUS STATEMENT ON THE PRECAUTIONARY PRINCIPLE**

The release and use of toxic substances, the exploitation of resources, and physical alterations of the environment have had substantial unintended consequences affecting human health and the environment. Some of these concerns are high rates of learning deficiencies, asthma, cancer, birth defects and species extinctions; along with global climate

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change, stratospheric ozone depletion and worldwide contamination with toxic substances and nuclear materials.

We believe existing environmental regulations and other decisions, particularly those based on risk assessment, have failed to protect adequately human health and the environment—the larger system of which humans are but a part.

We believe there is compelling evidence that damage to humans and the worldwide environment is of such magnitude and seriousness that new principles for conducting human activities are necessary.

While we realize that human activities may involve hazards, people must proceed more carefully than has been the case in recent history. Corporations, government entities, organizations, communities, scientists and other individuals must adopt a precautionary approach to all human endeavors.

Therefore, it is necessary to implement the Precautionary Principle: When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.

In this context the proponent of an activity, rather than the public, should bear the burden of proof.

The process of applying the Precautionary Principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action.

This information has been drawn from the resources on the Science and Environmental Health Network's website. For detailed information on the precautionary principle and its implementation, please visit www.sehn.org.
A HUMAN RIGHTS APPROACH TO SYNTHETIC CHEMICALS

RESOURCE LIST

THE HUMAN RIGHTS PERSPECTIVE

Asturias Declaration: A Call to Action
By the International Conference on Environmental and Occupational Determinants of Cancer: Interventions for Primary Prevention, March 17–18, 2011

A declaration released at the conclusion of the 2011 International Conference on Environmental and Occupational Determinants of Cancer. It outlines the need for the primary prevention of cancer and provides seven key recommendations. Full text available at www.who.int/phe/news/events/international_conference/Call_for_action_en.pdf.

The Environmental Rights Revolution: A Global Study of Constitutions, Human Rights, and the Environment
By David Boyd, University of British Columbia Press, 2011

A comprehensive international analysis of 193 constitutions and over 100 laws and court decisions. This book seeks to use evidence and tangible measurements to answer the oft-debated question of whether the right to clean water, air, and soil should be acknowledged in national constitutions.

Forcing the Spring: The Transformation of the American Environmental Movement

A book looking at the environmental movement of the 1960s through the lens of other social movements. Originally published in 1993, it is considered a seminal work on environmental history. The revised edition brings the discussions into the twenty-first century.

Defending the Earth
By Human Rights Watch and the Natural Resources Defense Council, 1992

“Health and Human Rights,” World Health Organization
www.who.int/hhr/en

A section of the World Health Organization’s website that provides an overview of the links between health and human rights, citing the WHO Constitution that “the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being.”

“Human Rights and the Prevention of Cancer”

A scholarly article arguing that “every person has a basic human right not to have cancer inflicted on him by the action of other persons” as well as “the right of informed control.”

*Linking Human Rights and Environment*
By Romina Picolotti and Jorge Daniel Taillant, University of Arizona Press, 2010

A book featuring contributions from experts whose work attempts to unify human rights and environmental interests. It provides a range of practical examples, offering insight into the ways in which legal human rights instruments may be applied to environmental protection.

**THE RIGHT TO KNOW**

“Learn about Your Right to Know,” Environmental Protection Agency
www.epa.gov/epahome/r2k.htm

A webpage outlining right-to-know information made available by the EPA, including the Toxics Release Inventory, AIRNOW, the Food Quality Protection Act, and Superfund risk assessment.

*The Public’s Right to Know: Principles on Freedom of Information Legislation*
By Toby Mendel, Article 19, 1999

A report outlining best-practice principles for legislation that deals with access to information. It was published by a British charitable organization named for Article 19 of the Universal Declaration of Human Rights. Full text available at www.article19.org/pdfs/standards/righttoknow.pdf.

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The Right-To-Know Network
www.rtknet.org

A national network in the United States that began in 1989 in response to the Emergency Planning and Community Right to Know Act, which granted the public the right to access the Toxics Release Inventory (www.epa.gov/tri). The network offers free access to a number of databases and technical support to assist the public in their searches.

“The Right to Know,”

An article providing an overview of the right to know, especially as it applies to risk management. Available at http://unesdoc.unesco.org/images/0011/001117/111704eo.pdf.

Silent Spring
By Rachel Carson, Houghton Mifflin, 1962

This seminal and groundbreaking book has been credited with inspiring the creation of the US Environmental Protection Agency, leading to the ban of several harmful pesticides including DDT, and launching the modern environmental movement. Written by biologist and nature writer Rachel Carson, it presents a careful scientific investigation into the dangers of pesticide use in the United States. Carson's main reason for authoring this book was that she believed in the public's right to know. In chapter 2 she writes, “The public must decide whether it wishes to continue on the present road, and it can do so only when in full possession of the facts.”

Trade Secrets: A Moyers Report
Produced by Sherry Jones, Public Affairs Television, 2001, 120 min

A video, hosted by Bill Moyers, revealing what industry, government, and science know about the health effects of chemicals.

THE ENVIRONMENTAL JUSTICE MOVEMENT

“Cancer, the Environment, and Environmental Justice”
By Frederick L. Tyson et al., Cancer (Supplement), 1998 (Vol. 83, No. 8), 1998, pp. 1784–1792

**Climate Refugees**  
By Collectif Argos, MIT Press, 2010  

An evocative book that brings together essays and photographs of people living in nine places already deeply affected by climate change—widely acknowledged to be the most urgent global environmental justice issue—from the melting permafrost in Alaska to the encroaching desert in China. This collection was created by Collectif Argos, a collective of French journalists and photojournalists.

**Center for Health, Environment and Justice**  
http://chej.org  

The website of a nonprofit organization founded by Lois Gibbs, the mother who fought for the evacuation of Love Canal in the 1970s. It provides a wealth of information for communities facing an environmental health risk, from background on the organization and the issues, to information on campaigns and ways to take action.

**Dumping in Dixie: Race, Class, and Environmental Quality**  
By Robert D. Bullard, Westview, 2000 (3rd edition)  

A book written by the sociologist and environmental justice activist who is considered the father of the environmental justice movement. First published in 1990, this book tells the stories of five African American communities as they struggle for their environmental civil rights. It is considered a historic and essential book for scholars of environmental justice.

**Environmental Justice Foundation**  
www.ejfoundation.org  

A registered charity based in London, England, that provides film and advocacy training to individuals and grassroots organizations in the global south who suffer most from environmental abuses, helping them to find peaceful ways to create long-term solutions. The foundation also campaigns internationally to raise awareness of the issues.

**Power, Justice, and the Environment: A Critical Appraisal of the Environmental Justice Movement**  
Edited by David Naguib Pellow and Robert J. Brulle, MIT Press, 2005  

A book assessing the effectiveness of the environmental justice movement.

**Sacrifice Zones: The Front Lines of Toxic Chemical Exposure in the United States**  
By Steve Lerner, MIT Press, 2010  

A book documenting the stories of twelve US communities that chose to fight the chemical pollution
of their neighborhoods. Written by the research director of Commonweal, a nonprofit health and environmental research institute, this book maintains a strong focus on the individual residents who became grassroots activists.

*Silent Snow: The Slow Poisoning of the Arctic*
By Marla Cone, Grove Press, 2005

A book about the toxic contamination of the Arctic that follows the author, a *Los Angeles Times* reporter, on a journey from Greenland to the Aleutian Islands. The extensive research for this book was funded by a Pew Fellowship (a grant typically reserved for scientists).

*Speaking for Ourselves: Environmental Justice in Canada*
Edited by Julian Agyeman, Peter Cole, Randolph Haluza-DeLay and Pat O’Riley, University of British Columbia Press, 2009

A book that examines environmental justice issues in a Canadian context in essays from scholars and activists. This book, which the publisher calls “the first major examination of the multidimensionality of environmental equity and injustice” has a strong focus on the experiences of First Nations communities in Canada.

**WORKERS’ RIGHTS AND OCCUPATIONAL HEALTH**

*Background Paper for Reform No. 6 of the Louisville Charter for Safer Chemicals: Take Immediate Action to Protect Communities and Workers*
By Roberta Chase Wilding and Sharon E. Lewis, The Louisville Charter for Safer Chemicals

A paper elaborating on the sixth reform of the Louisville Charter for Safer Chemicals (a platform developed by a community coalition that advocates for protection from toxic chemicals). Full text available at www.louisvillecharter.org/paper.protect.shtml.

*Deadly Dust: Silicosis and the On-Going Struggle to Protect Workers’ Health*
By David Rosner and Gerald Markowitz, University of Michigan Press, 2006

A book that tells the story of silicosis, an industrial lung disease that became a public health crisis during the Depression in the United States. Through this historical account, the authors examine how we define and understand disease at different moments in time.

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**Occupational Cancer/Zero Cancer: A Union Guide to Prevention**  
By Rory O’Neill, International Metalworkers’ Federation, 2007

A “work cancer prevention kit” that provides extensive information and resources about the links between workplace exposures and occupational cancer. It also offers practical advice on building a union cancer campaign and reducing workplace cancer risk. Full kit available at [www.hazards.org/cancer/preventionkit/index.htm](http://www.hazards.org/cancer/preventionkit/index.htm).

“Reducing Occupational Exposure to Chemical Carcinogens”  

An article contending “that priority should be given to controlling those agents that contribute most to the cancer burden.” Full text available at [http://occmed.oxfordjournals.org/content/59/2/96.full?sid=ba2915e6-dab6-468d-a6ce-0e45cae900cf](http://occmed.oxfordjournals.org/content/59/2/96.full?sid=ba2915e6-dab6-468d-a6ce-0e45cae900cf).

**Workplace Roulette: Gambling with Cancer**  
By Matthew Firth, James Brophy, and Margaret Keith, Between the Lines, 1997

A book written by Canadian health and safety specialists. It examines the occupational causes of cancer through case studies and provides a human rights analysis.
APPLYING THE PRECAUTIONARY PRINCIPLE TO CANCER PREVENTION

RESOURCE LIST

QUESTIONING THE SAFETY OF SYNTHETIC CHEMICALS

The Body Toxic: How the Hazardous Chemistry of Everyday Things Threatens Our Health and Well-Being
By Nena Baker, North Point Press, 2008

A book about how we became dependent on synthetic chemicals, and how, as a result, many chemicals reside in each of our bodies and impact our health. Written by the investigative journalist who was the first US reporter to write about Nike’s sweatshops in Indonesia, this book features the work of many scientific researchers, including Tyrone Hayes (who appears in Living Downstream).

Chasing Molecules: Poisonous Products, Human Health, and the Promise of Green Chemistry
By Elizabeth Grossman, Island Press, 2009

A book that looks at synthetic chemical exposures linked to human health problems. Investigative journalist Grossman makes the case that green chemistry has the potential to create new products that are good for human health, industry profits, and the environment.

Deceit and Denial: The Deadly Politics of Industrial Pollution
By Gerald Markowitz and David Rosner, University of California Press, 2002

A book exploring the reactions of the lead and chemical industries when confronted with evidence of the potential health risks of their products. Written by two historians, this book draws heavily on primary source materials, such as internal corporate and trade association documents and interviews with leading players.

Our Stolen Future: Are We Threatening Our Fertility, Intelligence, And Survival? A Scientific Detective Story
By Theo Colborn, Dianne Dumanoski, and John Peterson Myers, Plume, 1995

A book providing an overview of fifty years of research into endocrine disruptors (chemicals that disrupt the hormonal system) and revealing the vulnerability of our biological processes to the effects of synthetic chemicals. Theo Colborn is a zoologist and the leading expert on endocrine disruption. She founded The Endocrine Disruption Exchange, a nonprofit organization that compiles and disseminates the scientific evidence on endocrine disrupting chemicals. Dianne Dumanoski is an environmental journalist, and John Peterson Myers is a biologist and the publisher of Environmental Health News.
**Slow Death by Rubber Duck: The Secret Danger of Everyday Things**  
By Rick Smith and Bruce Lourie, Counterpoint, 2010

A book by two Canadian environmentalists who began exposing themselves to “a host of things that surround us every day.”\(^1\) They tested the pollution in their bodies before and after their exposures, revealing surprising facts about seven common chemicals. Rick Smith is a biologist, an environmental activist, and executive director of Environmental Defence Canada. Bruce Lourie is president of the Ivey Foundation, a private charitable foundation, and a director on several private and public boards.

**Poisoned for Profit: How Toxins Are Making Our Children Chronically Ill**  
By Philip and Alice Shabecoff, Chelsea Green Publishing, 2010

A book that unfolds as a crime story. The victims are babies with birth defects, teens with cancer, and siblings with mental disabilities—all poisoned by toxic substances in their communities. The authors, both journalists, are a husband-and-wife team. Philip Shabecoff was previously the chief environmental correspondent for *The New York Times* and founder of *Greennaire*, an online digest of environmental news. Alice Shabecoff is a freelance journalist who writes about family and consumer issues.

**Not Just a Pretty Face: The Ugly Side of the Beauty Industry**  
By Stacy Malkan, New Society Publishers, 2007

A book that reveals the potential hidden health costs of cosmetics and personal care products. In accessible language, Malkan encourages lovers of cosmetics to become environmental health activists. Malkan, a former journalist, is the cofounder of the Campaign for Safe Cosmetics.

**Silent Spring**  
By Rachel Carson, Houghton Mifflin, 1962

This seminal and groundbreaking book has been credited with inspiring the creation of the US Environmental Protection Agency, leading to the ban of several harmful pesticides like DDT, and launching the modern environmental movement. Written by biologist and nature writer Rachel Carson, it presents a careful scientific investigation into the dangers of pesticide use in the United States.

**Silent Spring Institute**  
[www.silentspring.org](http://www.silentspring.org)

A scientific research institute whose mandate is to “identify and break the links between environmental chemicals and women’s health, especially breast cancer.” The institute has conducted a number of groundbreaking studies that use a community-based approach. The institute was founded after members of the Massachusetts Breast Cancer Coalition called for an investigation of a potential breast cancer cluster on Cape Cod.

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1 Back cover of book.
DISMISSING THE CANCER–ENVIRONMENT LINK


This frequently cited article that attempts to quantify the percentage of cancer deaths attributable to various risk factors, such as smoking, diet, and occupational exposures. The authors state that occupational cancers account for 4% of the total cancer mortality in the US, while pollution accounts for 2%. Full text available at: www.ncbi.nlm.nih.gov/pubmed/7017215. For rebuttals of this analysis, see the following:

“Environmental and Occupational Causes of Cancer Re-visited”

A scientific article presenting a detailed look at past and current views of cancer causation. The authors argue that “it is not only pointless, but also counterproductive, to attempt to assign certain exposures a specific quantitative causal percentage.” Full text available at www.ohcow.memberlodge.com/resources/Documents/cancerrevisited.pdf.

“A Bridge to Somewhere—Responding to the President’s Cancer Panel Report (Part 3)”
By Sandra Steingraber, *Sandra’s Weekly Essays* at www.livingdownstream.com, July 2010

An essay in Steingraber’s series about environmental health. This piece examines the public reaction to the US President’s Cancer Panel report on the environmental links to cancer. It explains that the report is, in essence, a critique of Doll and Peto’s conclusion that the environmental contribution to cancer causation is small. Steingraber’s essay then reflects on the two opposing narratives that are currently vying for public support. Full text available at www.livingdownstream.com/essays/bridge somewheren_part3 and www.huffingtonpost.com/sandra-steingraber/a-bridge-to-somewhere-res_b_636716.html.

What Causes Cancer? mini doc in the *Living Downstream* Educational DVD bonus features
Directed by Chanda Chevannes, *Living Downstream* Educational DVD, 2010, 3.5 min

A short educational documentary in which Sandra Steingraber, PhD, and Richard Clapp, DSc, MPH, explain the complexity of cancer causation. While outlining the interplay of multiple causes in the formation of a tumor, they address the commonly held misconception that environmentally caused cancers are rare.
“Chemicals, Cancer and Claptrap”
By Henry I. Miller and Elizabeth M. Whelan, Forbes, June 2, 2010

An article critiquing the President’s Cancer Panel Report, Reducing Environmental Cancer Risk: What We Can Do Now. It lays out four arguments that contradict the findings of the report. Miller is a medical doctor and the Robert Wesson Fellow in Scientific Philosophy and Public Policy at the Hoover Institution, a conservative think-tank. Whelan has a doctor of science from the Harvard School of Public Health and is a founder and the president of the American Council on Science and Health, a nonprofit organization that has ties to the chemicals industry. Full text available at http://tech.dir.groups.yahoo.com/group/SDARI/message/7445.

Doubt Is Their Product: How Industry’s Assault on Science Threatens Your Health
By David Michaels, Oxford University Press, 2008

An investigative book that uses primary source materials to reveal the tactics industry uses to call science into question in order to continue selling their dangerous products (like tobacco, lead, and asbestos). Written by a scientist and former government regulator, this exposé ultimately demonstrates the flaws in the US regulatory system and provides suggestions for its rehabilitation.

Merchants of Doubt: How a Handful of Scientists Obscured the Truth of Issues from Tobacco Smoke to Global Warming
By Naomi Oreskes and Erik M. Conway, Bloomsbury, 2010

A book about a small group of US scientists who have run intentionally misleading campaigns on a range of public health issues, from DDT to tobacco smoke to global warming. Written by two leading science historians, this book draws on a range of key primary sources and makes a compelling case.

Toxic Terror: The Truth Behind the Cancer Scares
By Elizabeth M. Whelan, Prometheus Books, 1993

A book that presents a comprehensive argument that there is little scientific basis for the claims of a link between environment and cancer. The author looks at such cases as the banning of DDT, Love Canal, nuclear power, and asbestos. Whelan has a doctor of science from the Harvard School of Public Health and is a founder and the president of the American Council on Science and Health, a nonprofit organization that has ties to the chemicals industry.
PRIMARY PREVENTION AND THE PRECAUTIONARY PRINCIPLE

Lorenzo Tomatis and Primary Prevention of Environmental Cancer


Late Lessons from Early Warnings: The Precautionary Principle 1896–2000

A detailed report based on many case studies in which there were early warnings about hazardous activities. Identified by a range of experts, the case studies were analyzed to determine whether—and if so, in what way—the early warning information was used to reduce or eliminate the hazards. Then, in consultation with the European Environment Agency’s Scientific Committee, the editorial team summarized these analyses into twelve late lessons. The case studies cover a lot of ground, from the decline of fish stocks to mad cow disease and from PCBs to radiation. Full text available at www.kea.europa.eu/publications/environmental_issue_report_2001_22.

“Precautionary Principle,” Science and Environmental Health Network
www.sehn.org/precaution.html

A webpage providing detailed information on the precautionary principle, including an extensive collection of articles, reports, and other publications. The organization’s webpage on the Wingspread Conference on the Precautionary Principle, at www.sehn.org/wing.html, might also be of interest.

Precautionary Tools for Reshaping Environmental Policy
Edited by Nancy Myers and Carolyn Raffensperger, MIT Press, 2006

A book that “describes the analytical and ethical bases of the precautionary principle as well as practical options for implementing it.” Complete with case studies and hands-on materials, this is a useful guide for citizens and policymakers alike. Myers and Raffensperger are employees of the Science and Environmental Health Network, a nonprofit organization whose work focuses heavily on the precautionary principle.

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1 Back cover of book.
Reducing Environmental Cancer Risk: What We Can Do Now
By Susan H. Reuben for the President’s Cancer Panel, US Department of Health and Human Services, April 2010

A report outlining the findings of the President’s Cancer Panel meetings during 2008 and 2009. The panel heard testimonies from forty-five experts, including Sandra Steingraber and Tyrone Hayes (both featured in Living Downstream). In a letter to President Obama included with the report, the panel members said, “The true burden of environmentally induced cancers has been grossly underestimated.” Full text available at http://deainfo.nci.nih.gov/advisory/pcp/annualReports/pcp08-09rpt/PCP_Report_08-09_508.pdf.

“Rethinking Breast Cancer Risk and the Environment: The Case for the Precautionary Principle”
By Devra Davis et al., Environmental Health Perspectives, 1998 (Vol. 106, No. 9), pp. 523–529

An article reviewing the evidence on breast cancer risk and presenting an assessment focused on preventable risk factors. Davis is an epidemiologist who has authored over 190 publications. Her work has focused largely on links between the environment and cancer and has contributed to the public’s understanding of these links.

PRINCIPLES OF SUSTAINABILITY

The Ecology of Commerce: A Declaration of Sustainability

A book that presents an argument for sustainable business practices, written by an entrepreneur.

“Full Cost Accounting for the Life Cycle of Coal”

An article exploring the concept of full cost accounting using the coal industry as an example. Full cost accounting focuses not only on financial profit when calculating a company’s worth but also on the company’s impact on people and the planet. A medical doctor who also held a doctorate in public health, Epstein was the associate director of the Center for Health and the Global Environment at Harvard Medical School and was considered to be a leading expert in the field of public health. Full text available at http://chge.med.harvard.edu/sites/default/files/epstein_full%20cost%20of%20coal.pdf.
Lowell Center for Sustainable Production
www.sustainableproduction.org

A website providing information about the Lowell Center for Sustainable Production, a center based at the University of Massachusetts that is “helping to build healthy work environments, thriving communities, and viable businesses that support a more sustainable world.” The website contains a wealth of practical and informational resources on environmental practices, primary prevention, workplace safety, and sustainability training.

Making Better Environmental Decisions: An Alternative to Risk Assessment
By Mary O’Brien, MIT Press, 2000

A book that presents an alternative to the widely used environmental decision-making technique of risk assessment. Whereas risk assessment attempts to determine the threshold for harm, alternatives assessment, as described by O’Brien, attempts to minimize damage. This book makes a case for alternatives assessment while also outlining steps for its implementation.

“Principles for Sustainability: From Cooperation and Efficiency to Sufficiency”

An article comparing two policy goals: sustainability and environmental improvement. Princen argues that the principles that guide environmental improvement are not suited for the necessary task of creating environmental sustainability. Principles for sustainability are outlined, including restraint, precaution, polluter pays, zero, and reverse onus. Full text available at www.nicholas.duke.edu/solutions/documents/PrinciplesForSustainability.pdf.

“Polluter Pays Principle,” The Encyclopedia of Earth
www.eoearth.org/article/Polluter_pays_principle

A webpage on the polluter pays principle, including an overview of its history and application and a list of further resources.
Lesson 3
Personal Storytelling for Public Change

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OVERVIEW

LEARNING OBJECTIVES

• to examine the use of personal storytelling in social movements
• to explore the concept of public change as it relates to environmental health

ADDITIONAL TOPICS COVERED

cancer prevention, cancer survivorship, personal action versus public action, silence, theories of social change

SUBJECT AREAS

dramatic arts, English, ecology/environmental science, environmental studies, ethics, film/media studies, health, history, human rights, political science, public health, sociology, women's studies

bold lesson is highly relevant
regular lesson is moderately relevant
**Lesson Plan**

**Introduction**

1. Initiate discussion among students about the use of personal storytelling to effect public change, using questions such as the following:
   - What is the effect of hearing a good personal story?
   - What are the benefits of sharing your own story with others—for you and for those who hear the story?
   - Why do so many authors, filmmakers, and community activists choose to use personal stories as a microcosm through which to explore larger social issues?

2. Introduce the film.

3. Instruct students to make note of key ideas as they watch the film, such as the following:
   - the role Steingraber’s personal story plays in explaining the science regarding cancer and the environment
   - how Steingraber’s personal experiences have been her inspiration and have become a defining feature of her work
   - what can be learned about the wider experience of cancer from Steingraber’s individual story

**Screening**

4. Screen the film.
   - Option 1: *Living Downstream* feature-length film (85 min)
   - Option 2: *Living Downstream* one-hour version (55 min)

5. Screen one or more of the following bonus features from the Educational DVD (now or at any point during the lesson) to enhance class discussion:
   - scene compilation: “The Personal Experience of Cancer” (20 min, 31 sec)
   - scene 3: “Sandra and Her Mother” (3 min, 40 sec) (scene 3 in one-hour version)
   - scene 18: “Sandra Visits Her Doctor” (4 min, 52 sec) (scene 15 in one-hour version)
   - mini doc: *Why Talk about Chemical Destruction?* (5 min, 10 sec)
   - mini doc: *What Can We Do?* (5 min, 10 sec)
6. Review with students the content of the film, using questions such as the following:

**Q:** How has Steingraber’s bladder cancer diagnosis influenced her life? Thirty years later, what are the lasting effects of the disease?

**A:** Steingraber’s personal experience with cancer has (1) driven her to investigate its environmental links; (2) motivated her to advocate for public change; (3) meant that she entered marriage and motherhood without the usual confidence that she would live a long life; (4) ensured that she would continue to undergo routine medical surveillance and worry about the possibility of cancer returning; and (5) occasionally thrust her into the ambiguous period of watchful waiting.

*Scenes 9, 17, 18, 28, 32, 34 in the feature-length film. Scenes 8, 14, 15, 21, and 26 in the one-hour version.*

**Q:** What is the ultimate change that Steingraber is seeking?

**A:** The abolition of known and suspected carcinogens.

*Throughout the feature-length film. Throughout the one-hour version.*

**Q:** Why do you think Steingraber chooses to tell her personal story in the book and in the film? What is the effect of a personal story on readers and viewers?

**A:** Steingraber wants the audience to understand the human cost of cancer, to see the people behind the data points. Personal storytelling can be emotionally powerful, and an emotional response can move individuals toward making change.

*Throughout the feature-length film. Throughout the one-hour version.*

**Q:** The stories of others who have been diagnosed with cancer are touched upon briefly in the film (Rachel Carson, Steingraber’s mother, and the cancer survivor from Peoria who speaks with Steingraber backstage at the end of the film). What information or emotion do these stories contribute to the film?

**A:** These stories (1) provide other experiences to compare to Steingraber’s, allowing for a deeper understanding of the issues; (2) help reinforce Steingraber’s key message that every point in the cancer registry data represents a human life; and (3) present different “characters” to whom audience members may relate.

*Throughout the feature-length film. Throughout the one-hour version.*

**Q:** In the film, Steingraber discusses several forms of personal silence. What are they? What might the consequences be for those who keep silent?

**A:** Forms of silence include (1) the silence within the medical and research community, past and present; (2) the silence of those afraid of the despair they may feel in examining the issues; (3) the “Silence = Death” banner of the AIDS movement; and (4) the silence Rachel
Carson kept about her breast cancer diagnosis, for fear of being discredited. Forms of silence discussed in the feature-length film (and implied in the one-hour version) also include (1) the silence in Steingraber’s family at the time of her and her mother’s diagnoses and (2) the silence of cancer survivors and patients who find themselves in a period of watchful waiting.

*Scenes 2, 3, 10, 11, 29, 30, 32, and 34 in the feature-length film. Scene 2, 3, 9, 10, 22, and 26 in the one-hour version.*

**Q:** According to Steingraber, what is the consequence for the larger community when silence surrounds the issue of cancer? In Steingraber’s speech at the end of the film, how does she continue to break traditional silences through personal storytelling?

**A:** Steingraber emphasizes that if we can’t talk about something, then it is hard to take action for change. In her final speech, she shares her experience of watchful waiting, which is often not openly discussed.

*Scenes 11, 32, and 34 in the feature-length film. Scenes 10 and 26 in the one-hour version.*

**Q:** How have Steingraber’s personal experiences as a young cancer patient, an adoptee, a biologist, a writer, and a mother shaped her work in environmental health? How does this influence the way she tells others to pursue change?

**A:** Steingraber’s experience of cancer at an early age led her to question its causes. The cancer in her family and the fact that she was adopted led her to think about what families have in common besides their genes. Her training as a biologist led her to look for answers in the scientific research. (Students might also extrapolate that, since Steingraber is a published author and poet, her skill for writing and storytelling led her to communicating the scientific information in a way that was accessible and engaging for the public.) Her experiences as a mother have led her to study the links between development and toxic chemicals. Steingraber tells others to create change by starting with their own passions and interests.

*Scenes 2, 3, 9, 34 and throughout the feature-length film. Scenes 2, 3, 8, and 26 in the one-hour version.*

### 7. Discuss the broader topics and issues with students, moving beyond the scope of the film, using questions such as the following:

**Q:** What new insights did the film provide into the experiences of a cancer survivor? How has this influenced your understanding of the issues presented?

**Q:** How does thinking of each cancer diagnosis as someone’s personal story influence your ability to grasp the various costs of cancer (e.g., social, economic, research, health-care, labor, and emotional)?
Q: What personal changes can we make in our lives to reduce our risk for cancer? Why are many personal changes ineffective? What larger scale public changes can we make in our communities to reduce the general population's risk for cancer?
A: Refer to “The Myth of Living Safely In a Toxic World” for some possible answers (see page 183).

Q: Why are both personal changes and public changes important?
A: Refer to the info sheet for clarification on the differences between personal changes and public changes (see page 199).

Q: Have you had any personal experiences that made you more aware of a societal or environmental problem? How does the film make you feel about those experiences? Are there ways you could use your story to effect a larger change? Could you imagine yourself actually doing these?

TIP For a comprehensive list of discussion questions about the film see page 33. For discussion questions about the mini docs, see the mini docs section, beginning on page 79.
Lesson Plan Extensions

The optional activities and materials that follow have been designed for instructors and students who wish to delve more deeply into personal storytelling for public change. They may be used together or individually for a range of purposes, including in-class discussions, quizzes, or assignments. When used together, these items may be introduced in any order.

Reading and Discussion

“The Public Story of Cancer” by Sandra Steingraber, on page 179 of this guide
   For suggested discussion questions and answers, see page 187.

“The Myth of Living Safely In a Toxic World” by Sandra Steingraber, on page 183 of this guide
   For suggested discussion questions and answers, see page 189.

Assignments

Assignments on personal storytelling in social movements on page 191
Assignments on public change in environmental health on page 195

Additional Materials

Info sheet on comparing personal action to public action on page 199
Resource list on personal storytelling in social movements on page 203
Resource list on public change in environmental health on page 209
Vows of marriage. Oaths of citizenship. A jury’s verdict. Words with the power to change our identities are usually spoken in public places. But a cancer diagnosis is almost always delivered within a private conversation that takes place, unwitnessed, behind the closed door of a doctor’s office, on the phone, or, most unceremoniously of all, in a hospital room—where, on the other side of the curtain, a television blares, a roommate is served lunch, and a member of the cleaning staff mops the floor.

At age twenty, while lying on a hospital bed in my own hometown, I was diagnosed with bladder cancer. Before my physician shared the bad news, he asked my visitors—who were missing the first day of college classes to be with me—to step out.

Then he pulled the curtain.

A few minutes later, he told my friends in the hallway, not unkindly, that they could come back in. And they did—although they left soon after, tiptoeing out of the room, as though the hushed behavior we used in the library was what was required now that I had cancer.

From my fourth-floor window, I watched as they crossed the parking lot and drove away. A construction crew arrived. Women carried flowers into a church. Mallard drakes splashed in the park lagoon. A high school team ran wind sprints across an athletic field. My high school. My church. The lagoon where, as a child, I had caught a fish. How strange. The familiar world, full of jackhammers, ducks, and Bible study, was rolling its regular programming, as if nothing extraordinary had just happened. As if I had not just been culled from my own life. Or so it felt to me then.

~

Perhaps because the rituals of being a cancer patient are so far removed from public life, we sometimes presume its causes are likewise located in an interior, intimate place. We blame our private behaviors or our genes themselves, which we’ve inherited, like so many place settings of china, from our personal ancestors.

And some of the roots of cancer are indeed found there. But cancer has a public dimension, too. Our genes reside within cells, and cells reside within living bodies that, in turn, reside within particular public environments. And, as we breathe, bathe, eat, and walk the dog, our environment—with its carbon cycles and rivers, pollination systems and aquifers, industries and farms, geologies and jet streams—comes to reside inside us.
Mounting evidence suggests that exposures to chemical contaminants within our shared environment are playing a more significant role than previously appreciated in the burden of human cancer. Some of these chemicals can damage our genes directly—or silence their expression. Some interfere with the network of hormonal signals that serve as the body’s communications system. Some change developmental pathways in early life in ways that make us more vulnerable to cancer in later life. All together, the new science is mounting a challenge to the way we regulate toxic substances. These regulations rarely consider the cumulative impact of multiple exposures to multiple chemicals over a lifetime.

Yet the public story of cancer is a hopeful one. First, it shows us where we can begin a meaningful program of cancer prevention. It’s true that cancer rates among US children have risen sharply and that cancer is now the leading killer of middle-aged adults. But it’s also true that lung cancer rates are falling. This happy outcome is the result of our collective efforts to denormalize tobacco—to shun its use within public places, tax it steeply, restrict its advertising, and promote smoking cessation efforts. Ever-rising cancer rates are not the inevitable price of modern life. The story of tobacco shows us that when an exposure to a chemical carcinogen is eliminated, lives are saved. It is a story that can happen again. A 2008 statement, signed by many cancer researchers and submitted to the President’s Cancer Panel, put it like this: *The most direct way to prevent cancer is to stop putting cancer-causing agents into our indoor and outdoor environments in the first place.*

Second, as it turns out, the cynical joke that “everything causes cancer” is not true. Most of the chemicals implicated as carcinogens are derived from the same two sources as those responsible for climate change: coal and petroleum. Finding substitutes for these two substances is already a priority for many governments. In this, an investment in green energy is thus also an investment in cancer prevention.

Of course, sending people off to redesign the petrochemical economy is a different assignment than encouraging them to quit smoking. It’s a task so overwhelming that it requires all of us, with all of our various passions and talents, to act in concert. Happily, this allows any one of us to seize on a single piece of the problem and work as hard as we can on that piece. People who love food can support local, organic farmers. People who love fashion can go after toxic chemicals used by dry-cleaning and cosmetics industries. People who love sports can insist on pesticide-free playing fields and golf courses. And so on.

Think of it this way: We are all musicians in a great human orchestra, and it is now time to play the Save the World Symphony. You’re not required to play a solo, but you are required to know what your instrument is and play it as well as you can.
Thirty years ago, during our private conversation behind a gray, hospital curtain, while my friends waited in the hallway, my diagnosing physician assured me that, whatever the future held, he would take care of me. And he did. *Sandra, let’s grow old together*, he would often laugh. Growing old has been my life’s work as a cancer survivor.

But within that same conversation, my doctor also asked me some pointed questions about my possible past exposures to toxic chemicals. His questions that day let me know that bladder cancer is, by and large, an environmental disease. Understanding the public story of cancer became my life’s work as a biologist.

Ecologist, author, and cancer survivor Sandra Steingraber, PhD, is an internationally recognized authority on the environmental links to cancer and human health. This essay was first published by The People’s Picture Company in a pamphlet about the documentary film *Living Downstream*. For more information on Steingraber’s work, visit [http://steingraber.com](http://steingraber.com).
The Myth of Living Safely In a Toxic World

Essay by Sandra Steingraber

In the spring of 1997, after four years of research and writing, I published Living Downstream, a book that explored the relationship between human cancer and environmental contamination. Soon after, I was sent by my publisher on a two-week book tour that lasted a year and a half. It finally ended in September 1998 when I gave my last phone interview while sitting on a towel: I was in labor with my first child, and my water had just broken. I canceled an appearance in Boston that was scheduled for later that evening and headed to the hospital to give birth. Then I went on a self-declared maternity leave.

The eighteen months I spent on the road with Living Downstream formed an amazing journey. It was an odyssey that took me not only to bookstores, radio studios, and the sets of Hollywood talk shows, but to medical schools, college campuses, public libraries, church basements, union meeting halls, the floors of various state legislatures, and the headquarters of the Environmental Protection Agency. I met with university presidents, ministers, rabbis, pediatric oncologists, breast cancer activists, government scientists, business leaders, and elected officials—but mostly I talked with a lot of plain, ordinary folks. I spoke with mothers of children with brain tumors who lived near Superfund sites, Montana wheat farmers worried that herbicides had something to do with their high rates of lymphoma, student athletes curious about the pesticides used on the fields where they practiced, wealthy retirees wondering about the chemicals sprayed on their beloved golf courses, native women in Alaska who live near old military installations that leak PCBs, and sheep farmers in Ireland who suspected that insecticides were poisoning their drinking water.

In all these conversations, public and private, I became impressed with how deeply citizens are concerned with the question of how human health is connected to the health of our planet. The subject of my book was clearly a topic on a lot of people’s minds. On the other hand, I became equally impressed at the inability of many of my readers to imagine themselves taking action to redress their situation. Even among those wholly convinced that toxic chemicals were contributing to the growing burden of cancer and birth defects in their communities, few seemed to believe it was possible to bring about an end to their production, use, and disposal. Among the few who did, fewer still could imagine what they themselves could do to bring about such a change. It was as though the presence of harmful chemicals in our air, food, water, and bodies was an immutable fact of the human condition and not the result of short-sighted human decisions that could be modified or radically altered. “It’s just all so depressing,” many would sigh as I signed their books.

I didn’t know how to rescue my audiences from their own fatalistic thinking, and its manifestation during our discussions frustrated me. Perhaps because I’m a cancer survivor myself—I was diagnosed with bladder cancer at the age of 20—I view despair as a waste of time. Cancer patients learn to have
hope in desperate circumstances, and we don’t tend to surrender when the odds are stacked against us. If we could just bring this same damn-the-torpedoes attitude to our political lives, I thought, we would be a powerful force to reckon with. In this, I tend to side with my Canadian friend, the children’s singer Raffi, who argues that pessimism—with its smug presumption that solutions to our current predicament do not exist and cannot possibly lie just ahead of us—is a form of arrogance. “No new paradigm has ever sprung from the cynicism of arrested imagination,” writes Raffi in his autobiography. But I also began to see that another obstacle was preventing my readers from finding the courage to act on their convictions. I call it the myth of living safely in a toxic world.

It works like this. Environmental education in this country tends to focus on individual actions. From Earth Day pamphlets to college environmental science textbooks, we are exhorted to recycle, compost our food scraps, turn off the tap while brushing our teeth, and insulate our attics. If we are interested in protecting our own health against a toxic onslaught, we might be advised, say, to air out our freshly dry-cleaned suits before hanging them in the closet, or give up dry-cleaning altogether. We are not told how we might collectively persuade the dry-cleaning industry to switch over to nontoxic, wet-cleaning technology. (The dry-cleaning solvent perchloroethylene is a suspected carcinogen and a common contaminant of drinking water. In Ithaca, New York, where I live, the headlines this morning announce a final plan for remediating the contaminated soil and groundwater at one local dry-cleaning shop; the problem was first discovered ten years earlier. Such stories are replicated across the United States.)

Or consider the widespread contamination of ocean fish with mercury, which is now widely acknowledged as a threat to public health. The official response of our state and federal governments has been to warn the most vulnerable among us—pregnant and nursing mothers—to restrict their consumption of fish. Meanwhile, the industries responsible for creating the problem—coal-burning power plants, for example—are not warned to restrict their emissions of mercury.

This relentless attention to individual sacrifices seems almost unique to environmental issues. Other human troubles—shootings in schools, intoxicated drivers on the highway, cigarette addiction among teenagers—are widely understood as political problems requiring political solutions. Thus, a million moms march on Washington to demand changes in handgun regulations, Mothers Against Drunk Driving pushes for lower legal limits on blood alcohol levels, and tobacco advertising is restricted. We somehow understand that inviting individual citizens to just say no to firearms, liquor, and cigarettes isn’t the total solution.

In contrast, we pretend as if we can all live safely in a toxic world if we as individual consumers just give up enough stuff: stop eating meat, stop eating fish, stop drinking tap water, stop swimming in chlorinated pools, stop microwaving in plastic, swear off dairy products, remove shoes at the door so as not to track lawn chemicals into the living room, hand-wash silk blouses rather than drop them off at the dry-cleaners. Or worse yet, we pretend we can shop our way out of the environmental crisis: buy air filters, buy water filters, buy bottled water, buy pesticide-removing soaps for our vegetables, buy vitamin pills loaded with antioxidants to undo whatever damage we can’t avoid. It’s as though we all aspire to become the ecological equivalent of the boy in the bubble. No wonder people feel depressed.
Fortunately—and I do think it is fortunate—few of these lifestyle sacrifices actually offer much real protection for public health. The reason I think this is good news is that the sooner we quit trying to turn our bodies and homes into fortresses against toxic invasions, the sooner we’ll realize that we have no choice but to rise up and demand an end to the invasion. The hard fact is that we cannot opt out of the water cycle or the food chain.

Consider drinking water. You might think you can save yourself from exposures to carcinogens in tap water by purchasing bottled water. But the sense of safety offered by bottled water is a mirage. Because the industry is unregulated, there is no telling what’s actually in the bottle. It frequently contains trace contaminants. In some cases, it even is tap water. Moreover, it turns out that breathing, not drinking, constitutes our main route of exposure to volatile pollutants in tap water. This is because most of them—solvents, pesticides, by-products of water chlorination—easily evaporate. As soon as the toilet is flushed or the faucet turned on, these contaminants leave the water and enter the air. A recent study shows that the most efficient way of exposing yourself to chemical contaminants in tap water is to turn on a dishwasher. (This surprises you?) Drink a bottle of French water and then step into the shower for 10 minutes, and you’ve just received the exposure equivalent of a half-gallon of tap water. In short, we are all obligated to protect public drinking water, with which we enjoy the most intimate of relationships, whether we want to or not.

Well, then, I’ll just filter all the tap water coming into my house, you might be thinking here. Think again. Even if these gadgets worked perfectly—and they don’t—you are faced with changing them every three to six months. You’re left with a spent water filter laden with all the chemical toxics you’re determined to keep out of your own body. Now what are you going to do? Throw it in the trash so it can end up leaching in a landfill and contaminating someone else’s well? Or become a source of dioxin when it’s shoveled into an incinerator and lit on fire? Filters for tap water are nothing more than a way of playing an elaborate shell game with harmful chemicals.

Or consider breast milk, that most perfect form of infant nutrition, with its unsurpassed powers to boost IQ; fend off infectious diseases; encourage the development of the immune system; and prevent diabetes, allergies, and obesity. Because it exists at the top of the human food chain, mothers’ milk has become the most chemically contaminated of all human foods. It carries concentrations of organochlorine pollutants that are 10 to 20 times higher than cows’ milk. Indeed, prevailing levels of chemical contaminants in human milk often exceed legally allowable limits in commercial foodstuffs. Thus, on average, in industrialized countries, breast-fed infants ingest each day fifty times more PCBs, per pound of body weight, than do their parents. The same is true for dioxins.

We cannot ask newborns to become vegetarians. (Soy-based formula is far inferior to human milk. Even as chemically compromised as human breast milk is, breast-fed babies still end up smarter, healthier, less prone to leukemia, and exhibiting superior motor skills when compared to their formula-fed counterparts.) We could encourage their mothers to make such changes in their diet, but it turns out that the lifestyle approach to cleaning up breast milk is not very effective. Unless they are strict vegans, vegetarians have just as much dioxin in their fat tissues—from which breast milk is manufactured—
as meat-eaters. And even among those who forswear all animal products, veganism must be long standing—commencing a decade or more before a woman becomes pregnant—to result in meaningful declines in breast milk contamination. A Dutch study has compared macrobiotic mothers—whose protein sources come primarily from grains and legumes—with omnivorous mothers. The milk of macrobiotic mothers contained less PCBs, but their DDT levels were no different. Moreover, the nursing infants of macrobiotic mothers were still ingesting levels of contaminants that were two to eight times higher than the “allowable” daily intake.

On the other hand, political action works great to purify breast milk. I am pleased to report that average concentrations of certain key breast milk contaminants—DDT, PCBs, and dioxins—have declined dramatically since the ’70s. This improvement is a direct consequence of bans, tighter regulations, incinerator closings, emission reductions, permit denials, right-to-know laws, and tougher environmental enforcement. We nursing mothers owe a great debt to thousands of anonymous citizens from all around the world who worked to stop toxic pollution at its source.

The way we repay this debt—and continue the process of detoxification—is to stop distracting ourselves with individual sacrifices and get involved with the political struggle. Start by finding out what toxic chemicals are being released into your home community by visiting www.epa.gov/triexplorer and entering your zip code in the empty box. Then take a look at the President’s Cancer Panel Report, Reducing Environmental Cancer Risk: What We Can Do Now1. The panel felt so strongly about the evidence in the report that they took the unusual step of including a letter to the president in which they said that “the true burden of environmentally induced cancer has been grossly underestimated.”

Sit for a while with the new knowledge you gain from these two sources of information and notice what emotions and ideas come up for you. Ask yourself if we have a human rights problem here. Ask yourself how other human rights activists you admire once prevailed against formidable opponents—how women won the right to vote, how abolitionists succeeded in divorcing our economy from slave labor, how workers won the right to a weekend. I think you will find depression and cynicism soon yielding to inspiration and courage.

Ecologist, author, and cancer survivor Sandra Steingraber, PhD, is an internationally recognized authority on the environmental links to cancer and human health. This essay was adapted from a piece first published in 2001 by In These Times at www.InTheseTimes.com. For more information on Steingraber’s work, visit http://steingraber.com.

1 Available at http://deainfo.nci.nih.gov/advisory/pcp/annualReports/pcp08-09rpt/PCP_Report_08-09_508.pdf
The Public Story of Cancer

Discussion Questions for the Essay by Sandra Steingraber

The following questions are for use with “The Public Story of Cancer” by Sandra Steingraber, found on page 179 of this guide.

Q: In this reading and in the film and book Living Downstream, Steingraber discusses the personal secrecy and silence that surrounds cancer. Why do you think this secrecy and silence exist? What emotions arise for you as a reader when Steingraber breaks this silence through storytelling in the introduction of this essay?

Q: According to Steingraber, how might the private culture of cancer influence our assumptions about the causes of the disease?

A: Because cancer is diagnosed and treated in private spaces, we also think of its causation as occurring exclusively in the private and personal realms of life (i.e., our lifestyle choices or genes).

Q: How do both Steingraber’s style and message emphasize a vital interplay between the public and the personal when confronting cancer and its links to chemicals?

A: Because the story of cancer has both personal and public dimensions, Steingraber invokes these aspects through vivid scenes occurring in both spheres and by showing the reader how these spheres intertwine. Her message is that to achieve public change in the use of toxic chemicals, we must each play a part that begins with our personal passions and skills.

Q: Why does Steingraber say that “the public story of cancer is a hopeful one”? Do you see it this way?

A: Steingraber sees it as hopeful because (1) it is within our power to prevent cancer; (2) everything does not cause cancer—because most synthetic chemicals are derived from coal and petroleum, developing green energy sources will also help prevent cancer; and (3) the problem is so large that we all have a role in solving it.

Q: Has there been a time in your life when you kept silent about an issue you considered to be a private one? How did that silence affect you and the way you interacted with others and the world?

Q: Do you agree with Steingraber that we all have a role to play in cancer prevention and environmental protection? If so, what might your role be?
The Myth of Living Safely In a Toxic World

Discussion Questions for the Essay by Sandra Steingraber

The following questions are for use with “The Myth of Living Safely In a Toxic World” by Sandra Steingraber, found on page 183 of this guide.

Q: In this reading, and in both the book and the film Living Downstream, Steingraber invokes the fighting spirit typical of cancer survivors as an example of the energy and determination needed in the fight for the abolition of toxic chemicals. What are the differences and similarities between these two struggles? Why do you think Steingraber makes this comparison, and in your view, is it effective?

A: Some differences include that (1) individuals see themselves as exerting some control over their bodies, whereas they are often less likely to believe they have control over government, industry, and other entities responsible for the manufacture and use of toxic chemicals; (2) the struggle against cancer is a personal one whereas the struggle against toxic chemicals is collective; (3) the struggle against cancer has known stakes whereas the stakes in the struggle against toxic chemicals are not always clear; (4) the struggle against cancer typically has clearly defined medical and nonmedical interventions from which to choose whereas the struggle against toxic chemicals is not always as clearly defined and requires individuals to find their own way.

Some similarities include that (1) both struggles are directly related to our health as individuals; (2) both struggles can be all-encompassing; (3) each individual deals with these struggles in his or her own way; (4) each struggle is difficult and challenging, but also incredibly important; and (5) engaging in each struggle can change an individual’s view of him- or herself, his or her life, and the wider world.

Q: Steingraber describes some readers’ reactions as follows: “It was as though the presence of harmful chemicals in our air, food, water, and bodies was an immutable fact of the human condition and not the result of short-sighted human decisions that could be modified or radically altered.” Why might one have this reaction? In your opinion, how might this reaction differ from the reactions of those who have engaged in other social justice fights?

A: Readers might have this reaction because (1) many individuals cannot remember a time before chemicals were in large-scale use, (2) our use of chemicals is so ubiquitous that many people cannot imagine how we might live without them, and (3) the process by which we produce food and manufacture goods would have to undergo a radical shift to eliminate our dependency on toxic chemicals.
Q: What examples does Steingraber give of the individual actions we are told to take to reduce our exposure to toxic chemicals? Why does she say these actions are insufficient?
A: See essay for multiple examples, including the larger explanation that “we cannot opt out of the water cycle or the food chain.”

Q: Steingraber writes, “This relentless attention to individual sacrifices seems almost unique to environmental issues.” In your opinion, what might account for the differences in our approach to environmental issues, as compared to the other issues Steingraber mentions?
A: Some possible reasons for the differences in approach include (1) a lack of awareness about the severity of environmental issues, (2) a lack of scientific understanding among the general public that leads us to collectively discount scientific evidence of crises or to misunderstand the interactions between our bodies and environment, and (3) the personal messaging made prevalent early on by environmental organizations.

Q: Have you ever made changes in your personal life to protect yourself from chemical contaminants? Do you agree with Steingraber that these actions are insufficient? Why or why not? In what ways could you scale up your individual actions and turn them into public and political actions?

Q: Steingraber ends this essay with the following suggestion: “Ask yourself how other human rights activists you admire once prevailed against formidable opponents—how women won the right to vote, how abolitionists succeeded in divorcing our economy from slave labor, how workers won the right to a weekend.” What actions do you think helped these changes occur, and how might the same approaches be applied to the environmental movement?
PERSONAL STORYTELLING IN SOCIAL MOVEMENTS

ASSIGNMENTS

Expository Writing
Review of a Cancer Documentary

Some film critics say that a new subgenre of film is emerging: the cancer film. It is certainly true that there are many films (especially documentaries) that deal with cancer from a personal perspective. Some of these include *My Left Breast*, *A Healthy Baby Girl*, and *Crazy Sexy Cancer*. Write a review of a documentary film that deals with cancer from a personal perspective. Comment on the film’s strengths and weaknesses, whether and how it helps to illuminate the personal experience of cancer, and whether and how it makes a political statement.

Creative Writing
Personal Storytelling in a Social Movement

Select a social movement for which personal storytelling has been important. Research the use of personal stories in that movement, including the types of stories told, the forms used to present these stories (e.g., public service announcement, protest song, political speech), and the creative techniques employed. Using a storytelling approach that fits the patterns you uncovered, create a piece that tells your personal story in relation to the same movement. At the end of your piece, include a brief summary of the creative decisions you made and how these decisions were informed by your research.

Scientific Analysis
Report on the Value of Anecdotal Evidence

Sandra Steingraber has said that statisticians are fond of telling us that “the plural of *anecdote* is not *data*,” meaning that the personal stories of several individuals do not amount to scientific evidence. But is there a place for anecdotal evidence in science? Research the value of anecdotal evidence to scientific study and write a report summarizing your findings.

Lab/Field Research
Autobiographical Essay through Chemical Exposures

Create a personal timeline running from the year you were conceived to the present. Along this timeline, list the locations that were dominant in your life (such as residences, schools, workplaces, a grandparent’s house, a local playground, etc.). Using the toxics release data available in your country, search the zip or postal codes associated with each of these locations and compile information on what toxic chemicals were released in each of these areas during the years you were there. If possible, contact
a professional laboratory equipped to conduct chemical body burden testing and arrange to have your blood, urine, saliva, hair, and/or tissue samples analyzed. Research the potential health effects of the most prominent chemicals identified in the toxics release data or your body burden analysis. Using the information you collect, write a personal and scientifically accurate essay that both presents your autobiography through the lens of chemical exposures and also advocates for any changes you feel are necessary based on the data.

Possible resources

- US EPA Toxics Release Inventory at [www.epa.gov/tri](http://www.epa.gov/tri)
- Potential analytic labs
  - Axyz Analytical Services Ltd. in Canada at [www.axysanalytical.com](http://www.axysanalytical.com)
- Examples of scientifically grounded personal writing related to social movements:
  - *Silent Snow: The Slow Poisoning of the Arctic* by Marla Cone
  - *When Smoke Ran Like Water: Tales of Environmental Deception and the Battle Against Pollution* by Devra Davis
  - Any writing by Sandra Steingraber, including *Raising Elijah: Protecting Our Children in an Age of Environmental Crisis* and *Having Faith: An Ecologist Mother’s Journey to Motherhood*

**Oral Presentation**

*Speech That Breaks the Silence about Environment or Health*

In one of the final scenes of *Living Downstream*, Steingraber delivers a speech in which she tells of her ambiguous test results, in order to break the silence about this taboo topic. Drawing on your own personal experiences, write and deliver a speech designed to break the silence about a subject related to environment or health that you believe to be taboo in your community.

**Multimedia Project**

*Retelling of a Personal Story That Created Social Change*

Select one personal story that helped to create social change in the past. The story could have been communicated in any form—a published book or article, a speech, a piece of televised investigative journalism, a popular film, or some informal presentation. Create a multimedia retelling of the story in which you highlight its social impact. Examples of possible stories include those of Rosa Parks, whose refusal to sit at the back of a bus became a symbol for the US civil rights movement; former US First Lady Betty Ford, whose public disclosure of her breast cancer diagnosis decreased the silence and stigma surrounding the disease; and retired waitress Heather Crowe, who contracted lung cancer from workplace exposure to second-hand smoke and used her story to advocate for bans on workplace smoking in Canada.
Community Engagement

Compilation and Analysis of Personal Stories in a Social Movement

Select a social movement of importance to you. Alone or in a group, interview people who have personal stories that further the message of this movement. With each subject’s permission, create a compilation of these stories, including a larger social analysis of the issues, and present it to your school community.
Public Change in Environmental Health

Assignments

**Expository Writing**

*Essay Comparing Cancer Prevention Strategies*

Write a comparative essay that explores the differences between personal cancer prevention strategies and public health cancer prevention strategies. In your essay answer the following questions: Where has society’s focus been in recent years and why? What would be the possible outcomes of changing our approach?

**Creative Writing**

*Correspondence Debating Personal Action versus Public Action*

Many individuals feel they can take responsibility only for protecting themselves and their families from toxic chemicals—through the products they buy and the personal activities they pursue. Others (including Sandra Steingraber) suggest that personal action must be accompanied by public action to prevent toxicants from entering the environment in the first place, and that without public-level change, none of us can truly protect ourselves. Adopting each perspective in turn, write a series of imaginary letters or emails between two friends or colleagues debating a personal approach versus a personal-plus-public approach.

**Scientific Analysis**

*Pamphlet for the Public on Existing Evidence*

Many of the individuals featured in the film believe that scientists should speak publicly about their findings if these findings could have a social impact. But other individuals believe scientists have the responsibility only to conduct research and to publish their findings in professional journals. Select an environmental health topic of interest to you and familiarize yourself with the body of available scientific evidence. Compare the evidence presented in the scientific literature with the evidence presented in popular science and current affairs publications. Create a pamphlet intended for the general public that summarizes the scientific evidence as you understand it and write a brief explanation of your work, explaining the differences and similarities between your pamphlet and the existing materials created for the general public.
Lab/Field Research

*Research Aide in Science for Public Policy*

Today, many national and international groups work at the intersection of science and public policy. Some, like the Silent Spring Institute, are conducting scientific research in the hopes of affecting policy change. Others, like the Environmental Working Group, are working to change policy by, in part, conducting targeted scientific experiments (often analyzing specific products for their toxic contents). There are also many researchers and organizations working at the local level to achieve similar goals. Research the work being done in your community at the intersection of science and public policy. Volunteer to assist in the scientific research currently being done by one group. Once you have completed your volunteer assignment, write a report outlining the goals and methods of the research, your contributions and observations, and the lessons you learned from participating in a professional scientific study.

Oral Presentation

*Narrative on Policy Change in Public Health*

Select a public health policy of interest to you. Some possibilities include bans on smoking in public places, the use of vaccines to prevent childhood illnesses, and the addition of chlorine to water as a disinfectant. Research its evolution from the idea stage and early arguments against the policy change to its implementation. Create an oral presentation that tells the story of the policy change in narrative form. In your story, be sure to include the characters, events, and revelations that led to the policy change. Provide an update on the benefits and drawbacks we are currently experiencing because of the change.

Multimedia Project

*Presentation on Differences between Personal Change and Public Change*

Drawing on environmental health issues, create a multimedia presentation that explains the difference between personal change (efforts to protect oneself and one’s family from toxic exposures) and public change (efforts to protect the larger community by halting the manufacture and use of toxic chemicals). Employ dynamic content and visuals to engage a general audience. Include detailed explanations of the two approaches and their benefits, a reflection on their prevalence in society, and practical examples of each.

Community Engagement

*Event to Promote a Public Change*

Consider the role you could play in the symphony Steingraber describes in “The Public Story of Cancer.” Using your interests, talents, and skills as a starting point, identify a public change you believe
should happen in your community. Research other communities that have made similar changes and map out the first steps that should be taken. Organize an event to promote these changes within your community and invite your classmates and instructor. Write a brief report on the research and work you completed, what your next steps would be in this project, and whether your work changed the minds of anyone in your community (including your own).
Comparing Personal Action to Public Action

Info Sheet

Throughout history, social movements have called on ordinary individuals to take action for change. But citizen action can take many forms, and debates about what constitutes appropriate and productive action have played out in every social movement. For example, Dr. Martin Luther King Jr. and Malcolm X were both influential leaders during the US civil rights movement of the 1960s, yet they had vastly different ideas about what action should be taken: while King preached nonviolence, Malcolm X advocated for the use of force.

The contemporary environmental movement has typically focused on encouraging individuals to make changes in their personal lives to protect the environment. From recycling newspapers to planting trees, many experts believe that the most effective way to inspire individuals to work for large-scale public change is to first encourage them to make smaller scale changes in their personal lives. This approach has also taken hold in the growing environmental health movement. It similarly sees personal action (such as buying organic food or cleaning one’s home with nontoxic products) as a gateway to public action (such as increasing community access to organic food or advocating to government for legislation against the toxics in chemical cleaners).

However, some experts, like Sandra Steingraber (author of Living Downstream) and Andrew Szasz (author of Shopping Our Way to Safety), believe that the opposite is true: individuals who start by making change in only their personal lives often begin to feel protected from toxic chemicals and other environmental pollutants, making them less likely to take larger scale action. But personal actions provide little protection from toxic chemicals. Buying nontoxic cleaning products to clean one’s home, for example, does not alter the fact that toxic cleaning products are being used in other places we might frequent, such as workplaces; churches; schools; and the homes of friends, neighbors, and relatives. Nor does it alter the fact that a much broader range of toxics is being manufactured and used on a global scale. We are not able to escape these toxicants, as they can travel vast distances through our air, food, and water—those things necessary for all life.

Steingraber argues that we must broaden our focus by simultaneously working for change at home and in the larger community. To illustrate this point, she sometimes refers to another social movement: the abolition of slavery. Abolitionists knew that personal actions alone would not suffice: it was not enough to simply say I will not buy a slave. Working for abolition also meant publishing abolitionist literature in an effort to educate the public, running the Underground Railroad in an effort to free individual slaves, and working at the legislative level to end the legal practice of owning slaves.
The following chart presents examples of environmental health concerns. Each concern is followed by potential personal and public actions, thereby highlighting the difference between the two types of actions and illustrating why both are required for large-scale social change.

<table>
<thead>
<tr>
<th>Many institutions in our communities run cafeterias that provide fatty, processed, and chemically produced foods. These foods contribute to obesity, Type 2 diabetes, and heart disease.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERSONAL ACTION</strong></td>
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<tr>
<td>Avoid purchasing cafeteria foods. Instead, make meals using fresh, organic ingredients whenever possible. When eating prepared food from the cafeteria, select the freshest, healthiest meals available. Ask cafeteria staff about the food's origins and nutritional value.</td>
</tr>
</tbody>
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<tr>
<th>A school's art supplies—as well as its cleaning products, carpeting, and lawn care products—are often toxic.</th>
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<tbody>
<tr>
<td><strong>PERSONAL ACTION</strong></td>
</tr>
<tr>
<td>If you are feeling unwell at school, make note of any symptoms experienced and where they occur, as well as any other observations that may be significant (time of day, weather, temperature, odors, maintenance or cleaning occurring around you). Try to avoid those places whenever possible and register a hazards complaint with the instructor and the administration.</td>
</tr>
</tbody>
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There are potentially hundreds of contaminants in our drinking water. And yet, in the US, enforceable limits exist for only 90. In Canada, there are no mandatory national drinking water standards at all—only unenforceable guidelines.

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<tr>
<th>PERSONAL ACTION</th>
<th>PUBLIC ACTION</th>
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<tbody>
<tr>
<td>Choose to use tap water anyway—for drinking and other uses. Although it might seem safer, bottled water is not as carefully monitored as tap water, and bottling and shipping water only increase the contamination of the environment, ultimately degrading tap water further.</td>
<td>Contact your elected representatives to ask for stricter water safety regulations, including lower maximum contaminant levels for toxic chemicals and more enforceable drinking water standards.</td>
</tr>
</tbody>
</table>

Fragrances in many cosmetics, personal care products, and cleaners contain chemicals that are neurotoxicants or hormone disruptors. However, because fragrances are considered trade secrets, manufacturers do not have to reveal their contents.

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<tr>
<th>PERSONAL ACTION</th>
<th>PUBLIC ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase products without added fragrances or other potential toxicants.</td>
<td>Write letters to the cosmetics, personal care, and home care product manufacturers, emphasizing the dangers of toxic chemicals and their health and liability risks and asking for an immediate end to their use of toxic chemicals.</td>
</tr>
</tbody>
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Personal Storytelling in the Cancer Movement

The Cancer Journals
A memoir exploring the political dimensions of breast cancer through the author's own experience of the disease. Using a blend of journal entries, prose, and poetry, Lorde reveals her distinct perspectives and observations as a black lesbian feminist.

Crazy Sexy Cancer
Director Kris Carr, Cactus Three, 2007, 89 min
A documentary film billed as “irreverent and uplifting.” It follows US filmmaker and actress Kris Carr as she searches for a cure for her rare form of cancer. The film focuses on one individual’s struggle with cancer as a life-changing experience.

My Left Breast
Director Gerry Rogers, Pope Productions, 2002, 57 min
A documentary film following Canadian filmmaker Gerry Rogers as she undergoes chemotherapy for breast cancer. Rogers, an acclaimed feminist filmmaker, presents a personal portrait that is richly emotive and galvanizing, though not directly political.

Patient No More: The Politics of Breast Cancer
By Sharon Batt, Gynergy, 1994
A book presenting an examination of the politics of breast cancer, interwoven with the author's own personal experience as a breast cancer patient. From treatments to charities and from medical coverage to political activism, Batt’s book covers significant ground.

Autobiography of a Face
By Lucy Grealy, Harper Perennial, 2003
A poignant and poetic memoir about the author’s struggle with childhood cancer, which led to the

removal of part of her jaw, and her subsequent surgical attempts to avoid “looking different from everyone else.”

**PERSONAL STORYTELLING IN THE ENVIRONMENTAL HEALTH MOVEMENT**

**“Chasing the Cancer Answer”**
Producer Michael Gruzuk, *CBC Marketplace*, March 2006, 44 min

An episode of a consumer-affairs program. This documentary investigates the lack of attention being paid to cancer prevention. It was created by Canadian broadcast journalist Wendy Mesley, who was diagnosed with breast cancer even though she lived a healthy lifestyle. Strongly critical of the Canadian Cancer Society’s silence on environmental links to cancer, it stirred up a great deal of public response, which has been credited with inspiring the organization to become a vocal advocate for the prevention of environmental cancers, including encouraging provincial bans on nonessential pesticides. Full video available at [www.cbc.ca/marketplace/pre-2007/files/health/cancer](http://www.cbc.ca/marketplace/pre-2007/files/health/cancer).

**Having Faith: An Ecologist’s Journey to Motherhood**
By Sandra Steingraber, Berkley Publishing Group, 2003

A month-by-month memoir covering the time period from the author’s realization she is pregnant to childbirth and into her newborn daughter’s first months of life. Woven into the personal stories is an exploration of a range of scientific discoveries about genetics, embryonic development, and mothers’ health—as well as the alarming extent to which environmental hazards threaten each stage of infant development.

**A Healthy Baby Girl**
Director Judith Helfand, ITVS, 1996, 57 min

A personal documentary film focused on the experiences of filmmaker Judith Helfand. In 1963, Helfand’s mother was prescribed diethylstilbestrol (DES)—a pharmaceutical hormone intended to prevent miscarriage. But when Helfand was twenty-five, she was diagnosed with DES-related cervical cancer. She made this touching film after her radical hysterectomy as a way to explore the impact of the carcinogen on her life.

**Lake Effect: Two Sisters and a Town’s Toxic Legacy**
By Nancy A. Nichols, Island Press, 2010

A personal story set on the edge of Lake Michigan in Waukegan, Illinois. Written by a journalist who had pancreatic cancer and whose sister died of ovarian cancer, this book is an investigation into whether the town’s industrial surroundings might have led to the sisters’ illnesses.
**Raising Elijah: Protecting Our Children in an Age of Environmental Crisis**  
By Sandra Steingraber, Da Capo, 2011  

A funny and touching book written from the author’s perspective as an ecologist and the mother of two young children. This memoir, both personal and scientific, is a celebration of Steingraber’s children’s lives and a search for ways to protect them—and all children—from the toxic, climate-threatened world they inhabit.

**Refuge: An Unnatural History of Family and Place**  
By Terry Tempest Williams, Vintage, 1992  

A memoir detailing the author’s experience of her mother’s death from cancer and the flooding of the Bear River Migratory Bird Refuge. This personal narrative speaks to environmental, family, and women’s issues.

**The Seasons on Henry’s Farm: A Year of Food and Life on a Sustainable Farm**  
By Terra Brockman, Agate, 2009  

A week-by-week account of life on an organic farm in central Illinois. Written by the farmer’s sister, this personal book includes photographs, recipes, and a strong argument for local food grown without the use of chemicals and following the rhythm of nature.

**Toxic Trespass: How Safe Are Your Children?**  
Director Barri Cohen, If You Love Our Children Productions and National Film Board of Canada, 2007, 81 min  

A documentary film that begins when filmmaker Barri Cohen learns that her young daughter’s blood contains carcinogens including benzene and DDT. With her crew, Cohen travels to Canadian cities known for their chemical contamination to learn more about the health effects suffered by the residents—and what ordinary citizens are doing about it.

**Walden**  
By Henry David Thoreau, Ticknor and Fields, 1854  

A memoir of the two years Thoreau spent in a cabin in the woods near Walden Pond on the outskirts of Concord, Massachusetts. A critique and exploration of modern society, the book is a tribute to conservation, self-sufficiency, and simple living. While it predates the environmental health movement, Thoreau’s book is often referred to as an environmental memoir and is considered a classic of American literature.
**When Smoke Ran Like Water: Tales of Environmental Deception and the Battle against Pollution**
By Devra Davis, Basic Books, 2002

A memoir, written by a leading cancer epidemiologist, documenting the author's struggles against environmental contamination. Beginning with the toxic fog that forced the relocation of the residents of her hometown of Denora, Pennsylvania, Davis takes us through a personal and scientific argument for stronger environmental health protections.

**EXAMINING THE USE OF STORYTELLING IN SOCIAL MOVEMENTS**

“Art as Community Narrative: A Resource for Social Change”

A chapter looking at the narratives contained in the art of communities and the ways in which these narratives help to mirror and alter the personal and collective lives of their communities. Written by two professors of psychology.

“How Effective Is Personal Storytelling? Strategic Insights from Social Movement Theory”

An article that considers the effects of personal storytelling on social movements. The author addresses both the benefits of personal storytelling and the ways in which it might harm social movements.

**It Was Like a Fever: Storytelling in Protest and Politics**
By Francesca Polletta, University of Chicago Press, 2006

A book that explores the ways in which stories have been used in political and social movements and the effect that storytelling has had. Polletta uses a range of examples, from the tax revolts of history to the present-day conflicts over the appropriate memorials for the victims of the World Trade Center tragedy.

“The Personal Is Political”
By Carol Hanisch, in *Notes from the Second Year: Women’s Liberation, Radical Feminism*, 1970

An article that has been hailed as a classic of the women's movement in the United States. It was written to answer the critics of feminist consciousness-raising groups that were meeting at the time. The author explains that the sessions, in which women share their personal experiences and problems “are a form of political action.” Full text (with an introduction written in 2006) available at [www.carolhanisch.org/CHwritings/PIP.html](http://www.carolhanisch.org/CHwritings/PIP.html).
Storytelling for Social Justice: Connecting Narrative and the Arts in Antiracist Teaching
By Lee Anne Bell, Routledge, 2010

A book aimed at educators who have struggled in their attempts to address racial issues in the classroom. It presents storytelling not only as a human experience but also as an analytic tool for addressing the issue of racism. The book will also be of interest to those studying the social sciences and those interested in the potential social impact of storytelling. The author is a professor of education at Barnard College.
PUBLIC CHANGE IN ENVIRONMENTAL HEALTH

RESOURCE LIST

RESEARCHERS WHOSE WORK LED TO CHANGES IN PUBLIC HEALTH

“Map Stops Cholera: John Snow’s Map of London”
By Matt Rosenberg, About.com
An article that tells the story of the 1855 cholera epidemic in London, which a physician named John Snow was able to trace back to a single water pump. For his innovative work, Snow has been called the father of modern epidemiology. Full text available at www.geography.about.com/cs/medicalgeography/a/cholera.htm.

“Percivall Pott (1714–1788) and Chimney Sweepers’ Cancer of the Scrotum”
By John R. Brown and John L. Thornton, British Journal of Industrial Medicine, January 1957 (Vol. 14, Issue 1), pp. 68–70
An article profiling the life and work of Percivall Pott, a British surgeon who identified the first occupational cancer: cancer of the scrotum in chimney sweeps. This article includes the text of the original essay written by Pott about chimney sweepers’ increased risk for scrotal cancer. Full text available at www.ncbi.nlm.nih.gov/pmc/articles/PMC1037746.

“Ramazzini and Workers’ Health”
An article about Bernardino Ramazzini, a seventeenth-century Italian physician who dedicated his professional life to the study of occupational disorders. Ramazzini was able to identify over fifty occupations that were linked to specific disorders, including miners, chemists, and tobacco workers. Ramazzini is sometimes referred to as the father of occupational medicine. Full text available at http://155.185.2.46/immagini4/lancet354_99_858.pdf.

PERSPECTIVES ON CREATING CHANGE IN THE ENVIRONMENTAL HEALTH MOVEMENT

Break Through: Why We Can't Leave Saving the Planet to Environmentalists
This book makes the case that environmentalists have focused too much on problems and not enough on solutions. It also argues that the public and the politicians will begin working to solve environmental
issues only once these issues have been framed within the larger contexts of health, society, and human progress. Shellenberger and Nordhaus are career environmentalists and founders of the Breakthrough Institute, a public policy think tank focusing on energy and climate challenges.

*EcoMind: Changing the Way We Think, to Create the World We Want*
By Frances Moore Lappé, Nation Books, 2011

A book that coalesces research from a range of fields, including anthropology and neuroscience, to argue that the biggest environmental challenge is—in the words of the publisher—“our faulty way of thinking.” Lappé is the cofounder of the Small Planet Institute, which works to increase understanding of the root causes of global social and environmental problems.

“How Do We Live with What We Know?”
By Rebecca Gasior Altman, *The Networker*, 2011 (Vol. 16, No. 7)

A personal essay resulting from the author’s exploration of the title question. Written by a community health educator at Tufts University, this piece draws on the writings and research of several leading thinkers in the areas of environmental psychology. Full text available at [www.sehn.org/Volume_16-7.html](http://www.sehn.org/Volume_16-7.html).

*Shopping Our Way to Safety: How We Changed from Protecting the Environment to Protecting Ourselves*
By Andrew Szasz, University of Minnesota Press, 2007

A book that examines Americans’ reactions to the health threats of toxic substances in food, air, water, and consumer products. Szasz, the former chair of the sociology department at the University of California, Santa Cruz, describes how we attempt to purchase products that make us safe as individuals rather than pushing for policy change that makes us collectively safer. The author concludes that these individual consumer actions actually end up making us less safe—both as individuals and as communities.

**Organizations Working for Public Change**

**Breast Cancer Action**
[www.bcaction.org](http://www.bcaction.org)

A membership-based organization that works to end the breast cancer epidemic by providing information, organizing people, and advocating for policy changes directed at achieving true prevention through understanding and eliminating the causes of breast cancer.

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1 The descriptions in this section use wording that has been drawn in large part from the organizations’ websites.
Breast Cancer Fund  
www.breastcancerfund.org

A prevention-based organization that responds to the public health crisis of breast cancer by identifying—and advocating for the elimination of—the environmental and other preventable causes of the disease.

Campaign for Safe Cosmetics  
www.safecosmetics.org

A coalition that works with over 100 organizations, 1,300 companies, and thousands of grassroots supporters in seeking to secure the corporate, regulatory, and legislative reforms necessary to eliminate dangerous chemicals from cosmetics and personal care products.

Canadian Association of Physicians for the Environment  
www.cape.ca

A membership organization for health professionals that works to protect the environment in order to protect human health.

Canadians for a Safe Learning Environment  
www.casle.ca

A registered charity that works to improve the condition of school buildings and the products and practices used in schools.

Food & Water Watch  
www.foodandwaterwatch.org

A nonprofit organization that advocates for commonsense policies that will result in healthy, safe food and access to safe and affordable drinking water. Because everyone is dependent on these shared resources, this group believes that it is essential that they be regulated in the public interest rather than for private gain.

Health and Environment Alliance  
www.env-health.org

A European coalition of over sixty-five international and national organizations addressing how the environment affects health in the European Union.
Health Care Without Harm
www.noharm.org

An international organization working to implement ecologically sound and healthy alternatives to health-care practices that pollute the environment and contribute to disease.

Healthy Building Network
www.healthybuilding.net

A national network dedicated to transforming the market for building materials to advance the best environmental, health, and social principles.

Physicians for Social Responsibility
www.psr.org

A medical and public health voice that works to prevent the use or spread of nuclear weapons and to slow, stop, and reverse global warming and the toxic degradation of the environment.

Women's Healthy Environments Network
www.womenshealthyenvironments.ca

A Canadian nonprofit organization whose mission is to connect women to the vital information and tools necessary for taking preventative action.

Women's Voices for the Earth
www.womensvoices.org

A national organization that works to eliminate toxic chemicals that impact women's health by changing consumer behaviors, corporate practices, and government policies.
**Living Downstream** is being used as an educational resource in a wide array of disciplines. While detailed lesson plans have been provided to support exploration of some of the main topics presented in the film, there are countless other uses for both the film and book.

The three lesson ideas below, complete with viewing and reading options, are examples of how instructors might use *Living Downstream* as complementary resources to existing units of study.

**TIP** Discussion questions for the film begin on page 33, discussion questions for the book begin on page 63, and discussion questions for the mini docs are found throughout the mini docs section, beginning on page 79.

1. **Proving a Link between Chemicals and Cancer**

Throughout the book *Living Downstream*, Sandra Steingraber addresses the numerous difficulties facing scientists investigating the links between synthetic chemicals and human cancer. The difficulties make it impossible to prove a direct causal relationship and raise questions about how much evidence is enough to justify precautionary action, as explored in the film.

**Learning Objectives**

- to understand why it is so difficult to prove a direct causal relationship between synthetic chemicals and human cancer
- to explore the following questions asked by Steingraber in the film: “How much evidence do you want before you begin to do something different? . . . And who gets to decide?”
Recommended Viewing

- *Living Downstream* (feature-length film or one-hour version)
- scene 4: “A Possible Cancer Cluster” (3 min, 12 sec) (scene 4 in the one-hour version)
- mini doc: *What Causes Cancer?* (3 min, 30 sec)
- mini doc: *What Is the Precautionary Principle?* (6 min, 46 sec)

Recommended Reading

- *Living Downstream* by Sandra Steingraber, pages 11–15, for a comparison of the challenges of investigating the harm caused by DDT and the harm caused by atrazine
- *Living Downstream* by Sandra Steingraber, pages 70–78, for the reasons why epidemiological studies cannot prove direct causal linkages
- *Living Downstream* by Sandra Steingraber, pages 127–133, for the problems with conducting laboratory tests on animals and cells

2. The Evolving Understanding of Cancer Causation

Our understanding of the way cancer is created has changed significantly over the past fifty years. According to Steingraber, this new understanding is helping scientists see more clearly the role toxic chemicals may be playing. She states, however, that two narratives are now competing for our attention: that of the new science and that of the old.

Learning Objectives

- to explore the various causes of cancer and to understand the potential interplay between them
- to compare the two narratives of cancer causation and to assess their validity

Recommended Viewing

- *Living Downstream* (feature-length film or one-hour version)
- scene 19: “Children’s Vulnerability to Chemicals” (1 min, 3 sec) (scene 16 in the one-hour version, however note that it is significantly abbreviated in this version)
- scene 20: “Atrazine, Rats, and Linda Birnbaum, PhD” (2 min, 40 sec) (scene 17 in the one-hour version)
- mini doc: *What Causes Cancer?* (3 min, 30 sec)

Recommended Reading

- *Living Downstream* by Sandra Steingraber, “Chapter 11: Our Bodies, Inscribed,” to examine
the way cancer is made and the ways in which chemicals can contribute to this process

• *Living Downstream* by Sandra Steingraber, “Chapter 12: Ecological Roots,” to examine the knowledge we already possess linking chemicals to cancer at the cellular level, followed by a discussion of what Steingraber considers the obstacles to preventing environmental cancers

• “A Bridge to Somewhere: Responding to the President’s Cancer Panel Report (Part 3),” by Sandra Steingraber, *Sandra’s Weekly Essays* at [www.livingdownstream.com/essays/bridge_somewhere_part3](http://www.livingdownstream.com/essays/bridge_somewhere_part3), to examine the conclusions reached by the US President’s Cancer Panel in comparison to the American Cancer Society’s stance on environmental links to cancer

3. *Living Downstream* as Feminist Literature and Cinema

*Living Downstream* draws on Steingraber’s intimate personal story as a way to explore the larger political issue of the environmental causes of cancer. The sharing of women’s personal stories to validate individual experience, reflect on social problems, and effect public change has long been a tradition in the feminist movement. As such, both the book and the film lend themselves to examination and analysis from a feminist perspective.

**Learning Objectives**

• to explore *Living Downstream*—both book and film—through the lens of feminism

• to assess the relevance of environmental health issues to the women’s movement

**Viewing Options**

• *Living Downstream* (feature-length film or one-hour version)

• scene 23: “Sandra Speaks about Breast Milk” (2 min, 50 sec) (scene 19 in the one-hour version)

• scene compilation: “The Personal Experience of Cancer” (20 min, 31 sec)

• scene compilation: “Rachel Carson and Our Chemicals Policy” (16 min, 27 sec)

• scene compilation: “A Human Rights Issue” (28 min, 13 sec)

• mini doc: *Who Is Most Vulnerable?* (6 min)

**Recommended Reading**

• *Living Downstream* by Sandra Steingraber, “Chapter 6: Animals,” for an exploration of Steingraber’s personal experience of cancer and a discussion on a range of women’s health issues, including breast cancer research and the effect chemicals may be having on breast development

• “Earth Day—The View from the F Terminal,” by Sandra Steingraber, *Sandra’s Weekly Essays* at [www.livingdownstream.com/essays/earth_day](http://www.livingdownstream.com/essays/earth_day), for an exploration of Earth Day in
Resources for Environmental Educators

Association for the Study of Literature & Environment
www.asle.org

An organization in the field of literature and the environment whose members include educators, students, scientists, and independent scholars. ASLE sponsors conferences, discussions, and panels, and publishes ISLE: Interdisciplinary Studies in Literature and Environment, a professional journal.

Center for Ecoliteracy
www.ecoliteracy.org

An organization best known for its pioneering work with school gardens, school lunches, and integrating ecological principles of sustainability into school curricula. The website offers hundreds of resource materials, including practical guides for educators and essays by leading writers and experts.

Environmental Health News
www.environmentalhealthnews.org

A free syndication service whose mission is to advance the public’s understanding of environmental health issues by publishing its own journalism and by providing access to worldwide news on subjects related to the environment and the health of humans, wildlife, and ecosystems.

1 This section includes wording that has been drawn in large part from the resources' official descriptions.
Green Teacher
www.greenteacher.com

A magazine that helps educators enhance environmental and global education inside and outside of schools. It contains fifty pages of ideas and activities, four times a year.

North American Association for Environmental Education
www.naee.net

An association that aims to advance environmental education and support environmental educators in Canada, the United States, and Mexico.

Ontario EcoSchools
http://ontarioecoschools.org

An environmental education and certification program for grades K–12, helping school communities develop both ecological literacy and environmental practices to become environmentally responsible citizens and reduce the ecological footprint of schools. Although the program focuses specifically on the province of Ontario, educators in both the US and Canada will find useful information on this site, including program guides, best practices, and curriculum resources.

Place-Based Education: Connecting Classrooms and Communities
By David Sobel, Orion Society, 2004

A guide that uses academic research, practical examples, and step-by-step strategies to help teachers emphasize the connection of school, community, and environment.
Effecting Change Beyond the Classroom

“Teaching about the environmental crisis is critical. But learning about the problems without enacting the solutions can be depressing—both for students and educators. Schools are institutions that can be early adopters of green technologies and green ideas. Let’s encourage learning not only in the classroom, but also through the process of transforming the wider school community.”

~ Sandra Steingraber

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How to Create Lasting Change

After watching *Living Downstream* and learning more about environmental health, many educators and students will be motivated to take action—to play a role in reducing our collective dependency on toxic chemicals. Working for change is an exciting way to apply learning, develop new skills, and build a better world. And the school community is the perfect place to begin.

Educational institutions have often been at the forefront of social movements. The passion many students have for issues of social justice and the access many schools have to cutting-edge research, knowledge, and resources provide the right combination for making a significant impact. Furthermore, schools have immense power to influence new generations and to set an example for the wider community.

**TIP**

This section outlines five large-scale actions that educators and students can implement at school, beginning on page 227. For other ways to inspire change at school or in the larger community, see *Living Downstream ~ In the Community*, available for download at www.livingdownstream.com/guides.

The principles that follow have guided the work of many successful grassroots groups. They are at the heart of the actions outlined throughout this section. Whether you choose to take on one of the suggested projects or begin your own, these recommendations will assist you and your group in leading school-wide change.

**Focus on Meaningful Public Actions**

*Action* means different things to different people. Many institutions and organizations concerned with public health encourage individuals to take personal action—like supporting sustainable farming practices by buying organic food. While making personal choices that embody one’s values is important, it is public action—such as instituting an organics purchasing policy at school—that will create the systemic changes that are needed.

Select an aspect of environmental health that is important to your group and relevant to your school community (good food, protected water, safe products, etc.). Determine what public action would be most effective in creating the change you seek. Remain focused on the ultimate goal throughout the process.
Choose an Action That Leaves a Legacy

We are often tempted to implement one-off activities, such as a cleanup of the local conservation area, a rally in support of environmental legislation, or even a documentary film screening. But one-off activities alone cannot sustain lasting change. The most successful actions are, therefore, long-term projects.

Take the time to select your action based on an assessment of the school’s needs and the interests and skills of the individuals who will participate in the effort. Make a collective commitment of time, energy, and financial resources to the work ahead.

Use the Three-Step Process

Enacting social change takes time. It requires a shift in individual and collective thoughts, beliefs, and actions. It requires a revision of the systems and processes already in place. Therefore, actions that are enacted through several steps will have the greatest potential in effecting change.

Move through your chosen action, completing each of three critical steps:

1. **Learn** about environmental health, related problems facing the school community, possible solutions, and actions taken by other schools and communities.
2. **Share** the information learned—as well as a chosen goal and the planned action—in order to raise awareness and generate support for the work ahead.
3. **Change** practices and positions at your school, making it a model of what can be achieved through a collaborative, large-scale effort.

**TIP**

Individuals hoping to create change often choose to hold one or more public events. For example, screenings of *Living Downstream* can be used during any of the three steps. (For tips on organizing a public screening of the film, see page 239.) While it’s only one small part of the process outlined above, an event can be a useful and energizing way to spark interest in learning about an issue, to encourage sharing of information, and to celebrate the changes that have been made.

Tap Into Existing Knowledge and Support

Whatever the goal, it has likely been achieved by someone else before. Learning from the experience of others will save time and will provide new knowledge and understanding.

Contact groups and individuals who have taken similar actions. Invite them to share the lessons they have learned, the processes they have undertaken, and the successes they have had. Some potential sources of knowledge and support have been included for each of the actions that follow.
Work with Others

Making school-wide change requires the collaboration and assistance of a number of different parties. The more people are involved in your work, the more invested the community will feel in its success.

Assess which individuals and groups (in the school and in the wider community) should be included in the project. There are four types of groups and individuals to involve:

a. **Collaborators:** Large-scale actions, like those described in the pages that follow, cannot be effectively implemented by one person alone. In order to be successful, you must work in collaboration with others. For example, the suggested actions would be ideal projects for an established group, such as an extracurricular club, campus organization, student governance group, or office of sustainability.

b. **Stakeholders:** Educational institutions are large communities of individuals and groups with many different points of view, objectives, and interests. Effective action requires consultation with and engagement of a range of different stakeholders, including the school’s administration, student council, larger student body, faculty, staff, sustainability office, maintenance department, board of governors, school board trustees, and parent–teacher association.

c. **Allies and champions:** The school and wider community will undoubtedly be home to many key people who have an interest in the changes being sought. While they might not necessarily be available for hands-on collaboration, these individuals can still play a key role championing the project to the public and to those in power.

d. **Experts:** Within your school community there is a wealth of knowledge. Connect with individuals who have specific knowledge of the problem being addressed and its potential solutions. Technical experts from the larger community can also offer diverse services and expertise.

Prepare for the Group’s Future

An individual student typically attends a school for only a short period—perhaps three or four years. Similarly, those who run corporations, schools, and governments often serve only a limited amount of time in any given position. Short-term thinking is often the result of these realities. And yet, successful environmental change requires sustained long-term thinking.

By preparing for the inevitable transitions of leadership, you will ensure the continued viability of your work. Be sure to document the process carefully. Create resources, tools, and templates that can be used well into the future, such as checklists, reports, and policy papers. Engage students and instructors from different departments and at different stages in their education and careers; that way, as various individuals move on, there will be others to step into their roles.
ACTION 1 | INCREASE ACCESS TO GOOD FOOD

Making conscious choices about the food we eat has wide-ranging benefits. At the personal level, it can protect us from diabetes, obesity, and heart disease. At the public level, it can help to curb fossil fuel emissions and reduce farmers’ toxic exposures. We can ensure that everyone has the ability to eat good food by increasing access to fresh, local, organic food at school.

THE THREE-STEP PROCESS

1. Learn the facts about what you are currently eating.

Speak with the staff of the cafeteria and any other restaurants on campus. Find out more about where your food comes from, how it is prepared, and its nutritional value. Read up on the health effects of eating prepared foods, growing and eating nonorganic foods, and transporting food across large distances. Conduct a survey to learn what the average student at your school eats on a daily basis and how much your peers know about their food. Determine the role that factors such as cost, convenience, knowledge, preconceptions, and taste usually play in individuals’ food choices. Research what other schools have done to increase access to healthy food.

2. Share what you have learned about your school’s eating habits.

At times, many of us feel a deep emotional connection to our food. Using emotion (such as humor, awe, or outrage), present some of the most surprising information about your school’s eating habits to the faculty, staff, and students. How many total calories are consumed a day? How far does your food travel? How much of the daily recommended portions are eaten? What potential problems—both personal and public—are created by our current eating habits? Then inform your peers about the potential solutions while tapping into their enjoyment of food: host a local food cook-off, establish a weekly on-campus cooking class using only fresh ingredients, or host an organic dinner party. Be sure to discuss food issues both formally and informally at your event and ask attendees to commit to supporting the next steps of your project.

3. Change menus and attitudes to make healthier foods available, accessible, and in demand.

Work with the cafeteria and restaurant staff, school administration, student council, and your school’s purchasing office to develop a plan for buying, cooking, and promoting healthy foods at your school. This plan may include sourcing organic food from local farmers, renovating on-campus residences so students have access to communal kitchens, planting organic gardens in the school’s common areas, or all of the above. Whatever steps you take, be sure to make the student body aware of the reasons for the changes and their benefits.
SOURCES OF KNOWLEDGE AND SUPPORT

Community Food Security Coalition
www.foodsecurity.org

A North American coalition of almost 300 organizations working from the local to international levels to build community food security.

National Farm to School Network
www.farmtoschool.org

A US program that connects schools (K–12) and local farms with the objectives of serving healthy meals in school cafeterias; improving student nutrition; providing agriculture, health, and nutrition education opportunities; and supporting local and regional farmers.

The Land Connection
www.thelandconnection.org

An Illinois-based educational nonprofit organization that works to preserve and protect the state’s agricultural heritage by educating farmers and the public about the value of farmland and the need for more local food production and consumption.

Pesticide Action Network North America
www.panna.org

A nonprofit organization that works to replace the use of hazardous pesticides with ecologically sound and socially just alternatives. The organization also maintains the PAN Pesticide Database (www.pesticideinfo.org), which provides information on pesticide toxicity and regulation.

Slow Food
www.slowfood.com

A global grassroots organization with supporters in 150 countries, who are linking the pleasure of good food with a commitment to their community and the environment.

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1 The descriptions in this section use wording that has been drawn in large part from the organizations’ websites.
**Action 2 | Protect Our Water**

Access to clean, safe water is the right of every person. We can ensure this access by protecting drinking water sources from contamination and exploitation.

**The Three-Step Process**

1. **Learn about the source of your school’s drinking water.**

   Where does your school’s water come from? Contact the local water utility and ask what substances they test for, what the levels have been in the past, and what your school community can do to protect the water and improve its safety. Determine whether your school or community are behaving in ways that might put your water at risk. Are illegal or hazardous dumpings occurring? Is agricultural or industrial runoff a problem? Are students, educators, and staff disposing of toxic products (such as supplies from the art and chemistry departments) in a safe manner, or are they simply dumping these substances down the drain?

2. **Share the facts about your school’s drinking water.**

   Most people haven’t given much thought to the source of their drinking water. But once the information is available, you may be surprised how many people take an active interest. Distribute the most recent water testing data; post maps of your water sources; and host informational sessions to encourage students, educators, and school staff to take an interest in the water.

3. **Change school policies to better protect your drinking water.**

   Work with the school administration, student council, and other responsible parties to develop a plan for committing the school to contribute to the protection of your local water. This might involve changing certain products used in science labs, arts studios, agricultural programs, and janitorial facilities. It might involve the regular monitoring of the disposal practices of these departments. Because drinking bottled water gives us a false sense of safety (and is an environmentally unsustainable practice because of the manufacture, shipping, and disposal of the plastic bottles), making change in your school might also include increasing the number of drinking water fountains or water-bottle refill stations and banning bottled water sales in vending machines, restaurants, and cafeterias.
**Sources of Knowledge and Support**

**Clean Water Action**
www.cleanwateraction.org

An organization of 1.2 million members empowering people to protect America’s waters, to build healthy communities, and to make democracy work for all of us.

**Council of Canadians**
www.canadians.org

Canada’s largest citizens’ organization, working to promote progressive policies on fair trade, clean water, energy security, public health care, and other issues of social and economic concern to Canadians.

**Polaris Institute**
www.polarisinstitute.org

A Canadian institute that works on both a national and international basis to help citizen movements develop strategies and tactics to challenge corporate power. Water is one of this group’s main issues.

**Waterkeeper Alliance**
www.waterkeeper.org

An international organization that provides a way for communities to stand up for their right to clean water and for the wise and equitable use of water resources, both locally and globally. The organization has nearly 200 waterkeepers patrolling rivers, lakes, and coastal waterways on six continents.

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1 The descriptions in this section use wording that has been drawn in large part from the organizations’ websites.
Action 3 | Use Safe Products

One effective way to protect human health and the environment is by changing the purchasing practices of our schools. From conventional cleaning and lawn care products to art studio and science lab supplies, many of the products used in educational institutions contain toxic chemicals. Using safer products creates a safer school environment and gives the manufacturers incentives for developing and producing safer products.

The Three-Step Process

1. Learn about the products used in your school.

Beginning with a specific area or department (such as art, science, agriculture, maintenance, or sports), itemize the products used in your school that might be toxic. Investigate these items to determine their potential for harm. Then, research safer alternatives that could be used to replace the toxic products. Finally, learn how your school purchases its supplies, including who makes the purchasing decisions and whether the system allows your school to change suppliers or to make specific product requests.

2. Share what you have learned with those who are most affected.

Find a compelling way to inform your school community about the potential hazards of the toxic materials to which they are exposed. Hold a teach-in, hang posters, or conduct tours through school areas that are potentially putting students and staff at risk. Gather the support of diverse stakeholders and organize their involvement in shifting your school to using products that are free of toxicants. Together, approach those who have the power to change what products are used. This could be the head of the maintenance department or a senior faculty member in the art department or an administrator. Share your reasons for wanting your school (or a specific department) to commit to becoming toxics free.

3. Change your school’s purchasing habits in favor of safer alternatives.

In collaboration with the school’s administration, purchasers, and any relevant departments, work to identify potential alternatives and how the school could use these products most effectively. Whenever a toxic product is replaced, announce and celebrate the change publicly.
Sources of Knowledge and Support\textsuperscript{1}

Canadians for a Safe Learning Environment

\texttt{www.casle.ca}

A registered charity that works to improve the condition of school buildings as well as the products and practices used in schools.

CHE Toxicant and Disease Database

\texttt{www.database.healthandenvironment.org}

A database maintained by the Collaborative on Health and the Environment that summarizes links between chemical contaminants and 180 human diseases.

Healthy Schools Network

\texttt{www.healthyschools.org}

An award-winning not-for-profit environmental health organization based in New York State that launched the national healthy schools movement with comprehensive state policies and a model coalition.

Women’s Voices for the Earth

\texttt{www.womensvoices.org}

A national organization that works to eliminate toxic chemicals that impact women’s health, by changing consumer behaviors, corporate practices, and government policies. This group often advocates directly to corporations, requesting more product labeling and safer cleaning and personal care products.

\textsuperscript{1} The descriptions in this section use wording that has been drawn in large part from the organizations’ websites.
**ACTION 4 | CONSTRUCT HEALTHY BUILDINGS**

Toxic materials are often used in building construction and as a result, indoor air is often more toxic than outdoor air. Insisting that schools avoid these toxic materials and adopt healthy building standards will make our schools a safer place to be.

**THE THREE-STEP PROCESS**

1. **Learn about healthy and green building standards.**

   Professional standards associations are leading the way in healthy and environmentally conscious building choices.¹ There are ratings systems for everything from the energy efficiency of heating systems to the origin of lumber used in construction. Become knowledgeable about the risks associated with the use of conventional building supplies. Then learn about the current healthy and green standards and their benefits—economic, environmental, and health.

2. **Share what you have learned with your school’s administration.**

   Many schools are in a seemingly constant state of construction or renovation. When your school is creating a new structure or renovating an old one, it’s the perfect opportunity to make a strong commitment to human health and the environment. Working with a consultant who has been trained in Leadership in Energy and Environmental Design (LEED) or healthy building standards, develop a formal presentation for the school administration about the benefits of healthy and green building practices. Meet with the administration and consultant to make your presentation. Gain administrative agreement to establish new protocols that prioritize human health and environmental protection during construction and renovations. Notify the school and the wider community about this intention for change.

3. **Change your school’s approach to building renovation and construction.**

   Work with your school’s administration to define the new construction and renovation protocol, as well as how they will be implemented and monitored. The new protocol may mandate proactive renovations when there are health and safety concerns—such as safely removing asbestos, replacing worn carpeting with more sustainable flooring, or reinsulating leaky buildings. It may require representatives on key decision-making and construction teams who are responsible for ensuring healthy building supplies and processes are prioritized. It may outline appropriate communication with the broader school community, including ensuring that the health effects of materials used in any new construction are publicized to the students and staff before, during, and after construction. Once the protocol is written,

¹ Note that the principles of healthy building design and green building design are not always the same.
share it with the school community through town-hall meetings and the school newspaper. Conduct and publicize an annual review of how well the protocol is being upheld and assess what more can be done.

**SOURCES OF KNOWLEDGE AND SUPPORT**

*“Indoor Air Quality,” US Environmental Protection Agency*

[www.epa.gov/iaq/index.html](http://www.epa.gov/iaq/index.html)

This webpage presents comprehensive information on many indoor air quality (IAQ) hazards, including how to prevent and solve the problems. See especially the IAQ Tools for Schools section at [www.epa.gov/iaq/schools/index.html](http://www.epa.gov/iaq/schools/index.html).

*Healthy Building Network*

[www.healthybuilding.net](http://www.healthybuilding.net)

A national network dedicated to transforming the market for building materials to advance the best environmental, health, and social principles. The network’s projects have directly resulted in the introduction of new, healthier building materials, shifting over $4 billion in materials purchases from toxic materials to healthier alternatives.

*US Green Building Council*

[www.usgbc.org](http://www.usgbc.org)

A nonprofit organization committed to a prosperous and sustainable future through cost-efficient and energy-saving green buildings. This organization has developed the LEED certification process, which provides building owners and operators with a framework for identifying and implementing green building design, construction, operations, and maintenance solutions.

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2 The descriptions in this section use wording that has been drawn in large part from the organizations’ websites.
The US Department of Energy has said it best: “Schools are central to the communities they serve and should reflect community values.” Implementing a program for energy conservation and green energy generation will save money in the long term and demonstrate the school’s commitment to reversing climate change.

**THE THREE-STEP PROCESS**

1. **Learn how your school can conserve energy—and even generate green energy.**

   Conduct field research to determine where your school is wasting energy and what types of alternative energy generation might be possible. Find out what kind of energy your school currently uses. Is it plugged into the municipal grid or does it generate its own power? Many college campuses still rely on coal-fired power plants, while others have erected their own wind turbines. Speak with local energy experts and with the permission of your school’s administration, schedule a professional energy audit to learn more about conservation. Visit places in your community and speak with other schools that are generating their own green energy.

2. **Share the energy facts with others.**

   With your energy audit in hand, begin spreading the word on how much savings—both energy and financial—could be had if your school were to implement the recommendations. Tell others about the schools and communities that are already generating green energy. Present your findings to the school’s administration and then seek permission to form a task force for defining the implementation plan for conserving and generating energy.

3. **Change energy habits and infrastructure.**

   In collaboration with school officials, follow your implementation plan for conserving energy and generating green energy. Start small and finish big. For example, begin by installing fluorescent lightbulbs and implementing a policy of turning off lights and computers in classrooms when they are not in use. Next, create a rooftop garden, plant shade-giving trees, and reinsulate the buildings. Finally, install solar panels and windmills, begin a training program for green power technicians, and conduct research aimed at advancing the efficiency of green energy generation systems. Whatever changes you make, be sure to determine how much energy and money have been saved in the process and then

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communicate this information to both the administration and the student body. Share what you learn throughout the process by maintaining a blog, contributing a column to the school's newspaper, or posting regular updates on the school's website.

**TIP**

It's important for our schools to say “yes” to conserving energy and to generating renewable energy. But it’s also important for our schools to say “no” to profits from the fossil fuel industry. Many universities and colleges hold investments in fossil fuel companies and are thus making money at the expense of environmental stability and human health. But there is good news: many student groups are leading fossil fuel divestment campaigns to change this. Learn how to get involved at [http://gofossilfree.org/](http://gofossilfree.org/).

**Sources of Knowledge and Support**

**350.org**  
[www.350.org](http://www.350.org)

A global, cutting-edge movement that aims to solve the climate crisis by inspiring individuals and groups to engage in large-scale activism.

**Clean Energy Classrooms**  
[www.cleanenergyclassrooms.ca](http://www.cleanenergyclassrooms.ca)

A website produced by the BC Sustainable Energy Association. A guide to sustainable energy training in Canada, it offers lists of programs, workshops, and courses, as well as companies and nongovernmental organizations working to build a clean energy economy.

**Guide to Operating and Maintaining EnergySmart Schools**, US Department of Energy  

A comprehensive manual providing information on how to plan, finance, design, build, operate, and maintain an energy-efficient school. It also provides lesson plans and activities for grades K–12.

**NexGen Energy Partners**  
[www.nexgen-energypartners.com](http://www.nexgen-energypartners.com)

An owner/operator of distributed renewable energy systems sited at customers' facilities. The company works with governments, schools, businesses, and utilities across the US to bring its customers the benefits of clean energy without the capital investment and technical risk.

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2 The descriptions in this section use wording that has been drawn in large part from the organizations' websites.
Second Nature

www.secondnature.org

A nonprofit organization whose mission is to accelerate movement toward a sustainable future by supporting senior college and university leaders in making healthy, just, and sustainable living the foundation of all learning and practice in higher education. One of this group's major projects is the American College and University Presidents' Climate Commitment, which encourages schools to model ways to eliminate carbon emissions.
Hold a Screening of Living Downstream

Many educators and students are interested in having public conversations about environmental health and rallying support for large-scale projects. One way to engage the school community is to organize a screening of Living Downstream. A well-planned event can be a catalyst for change—educating audiences, encouraging discussion, and inspiring action.

A screening of Living Downstream can be about much more than the film itself. Watching Living Downstream will build the school community’s awareness and concern, laying the foundation for a deeper connection with the issue of environmental health. Use the event as an opportunity to inform your audience about the school-wide changes being sought and how they can participate. Before the event ends, present attendees with a simple first action to take and invite them to a follow-up meeting or event.

Use the five checklists in this worksheet to plan a successful and customized screening event:

- **PART 1 | GOAL AND VISION** ................................................................. PAGE 240
- **PART 2 | LOGISTICS** ........................................................................ PAGE 243
- **PART 3 | PROMOTION** ...................................................................... PAGE 248
- **PART 4 | AUDIENCE ENGAGEMENT** .................................................. PAGE 250
- **PART 5 | NEXT STEPS** ...................................................................... PAGE 256

When planning a screening of Living Downstream, above all, have fun! People love an entertaining, thought-provoking film, and they enjoy spending time with others. The excitement, creativity, and hope you bring to your screening will be felt by the audience.

Email us with any questions at screenings@livingdownstream.com.
PART 1 | GOAL AND VISION

Setting a goal and creating a vision for your event will make the decisions that follow easier. Keep your goal in mind as you make plans for your screening.

What is my goal for this screening?
- [ ] raise awareness about environmental health to begin a school-wide conversation about the issue
- [ ] raise awareness about a specific local environmental issue to begin a school-wide search for solutions
- [ ] encourage students, faculty, and staff to become active in an environmental club or organization
- [ ] inspire students to consider a career or program of study related to environmental health
- [ ] inspire students and faculty to consider conducting research in an area of environmental health
- [ ] identify an environmental health issue that is relevant for the school community and begin working with others to try to solve it
- [ ] galvanize support for a specific large-scale change being sought (See page 221 for possible school-wide projects to consider.)
- [ ] fundraise for an environmental organization, program, or initiative
- [ ] other

Details:

Who is my target audience?
- [ ] members of the full school community
- [ ] students
- [ ] faculty
- [ ] staff
- [ ] members of the general public
- [ ] members of a specific program, department, group, or club
- [ ] members of a specific portion of the wider community (e.g., business owners, government officials, agricultural workers)
potential allies and partners

- donors and funders
- members of the media
- other

Details:

**TIP**  Even if the screening is intended for the full school community, consider whether to invite some specific people to attend. Whom you invite will depend on your goal. For example, if the goal is to galvanize support for a project to increase the school community's access to good food, consider inviting members of the school's administration, cafeteria staff, and students and faculty in programs related to the issue (such as agriculture, health, and culinary arts).

With whom will I partner?

- an individual
- a group, club, faculty, or organization with a similar mandate and values
- a group, club, faculty, or organization with similar values but a different mandate (e.g., an environmental club partnering with the faculty of medicine)
- another school
- a hospital, library, business, nonprofit organization, community center, or faith group in the wider community
- a local theater
- a film festival or arts group
- nobody
- other

Details:
How will the screening be held?

☐ as a school-wide event
☐ as a program-wide event
☐ as part of another existing event (e.g., conference, film festival, environmental fair)
☐ as a small and intimate gathering (e.g., in-class screening, lunch-and-learn screening for faculty members)
☐ other

Details:
PART 2 | LOGISTICS

A well-planned event helps everyone feel relaxed and engaged. Preparing for contingencies in advance will allow organizers to interact with attendees at the event and ensure the event serves the larger goal.

When will the screening be held?
Date: _______________________________
Time: _______________________________

TIP When selecting a screening date, find out what other events are happening at school and in the community. Try to select a day and time when there isn’t much competition for audience members.

Where will the screening be held?

☐ in the school auditorium
☐ in a lecture hall or classroom
☐ in a school library
☐ in the student center
☐ in the cafeteria or pub
☐ outside on campus (projected onto a wall or screen, or on a television)
☐ over the school’s closed circuit television channel
☐ in a place of worship
☐ at a local cinema
☐ in a private residence
☐ at a conference facility
☐ at a hospital or other health-care facility
☐ in a community center
☐ at the public library
Living Downstream - In the Classroom

☐ at a local place of business
☐ other

Details:

What will I charge for tickets?
☐ free
☐ mandated attendance (school-wide, program-wide, or in-class)
☐ $5
☐ $10
☐ donation
☐ other

Details:

TIP When setting a ticket price, ask yourself the following questions:

• What are the total costs for the event and are there other sources of funding?
• What is the goal of the event? Is it primarily about raising awareness or raising funds?
• What is the current cost of a movie ticket in this community?

What will I screen?
☐ feature-length film (85 min)
☐ one-hour version (55 min)
☐ single scene(s)
☐ scene compilation(s)
☐ mini doc(s)

Details:
TIP  Watch the Living Downstream Educational DVD well in advance of the event. This will help you reconnect with the message and will inform the planning of your event. It will also help ensure that the DVD is in good working order and that the screening will not be interrupted due to technical problems.

What kind of equipment will I need?

- [ ] DVD player
- [ ] projector and screen, or television
- [ ] sound system
- [ ] comfortable seating
- [ ] microphones, chairs, and tables (for the post-screening activity)
- [ ] other

Details:

What can I include to attract audience members?

- [ ] an appearance by a special guest (e.g., a well-known and respected member of the school or wider community)
- [ ] an appearance by elected officials, giving them the opportunity to meet constituents and answer questions
- [ ] a range of different groups, asking them to promote the event to their lists in exchange for the opportunity to publicize their work at the event
- [ ] a performance by a local musician or an introduction by a local media personality or actor
- [ ] an appearance by someone connected to the film (e.g., Sandra, a featured expert, or a member of the crew)
- [ ] mandatory attendance
- [ ] other

Details:
What will I do to reflect my commitment to environmental health at the event?

- use rented plates, linens, and cutlery, as opposed to disposables
- offer speakers and audience members pitchers and glasses of tap water, as opposed to bottles
- provide refreshments from local, organic producers
- use electronic dissemination of materials whenever possible; when not possible, print materials on unbleached recycled paper with nontoxic vegetable inks
- collect donations for a local organization during the event
- contribute a portion of ticket sales to a local organization
- hold the screening in a venue committed to environmentally sustainable practices, and mention this commitment during the evening and in the publicity
- hold the screening in a venue close to public transit
- invite speakers from out of town to participate by video conference or Skype

Details:

What tasks will I need help with?

- promoting the event
- selling or distributing tickets
- outreach to other groups and individuals
- media outreach
- distributing posters, flyers, and invitations
- venue setup
- refreshment preparation and sales
- collecting tickets
- greeting audience members and showing them to their seats
- managing the literature table and distributing printed materials
- taking photographs
Hold a Screening of Living Downstream | Part 2: Logistics

- signing people up for further actions or information
- DVD projection
- facilitation of the discussion
- venue cleanup
- post-screening follow-up with audience members
- other

Details:

TIP Check with the venue to determine what equipment, staff, and publicity they can provide.

What will I do to document the event?
- invite members of the school or local media to report on the event and the issues
- post information about the screening and your larger goal on the school or faculty website
- take notes on audience numbers, interesting topics discussed, and any measurable outcomes
- invite audience members, panel participants, and staff and volunteers of the venue to blog, tweet, and email their impressions of the event
- take photographs of the event
- share info about the screening with the producers of Living Downstream by sending an email to screenings@livingdownstream.com
- other

Details:
PART 3 | PROMOTION

The success of your event depends significantly on how much promotion, including word of mouth, you are able to generate. Promotion will determine not only the number, but also the type of people there. Use promotion and outreach strategically to increase audience size and ensure that the event attracts your target audience.

How will I draw an audience to the screening?

☐ post the screening at www.livingdownstream.com/hold_screening
☐ contact school and local media
☐ email distribution lists
☐ post on the websites of environmental programs, clubs, and groups
☐ post on personal blogs
☐ post on the venue’s website
☐ advertise on the venue’s marquee or signboard
☐ post on listservs
☐ use online social networking tools (e.g., Facebook, Twitter)
☐ post on the Living Downstream Facebook page at www.facebook.com/livingdownstream
☐ use word of mouth: talk about the screening with neighbors, local business owners, and coworkers—and encourage others to do the same
☐ call or email friends, family, colleagues, etc.
☐ hang posters around the school
☐ distribute flyers
☐ use existing newsletters
☐ place community calendar listings
☐ use free ticket giveaways
☐ make attendance mandatory
☐ ask faculty members to promote the screening in their classes and lectures
☐ other

Details:
What official *Living Downstream* screening resources will I use?

- ☐ customizable flyer
- ☐ printable poster
- ☐ pamphlet
- ☐ press release template
- ☐ publicity photos
- ☐ film trailer embedded on my website or played in front of live audiences in the weeks leading up to the screening
- ☐ teasers embedded on my website

Details:

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**TIP** When hosting a screening, don’t do everything from scratch. Visit [www.livingdownstream.com/hold_screening](http://www.livingdownstream.com/hold_screening) to see the resources listed above.

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What information will I include in the promotional material?

- ☑ date and time
- ☑ venue name and address
- ☑ ticket price and how to purchase tickets or RSVP
- ☑ description of *Living Downstream*
- ☐ the larger goal of the event
- ☐ contact information for the sponsoring group, club, or program
- ☐ a link to the website of the sponsoring group, club, or program
- ☐ a link to [www.livingdownstream.com](http://www.livingdownstream.com) or [http://steingraber.com](http://steingraber.com)
- ☐ the activities that will occur during the event
- ☐ any special information that might draw audience members to the event
- ☐ other

Details:
PART 4 | AUDIENCE ENGAGEMENT

People often come to a film screening with thoughts and questions about the issue already on their minds. Then, as they watch the film, new ideas emerge. The success of the event hinges largely on the organizers’ ability to engage the audience in a way that develops those ideas into action.

Who will do the introduction at the event?

- me
- a representative of the sponsoring club, group, or program
- a member of the school’s administration
- a special guest (e.g., a media personality, a government official, another well-known individual in the community)
- other

Details:

TIP If a special guest is introducing the event, be sure to include this information in your promotional materials.

What will we talk about to welcome the audience and briefly introduce the film and the event?

- who I am and my connection to health and the environment
- what club, group, or program is hosting the event and why
- what Living Downstream is about
- why this film is relevant to the school community
- what the audience might take away from the event
- how the audience might support the changes being sought at the school
- other

Details:
If facilitating a short pre-screening discussion, what questions will I ask?

☐ What are your reasons for attending this screening?
☐ What are you hoping to learn?
☐ What is your current level of knowledge about the issue of health and the environment?
☐ Are there specific environmental health topics that concern you? If so, what?
☐ Do you have specific concerns about environmental issues at our school? If so, what?
☐ other

Details:

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**TIP**  The pre-screening discussion is most appropriate for small events where an interactive discussion will follow the film.

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What kind of activity will I use to engage the audience immediately after the film?

☐ question-and-answer session with a local expert
☐ question-and-answer session with Sandra Steingraber or a member of the film crew (Contact us at screenings@livingdownstream.com to assess this possibility.)
☐ facilitated audience discussion
☐ discussion or presentation of the large-scale change being initiated (For ideas of projects schools might undertake, see page 221.)
☐ panel discussion with individuals representing different points of view or areas of expertise
☐ small group discussions
☐ meet-and-greet over refreshments
☐ presentations or speeches by local community members
☐ town hall meeting about a specific issue
☐ advocacy letter-writing session
☐ strategizing session
☐ other

Details:
If my post-screening activity includes a discussion, what questions will I ask to energize and direct this discussion?

☐ How did the film make you feel?
☐ Are there any moments that stood out in your mind? What did these moments make you think about or realize?
☐ What surprised you? Moved you? Angered you? Impressed you?
☐ What did you learn that you didn't know before?
☐ How did the film confirm or contradict information you have heard?
☐ What questions did the film raise?
☐ The film features many different communities in North America. Which one do you think most closely resembles our community? Why?
☐ Are there specific health and environmental problems in our school community or the wider community that we should be addressing?
☐ Are there groups already working on these issues in our school? In the larger community? If yes, describe their work for us.
☐ Is anyone here today currently doing work related to these issues (e.g., cancer, environment, environmental health)? If yes, describe your experiences for us. What have been your challenges and successes? What can the school community do to support your work?
☐ What can we—as students, faculty, and staff of this school—do?
☐ other

Details:

**TIP** Here are some ways to ensure your discussion is successful:

- Expect audience members to ask what products they can buy or things they can do to protect themselves. If you wish, give some brief examples, yet emphasize that personal action provides limited protection. To be truly protected, we all need to help change how chemicals are used in our communities.
- Make sure no one—including you—monopolizes the conversation.
- If someone begins discussing a side issue, invite interested audience members to speak with the individual after the event, and then gently redirect the conversation.
- Strive to energize and uplift your audience with a hopeful and positive tone.
What one piece of information about environmental health do I want my audience to know by the time the event is over?

- There is no barrier between our bodies and our environment.
- Chemicals can travel far from where they were released—pollution knows no boundaries.
- Most chemicals on the market in the US and Canada have not been thoroughly tested for toxicity.
- When evidence exists for the harm of a chemical, the chemical is not automatically withdrawn from use.
- Once chemicals are released into the environment, it’s difficult to clean them up.
- Atrazine, one of the most commonly-used herbicides, may be causing cancer.
- PCBs, although banned, still exist in our environment and have been linked to many health problems, including cancer.
- The experience of cancer has a lifelong impact on cancer patients and their families.
- The precautionary principle means that we should take action when we have some evidence that a chemical may be harmful to human health.
- Stronger school policies could contribute to a reduction in our community’s dependency on toxic chemicals.
- Other

Details:

What will I do during the event to support audience members’ interest in obtaining further information?

- Invite an expert in the area of environmental health to answer questions after the screening
- Distribute literature about the issues and the sponsoring club, group, or program
- Invite audience members to register for a follow-up discussion, meeting, or initiative
- Direct audience members to visit www.livingdownstream.com or the website of the sponsoring club, group, or program to learn more
- Suggest students enroll in a specific environmental or health-related course being offered by the school
- Sell books and videos at the event (See ordering information on page 271.)
Sandra Steingraber always ends her speeches on a hopeful and positive note, but never downplays the seriousness of our situation. What positive message will I leave with the audience?

- By working in collaboration with others, one person can make a difference.
- The world is a beautiful place, deserving of our protection (or, as Steingraber says in the film, “What we love, we must protect”).
- Environmental health is an issue we can do something about—we can change our environment.
- Educational institutions and their students have been at the forefront of social changes throughout history. We can be leaders in addressing the environmental crisis, too.
- Changing the way this school deals with toxic chemicals and products can have large and far-reaching impacts.
- Everyone has talents and skills that can advance the new environmental human rights movement.
- It is time to become heroes in the struggle for environmental human rights.
- Steingraber says, “I believe we are all musicians in a human orchestra. It is time now to play the Save the World Symphony. It is a vast orchestral piece, and you are but one musician. You are not required to play a solo. But you are required to figure out what instrument you hold and play it as well as you can.”

Other

Notes:

TIP Consider offering the audience one hopeful example of an initiative or change that is already occurring at your school or in your community.

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What will I do during the event to ensure that audience members commit to taking further action?

☐ collect names and contact information for a mailing list

☐ provide audience members with a simple action they can do immediately, such as the following:
  ☐ sign a petition to the school’s administration about a specific change that needs to happen within the school community or to an elected official on a specific change needed at the community level
  ☐ join an environmental club, group, or course
  ☐ sign up to participate in a school-wide initiative
  ☐ respond to an action alert featured at www.livingdownstream.com/action_alerts

☐ encourage the audience to share the film and its message with others at school, home, and work and in the broader community

☐ other

Details:
PART 5 | NEXT STEPS

The greatest value from the screening will likely come after the event itself—as organizers and others use it as a springboard for making school-wide change. Evaluate the outcome as soon as the screening is over, remembering not only to explore what might have been done differently but also to celebrate the successes. While the screening itself will likely be a one-time event, it should be seen as a starting point for new work, relationships, and discussions in your school community.

When will I debrief the event with my co-organizers?
Date: ____________________________

TIP Here are some possible questions for your debriefing:

- Was the goal met?
- What other activities should be conducted to raise awareness and build support at the school for the larger initiative?
- Which audience members expressed interest in taking up the issue of environmental health? When will we follow up with them?
- What will our next steps be, and what is the timeline for these actions?

How will I know if the event achieved its goal?

☐ The audience displays a greater awareness of the issues during the post-screening discussion.
☐ Audience members sign up to be involved in upcoming activities or initiatives.
☐ The issue of environmental health becomes a topic of greater concern in the school.
☐ Follow-up sessions are well attended and productive.
☐ Greater numbers of students enroll in environmental studies courses.
☐ Greater numbers of students and faculty begin engaging in environmental health-related research.
☐ Support for school-wide environmental initiatives is evident.
☐ other

Details: ____________________________
Who will I thank for their help with the event?

- co-organizers and event volunteers
- other individuals, groups, clubs, and programs that helped publicize the event
- members of the school or local media who attended the event or announced it to the public
- special guests who attended the event
- the school’s administration
- event funders
- the venue
- other

Details:

What will I do to follow up with audience members and encourage them to take further action?

- send out a thank-you email, with ways to get involved in school-wide change, other action ideas, or links to more information
- follow up with audience members by phone and invite them to do any of the following:
  - attend a meeting about the large-scale initiative being planned for the school (see page 221 for ideas)
  - participate in a workshop to further explore the issues and the opportunities for action
  - join an environmental group, club, program, or course
  - discuss what actions they would like to take, in order to find a way to support them in this work

Details:

When will I do this follow-up?

Date: ___________________________
How will I share what I have learned with others?

☐ share info about the screening with the producers of *Living Downstream* by sending an email to screenings@livingdownstream.com

☐ talk with classmates, friends, and family

☐ write an article for the school or local paper

☐ volunteer to be an interview guest on a school or local radio program

☐ share photos of the event on a personal blog, website, or Facebook page

☐ tweet about the post-screening discussion

☐ create a podcast of the post-screening portion of the event

☐ using this worksheet as a guide, train others to hold a screening

☐ other

Details:

**TIP** Discussing the screening after it has occurred is an important part of the process—for organizers, attendees, and the wider school community. Sharing reflections on the event helps the film’s producers learn how to better support screening organizers, and the lessons learned will be of value to others planning future screenings.
Navigating the Living Downstream Resources

The Educational DVD .................................................................................................... PAGE 261

The Interactive Website ............................................................................................... PAGE 265

The Community Guide .................................................................................................... PAGE 269

Ordering Information .................................................................................................. PAGE 271
The Educational DVD

The Living Downstream Educational DVD is a two-disc set designed for use with this guide. Purchase of the DVD includes the right to screen the film publicly for educational or nonprofit purposes. It also contains a wide range of screening options—to help educators and organizers meet a specific goal, stay within strict time constraints, or focus on a specific theme—ensuring flexibility and the broadest possible use.

The Living Downstream Educational DVD is available for purchase online at www.livingdownstream.com/dvd. To use a purchase order number or to order in bulk, contact dvd@livingdownstream.com.

**DISC ONE**

*Living Downstream*

Feature-Length Film (85 minutes)

Scene Selection

Bonus Features

Single Scene Index

Scene Compilations

Film Trailer

Mini Docs

Audio Commentaries

Written Guides

**DISC TWO**

*Living Downstream*

One-Hour Version (55 minutes)

Scene Selection
DISC ONE CONTENTS

Living Downstream: Feature-Length Film (85 min)

This documentary, based on the acclaimed book by ecologist and cancer survivor Sandra Steingraber, PhD, follows Steingraber during one pivotal year as she travels across North America, working to break the silence about cancer and its environmental links. The feature-length film is the original version and the version most often screened publicly in film festivals and independent cinemas. The scene selection, single scene index, and scene compilations on this disc all link back to this version of the film.

Scene Selection

This standard feature allows one to skip to a specific scene in the film and play the film from there to the end.

Bonus Features

The bonus features on this disc provide several different playing options for the film, as well as over three and a half hours of bonus material.

Single Scene Index

The single scene index allows for quick navigation to a specific scene found in the feature-length film, playing only that scene for the audience. It has been specially designed for those using individual scenes during presentations or to start discussion in lessons and workshops. See a full list of the scenes and scene descriptions starting on page 25 and corresponding scene-by-scene discussion questions starting on page 33.

Scene Compilations

The scene compilations each combine a selection of scenes relating to a common theme. They have been designed to support the in-depth discussion and study of particular concepts or ideas featured in the film.

- “Knowing Our Environment” (scenes 1, 3, 4, 5, 8, 13, 21) (11 min, 21 sec)
- “The Personal Experience of Cancer” (scenes 2, 3, 16, 17, 18, 27, 28, 32) (20 min, 31 sec)
- “Rachel Carson and Our Chemicals Policy” (scenes 9, 10, 26, 29, 30, 31, 33) (16 min, 27 sec)
- “Atrazine” (scenes 6, 7, 19, 20, 22) (12 min, 56 sec)
“PCBs” (scenes 14, 15, 24, 25, 26) (11 min, 8 sec)

“A Human Rights Issue” (scenes 1, 4, 8, 11, 12, 23, 30, 31, 33, 34, 35) (28 min, 13 sec)

Film Trailer (4 min)

This promotional trailer introduces the audience to the story of Living Downstream and to Steingraber as its main subject. It is a perfect tool for introducing the film or promoting a screening. Also available online and for embedding on other websites at www.livingdownstream.com/trailer.

Mini Docs

The mini docs are short educational documentaries that provide additional information and perspectives on concepts in the film. Using new footage, including additional interviews and graphics, these mini docs encourage critical thinking and enable viewers to explore select topics in greater depth. See more information about the mini docs, including synopses and discussion questions, beginning on page 79.

- Why Talk about Chemical Destruction? (5 min, 10 sec)
- What Causes Cancer? (3 min, 30 sec)
- Who Is Most Vulnerable? (6 min)
- What Is the Precautionary Principle? (6 min, 46 sec)
- What Can We Do? (5 min, 10 sec)

Audio Commentaries

The audio commentaries are additional audio tracks featuring conversations between individuals who contributed to the making of the film. They play in real time over the feature-length film and provide insight into the filmmaking process.

- Commentary 1 (85 min)
  Featuring author Sandra Steingraber and director Chanda Chevannes as they discuss the process of making the film, the science featured in the film, and the differences between literature and film. This commentary track will be especially useful for students of biology, English, and film; for nonprofit organizations; and for grassroots activists.

- Commentary 2 (85 min)
  Featuring director Chanda Chevannes, editor Nathan Shields, and director of photography Benjamin Gervais as they discuss the creative and technical challenges of making the film. This commentary track will be especially useful to film students and enthusiasts.
Written Guides

Link for downloading the electronic guides, Living Downstream ~ In the Classroom and Living Downstream ~ In the Community: www.livingdownstream.com/guides.

DISC TWO CONTENTS

Living Downstream: One-Hour Version (55 min)

This documentary is a re-edited version of the feature-length film and has a running time of 55 minutes. It covers many of the same topics, but at a quicker pace. It was created specifically for television viewers and educational audiences. Screening this version for a class allows more time for post-screening discussion.

In addition to the abbreviation of many scenes, the following scenes from the feature-length version have been entirely removed:

- scenes 8, 16, 21, 27: Readings from the book Living Downstream
- scene 13: “Sandra Runs to Know the Land”
- scene 24: “How Chemicals Can Contribute to Cancer”
- scene 25: “PCBs, Non-Hodgkin Lymphoma, and John Spinelli, PhD”
- scene 32: “Sandra’s Watchful Waiting”

Scene Selection

This standard feature allows one to skip to a specific scene in the one-hour version and play the film from there through to the end.
The Interactive Website

The *Living Downstream* website, [www.livingdownstream.com](http://www.livingdownstream.com), connects educators and students with others who are using the film in their schools and communities. The website enables educators to tap into a wealth of resources, share teaching materials, forge new relationships and alliances, and learn from the experiences of others. It allows students to experience the active and timely nature of the issues by reading weekly essays by Sandra Steingraber, blogs from activists in the field, and action alerts from across North America.

The interactive website is designed to be comprehensive and, at the same time, fun, fast, and easy to explore. Below are two links for getting started, as well as a summary of the contents of the two main menus.

**Join the mailing list** | [www.livingdownstream.com/mailing-list](http://www.livingdownstream.com/mailing-list)

Receive occasional emails with up-to-date information on the film, the website, and Sandra Steingraber’s work.

**Read the news** | [www.livingdownstream.com/news](http://www.livingdownstream.com/news)

Learn the latest *Living Downstream* news, as it happens. This page identifies the most recently added material on the site, including our monthly newsletters.
**Living Downstream | The Film**

This section of the website contains everything anyone would want to know about the film itself. Read about the film, the book that inspired the film, and the upcoming screenings. In addition, film trailers, video clips, reviews, and publicity stills are available here.

**About the Film | [www.livingdownstream.com/about-film](http://www.livingdownstream.com/about-film)**

Read a synopsis of the film and get production details at a glance.

**Reactions to the Film | [www.livingdownstream.com/reactions](http://www.livingdownstream.com/reactions)**

Read what others have said about the film. This page contains brief quotes from the media and from audience members, including educators and activists.

**Screenings and Events | [www.livingdownstream.com/screenings](http://www.livingdownstream.com/screenings)**

*Living Downstream* is screening internationally—at art house theaters, in film festivals, at conferences, and at special events. This page contains a comprehensive list of public screenings by date.

**Trailer and Video Clips | [www.livingdownstream.com/trailer](http://www.livingdownstream.com/trailer)**

Watch the trailer and selected video clips from the film. New clips are posted periodically. All clips can be embedded on school or organizational websites.

**About the Team | [www.livingdownstream.com/about-team](http://www.livingdownstream.com/about-team)**

Read the bios of the experts featured in the documentary and of the film crew responsible for the documentary’s creation.


Read a synopsis of the second edition of the book *Living Downstream*.

**For the Media | [www.livingdownstream.com/for-media](http://www.livingdownstream.com/for-media)**

Find a large selection of resources, including press releases, images from the film poster and book cover, and a variety of production stills.
This section of the website is focused on building the environmental human rights movement. It is a resource for individuals and groups who are using the film as a tool for education, community engagement, and creating social change. In this section one can log actions, learn how to hold a screening, read blogs, participate in action alerts, and more.

About the Movement | www.livingdownstream.com/about-movement

Read information about the environmental human rights movement described by Sandra Steingraber, including a list of links to help engage with the issue of environmental health. Whether one is an educator, an activist, or a concerned citizen, there is a role for all to play.

Log Your Action | www.livingdownstream.com/logyouraction

Record actions taken on the issue of environmental health. Big or small, every step toward change is worthy of recognition. Whether the action is attending a workshop or running a public education campaign, logging the actions taken will help us track the numbers of individuals reached and provide us with valuable information on how the film is being used.

Hold a Screening | www.livingdownstream.com/hold_screening

Find step-by-step instructions and resources for holding a screening of Living Downstream at school or in the wider community. This section also includes the option to post information about the screening on our website.

Use the Guides | www.livingdownstream.com/use_guides

Read descriptions of the three guides for use with the film: Living Downstream ~ In the Community, Living Downstream ~ In the Classroom, and Living Downstream ~ At Home.

Sandra's Weekly Essays | www.livingdownstream.com/essays

Explore with Sandra Steingraber the ways in which the environment is within us. All these essays are available for republication free of charge for educational or nonprofit purposes.

Sharing Resources | www.livingdownstream.com/resources

Download resources created by others for use with Living Downstream.
Blogs from the Field | www.livingdownstream.com/blogs

Follow our bloggers as they engage in issues related to environmental health. Both personal and professional, these blogs capture the successes, challenges, and learnings that come with doing this groundbreaking work.

Recommended Links | www.livingdownstream.com/links

Check out our comprehensive list of websites, including organizations doing work related to environmental and occupational health and those using film in education and for social change.
**The Community Guide**

*Living Downstream ~ In the Community* is a written guide for community, nonprofit, and professional use. It is available electronically or in print with purchase of the Educational DVD. Download it at [www.livingdownstream.com/guides](http://www.livingdownstream.com/guides).

All across North America, people are using the film *Living Downstream* to create change in their communities. Use the ideas in this guide to raise awareness about the links between toxic chemicals and cancer incidence, to encourage public involvement in prevention of environmental contamination, and to brainstorm ways to take action to improve the wider community’s environmental health.

A supplement to the *Living Downstream* Educational DVD, this guide supports the creative use of the film by organizations, community groups, activists, and other professionals. Students and instructors eager to use the film for raising awareness and inspiring change at school and in the larger community will also find a range of unique resources and information in this guide, which can be used as a companion to *Living Downstream ~ In the Classroom*.

*Living Downstream ~ In the Community* has been designed for easy customization according to one’s mandate, goals, and expertise. Its tools will help users encourage others to think differently about environmental health. They will help move people beyond questions about preventing personal exposures to the realization that true prevention requires public efforts to stop the manufacture of toxic chemicals.

Educators and students will be particularly interested in the following sections:

**Train Others to Hold a Screening**

A simple step-by-step training session in which participants will learn how to hold a screening of *Living Downstream*.  

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Lead a Workshop

Three workshop outlines that use clips from the film to energize participants and help them make a personal connection to the issue of environmental health. The respective workshops allow participants to gain knowledge about environmental health, find their role in the environmental health movement, and prepare for taking public action. The workshops include a wide range of participatory activities that could also be used in a classroom setting.

Create a Campaign

Ideas for using *Living Downstream* as the foundation for a large-scale public education or advocacy project to effect change.

Additional Information and Resources

A wealth of information and handouts. This section provides the in-depth conceptual and scientific information that will add to the user’s knowledge and empower individuals in their work. Designed for quick reference and easy exploration, it includes the following resources, created for easy reproduction and distribution:

- **Background information** that can be used in building knowledge or distributed as handouts. This section includes a glossary of terms; facts and figures; and discussions of the precautionary principle, the connection between fossil fuels and cancer prevention, and Europe’s precautionary approach to chemical regulation. It also includes a range of brief stories from the environmental health movement that can be used to inspire workshop participants, screening audiences, or an organization’s staff and volunteers. The final page of this section is a short sample evaluation form for use in monitoring participants’ response to screenings, workshops, and other *Living Downstream* events.

- **Workshop handouts** designed specifically for the workshops in the guide, yet generic enough to be adapted for other uses.

- **Recommended reading and viewing** lists, complete with annotations, which will guide users to a range of websites, books, films, and videos. This section also includes further details about [www.livingdownstream.com](http://www.livingdownstream.com), other publications by Sandra Steingraber, and more *Living Downstream* resources.
ORDERING INFORMATION

Living Downstream Educational DVD
Directed by Chanda Chevannes

Producer: The People’s Picture Company
For single copies with a credit card: www.livingdownstream.com/dvd
For single copies with a purchase order: fax (647) 342-2867 or dvd@livingdownstream.com
For bulk orders or special inquiries: phone (647) 343-2647 or dvd@livingdownstream.com

Living Downstream: An Ecologist’s Personal Investigation of Cancer and the Environment
By Sandra Steingraber

Publisher: Da Capo Press
For single copies: 1-800-343-4499
For bulk orders in the US: 1-800-810-4145, ext. 5000
or special.markets@perseusbooks.com
For bulk orders in Canada: 1-800-747-8147 or customerservice@raincoast.com
For exam copies: www.perseusacademic.com/policies.php
or examcopies@perseusbooks.com

Living Downstream ~ In the Classroom and Living Downstream ~ In the Community
By Chanda Chevannes, in collaboration with Sandra Steingraber

Publisher: The People’s Picture Company Inc.
For digital download (in PDF format): www.livingdownstream.com(guides
For additional hard copies: phone (647) 343-2647 or info@livingdownstream.com
At The People’s Picture Company, we are conscious that everything we create has an **impact on the environment**. As such, we have been working to lessen these impacts throughout our production processes. Our strategy is to work with local suppliers and manufacturers who are committed to making their processes as sustainable as possible, and to purchase environmentally friendly supplies at every opportunity.

Some highlights of our efforts include the following:

- When filming, we used local equipment suppliers and crew members whenever possible to reduce the impact of our travel. We ate local, organic food when it was available to us. While filming in central Illinois, we were especially fortunate to have our food provided by Henry Brockman of Henry’s Farm ([www.henrysfarm.com](http://www.henrysfarm.com)) and cooked for us by Joel Smith, the Midwest Regional Governor for Slow Food.

- All publicity materials have been made available for download for paperless dissemination. Hard copies of select materials have been printed using vegetable-based inks on FSC-certified recycled paper.

- For the Educational Edition, we chose an alternative DVD case, called a **digipak**, made of 100% unbleached, recycled cardboard. The plastic trays are made from 100% recycled plastic and are designed to hold discs firmly in place in high-volume-use environments such as libraries and resource centers. The printing was done using vegetable-based inks, and the boxes have not been shrink-wrapped.

- The guides are available for electronic download in PDF format to all purchasers of the Educational DVD. We are actively encouraging electronic use of the guides to reduce the impact created by the printing and shipping of the written guides. For those purchasers who require a hard copy, the guides are printed on FSC-certified paper that has been manufactured from 100% recycled material and without the use of chlorine.
We welcome your feedback on the film and the guides.
Please email us at dvd@livingdownstream.com.