

# Cultural Studies of Science Education

Volume 3

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Deborah J. Tippins • Michael P. Mueller  
Michiel van Eijck • Jennifer D. Adams  
Editors

# Cultural Studies and Environmentalism

The Confluence of EcoJustice,  
Place-Based (Science) Education,  
and Indigenous Knowledge Systems

 Springer

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# **Preface**

## **Mission**

To produce one of the most authoritative guides for ecojustice, place-based education, and indigenous knowledge in education.

## **Promotional Text**

Ecojustice philosophy is a way of learning about how we frame the world around us and why that matters. Ecojustice is not social and environmental justice, but its priorities span the globe. Therefore, ecojustice recognizes the appropriateness and significance of learning from place-based experiences and indigenous knowledge systems rather than depending on some urgent “ecological crises” to advocate for school and societal change. The idea is that schooling is a small part of the larger educational domain in which we live and learn. Given these ideas, this book offers a conversation for developing homegrown talents, narratives, and knowledge; eco-region awareness; and global relationships. This book provides a nuanced lens for evaluating educational problems and community conditions while protecting and conserving the most threatened and vulnerable narratives. These narratives if lost, would affect us all in ways that should be discussed more fully, where children and their teachers share some of the responsibility for setting things right. With the diversity of voices coming together to initiate these conversations around the confluence of ecojustice, place-based (science) education, and indigenous knowledge systems, this book is an important starting point for educators in many facets of life itself. We anticipate this book brings into better focus a vital role for Earth’s ecosystems within ecosociocultural theory and participatory democracy which engenders a new era of peace.

## **Promotional Book Quote**

Encompassing theoretical, empirical, and experiential standpoints concerning place-based knowledge systems, this unique book argues for a transformation of (science) education's intellectual tradition of thinking that emphasizes individual cognition. In its place, the book offers a wisdom tradition of thinking, living, and being that emphasizes community survival in harmony within itself and with Mother Earth. (Glen Aikenhead)

# Foreword

Objectivity, experimental design, the scientific method – these have long been the chestnuts of science education. But this emphasis on scientific remove, on there being one right way to do things, belies the diversity of learners and cultures that fill our schools, in North America and around the world. *Cultural Studies and Environmentalism: The Confluence of EcoJustice, Place-based (Science) Education, and Indigenous Knowledge Systems* is the counterpoint to this constrained, single-minded view of science education. Instead of a one-size-fits-all mindset, it provides a tapestry of perspectives on culturally sensitive science education. It opens our minds to the reality that teaching science in rural Quebec, in agricultural Malawi, in inner city Detroit is in some ways alike, but is in many ways crucially different. If we do not attend to the differences, we lose the learners and the vital potential for students shaping the communities they live in.

Browse through this collection of thought-provoking essays as if you are shopping at your local farmer’s market in search of the distinct terroire of regional cheeses, lost varieties of heirloom vegetables, unusual combinations of herbs and spices. Terroire is a French term that describes the unique aspects of a place that influence and shape the wine made there. But the term has spread from wine and other beverages to refer to the unique flavor of locally grown and prepared foods. So, if you’re attentive, you can tell the difference between the terroire of New York Black Diamond cheddar and Vermont Grafton Farms cheddar because the local grasses and bacteria that shape the culture of the milk are different in each location. Similarly, when science and environmental education emerge out of real people, issues, and places, it is fresh and uniquely flavored. It can open students’ eyes to the life outside the door and it can reinvigorate local cultural traditions. The science educators writing in this book, from Arizona to Australia, are bringing science education alive through infusing it with the terroire of local people and places. They are creating hope through providing opportunities for students to learn science through making their lived-in communities better places.

Science education, in the later part of the twentieth century was about homogenization and standardization, about making sure that every student got fed the same piece of denatured information in the same way on the same day. But this assumed that all our students were the same color, from the same cultural traditions, had the same opportunity for socioeconomic success. In the twenty-first century,

science education instead needs to appreciate, to adapt itself to the vast array of unique students, problems, and opportunities that present themselves. Many new teachers confront a sea of faces diverse in color, culture, and language ability. How can these new teachers instill the wonder of the biosphere in all of their students, especially those who are marginalized? How will they teach Eduardo, for instance, who just went through a harrowing experience illegally immigrating into the USA, about the Periodic Table of the Elements? And, more importantly, why is that important? Do Eduardo, and Monique, and Abdul really care about the periodic table, or would it be more appropriate to lure them into science by measuring air quality in front of the school when the school buses are idling, or through looking at how traditional methods of agriculture preserve the integrity of the soil? These approaches might actually eventually get them intrigued with understanding what that periodic table is all about.

While you are browsing for unique flavors at that farmers market, you also wind up in a wide variety of intriguing conversations. Your fellow shoppers are talking about genetic engineering, sustainable agriculture, the rivers that run through their lives, the many uses of coconuts. *“I didn’t realize there were so many innovative wonderful thinkers working in my community,”* you muse to yourself. The ideas are so refreshing, so unique, and so important that you feel tickled to be included. The editors and authors of this book make you feel the same way. They stray from the mainstream of annual yearly performance and “teaching to the test” discourse and instead pick up the side conversations, the ones outside the box, that view science education through the widest possible lens. One great achievement here is that the book offers not only new theory but also what-do-I-do-on-Monday ideas so educators can spice up their curriculum and pique their students’ interests. These methods will help students find their own voice, make meaningful connections with their abiotic and biotic environments, and share their narratives with each other and the global commons. These passionate writers view science not as fast-food curriculum, but as a global banquet grown out of deep cultural traditions.

*Cultural Studies and Environmentalism* is organized into three sections: Ecojustice, Place-based Education, and Indigenous Knowledge Systems – each posing incisive questions about the state of education today. In the first section, one of the authors asks: *“Why teach mathematics and science in schools if what students learn is not used or unusable in the everyday life?”* Instead of teaching denatured water chemistry out of the textbook, this author engages British Columbian students in a place-based study of well-water degradation in their region that unfairly impacts low-income residents. The students become active participants in their education and what starts as math and science curriculum evolves into civic activism. Science becomes relevant to righting social wrongs while also teaching good chemistry. This curriculum teaches students how to become democratic citizens participating in community service through the vehicle of making strong connections to the local landscape. They do not just earn a grade on a piece of paper; they can physically see the outcome of their work and feel good about helping their neighbors.

The second section explores the intersections between place-based education, indigenous knowledge, and ecojustice education asking questions such as: *“What*



*is the role of culture in science learning?*” and *“How does a science teacher become an effective instructor of underrepresented, low-achieving, racially marginalized students?”* In one article, David, a Hawaiian science educator, reveals how articulating his own cultural heritage helps him connect with indigenous students. David brings ethnic and social relevance to his curriculum through place- and culture-based science education. David does not just teach about Hawaii through the standardized curriculum. Instead, he and his students cruise the island viewing its flora and fauna through David’s native perspective fused with indigenous art forms such as Hula. This unique vantage point helps all students, but especially engages “at risk” students, who are given perhaps their first opportunity to bond with and take ownership of their own lands. These students learn how to be successful in school and beyond.

The final section of the book ponders how educators can infuse science education with indigenous knowledge systems using the local to help the global. Indigenous people around the world are fighting to keep their lands and natural resources from the capital corporate enterprises looking to earn their fortunes. (Sounds a lot like mining unobtainium on Pandora, does it not?) Many of these contested places are hotspots in science education research. One question asked in this section is: *“How can these communities work together to achieve cultural sustainability for the indigenous people, community survival for the residents of the town and ecological integrity of the natural settings?”* Place-based education is introduced as a viable tool that can help indigenous people navigate the power structures that wage war for their lands. Place-based education, along with participatory research, are portrayed as tools that help indigenous people work with their land sustainably thereby fostering vibrant communities who live symbiotically with their natural environment. These beautiful narratives consider indigenous groups from around the world.

Let us bring science and environmental education back to the here and now, out of the textbook and into the farmers market, with it tendrils stretching out into worm-turned soil, subsurface aquifers, and many generations of traditional knowledge. The world is being gobbled up, faster than a teenager inhaling a bag of chips. But it is these special places around us that provide real nourishment. In these places we quiet our minds, our breath is taken away in amazement, we have fun and sweat, we talk to our God, and we sink our toes into the earth that provides the sweet corn we cherish. Science and environmental education gets cut off from its roots when it denies the nearby. Comenius, a seventeenth-century educator, said: *“Knowledge of the nearest things should be acquired first, then that of those farther and farther off.”* Through starting with the nearest things, the places we can walk to, the local watershed, the animal shelter, the Registry of Deeds, the community garden, we root the curriculum in things we can touch, and be touched by. Once we are touched, we want to know, and the wanting to know becomes the quest for knowledge. Science, rooted in place, becomes a way for students to set right the world.

Paige Jackins  
David Sobel



# Contents

<b>1</b>	<b>The Need for Confluence: Why a “River” Runs Through It .....</b>	<b>1</b>
	Deborah J. Tippins and Michael P. Mueller	
<b>Part I EcoJustice</b>		
<b>2</b>	<b>Nurturing Morally Defensible Environmentalism .....</b>	<b>7</b>
	Michael P. Mueller and Deborah J. Tippins	
<b>3</b>	<b>EcoJustice Education for Science Educators.....</b>	<b>11</b>
	Rebecca A. Martusewicz, John Lupinacci, and Gary Schnakenberg	
<b>4</b>	<b>Toward Awakening Consciousness: A Response to EcoJustice Education and Science Education .....</b>	<b>29</b>
	Michael L. Bentley	
<b>5</b>	<b>Invoking the Sacred: Reflections on the Implications of Ecojustice for Science Education .....</b>	<b>43</b>
	Maria S. Rivera Maulucci	
<b>6</b>	<b>Local Matters, EcoJustice, and Community .....</b>	<b>51</b>
	Wolff-Michael Roth	
<b>7</b>	<b>Engaging the Environment: Relationships of Demography, EcoJustice, and Science Teacher Education in Response to Wolff-Michael Roth .....</b>	<b>83</b>
	Kurt Love, Teddie Phillipson Mower, and Peter Veronesi	
<b>8</b>	<b>Moral–Ethical Character and Science Education: EcoJustice Ethics Through Socioscientific Issues (SSI).....</b>	<b>105</b>
	Michael P. Mueller and Dana L. Zeidler	

**9 What’s Wrong with Genetic Engineering? Ethics, Socioscientific Issues, and Education** ..... 129  
Bradley D. Rowe

**10 Action-Based Science Instruction: Service-Learning, Stewardship, and Civic Involvement**..... 137  
Jennifer Ponder and Amy Cox-Peterson

**11 Developing a Sustainable Agricultural Curriculum in Malawi: Reconciling a Colonial Legacy with Indigenous Knowledge and Practices**..... 151  
George E. Glasson

**12 When Elephants Fight, It Is the Grass That Suffers** ..... 165  
Norman Thomson

**13 Working for Change: Reflections on the Issue of Sustainability and Social Change**..... 171  
Ajay Sharma

**14 Questions for Copenhagen: EcoJustice Perspectives and Summary** ..... 181  
Deborah J. Tippins and Michael P. Mueller

**Part II Place-Based (Science) Education**

**15 Place-Based (Science) Education: Something Is Happening Here** ..... 187  
Michiel van Eijck

**16 Educating-Within-Place: Care, Citizen Science, and EcoJustice** ..... 193  
Doug Karrow and Xavier Fazio

**17 Invoking the Ontological Realm of Place: A Dialogic Response**..... 215  
Jennifer D. Adams, Sheliza Ibrahim, and Miyoun Lim

**18 A Case Study of David, a Native Hawaiian Science Teacher: Cultural Historical Activity Theory and Implications for Teacher Education** ..... 229  
Pauline W.U. Chinn and David D. Maika’i Hana’ike

**19 Deconstructing Chinn and Hana’ike: Pedagogy Through an Indigenous Lens** ..... 247  
Suzanne L. Stewart

**20 Critical Pedagogy of Place: A Framework for Understanding Relationships Between People in (Contested) Shared Places.....** 257  
Sonya N. Martin

**21 River Advocacy: Valuing Complex Systems as the Groundwork for River Relationships.....** 269  
Tina Williams Pagan

**22 Bringing the Invisible to Light: Art as Places for Advocacy.....** 275  
Jamie Calkin

**23 River Advocacy as a Case of/for Novelizing Discourse in Science Education.....** 281  
Michiel van Eijck

**24 Implications of Sense of Place and Place-Based Education for Ecological Integrity and Cultural Sustainability in Diverse Places.....** 287  
Steven Semken and Elizabeth Brandt

**25 Responding to Place.....** 303  
David B. Zandvliet

**26 Envisioning Polysemiticity: Generating Insights into the Complexity of Place-Based Research Within Contested Spaces.....** 315  
Christina A. Siry

**27 Place-Based Education as a Call from/for Action.....** 323  
Michiel van Eijck

**Part III Indigenous Knowledge Systems**

**28 One Hundred Ways to Use a Coconut.....** 331  
Jennifer D. Adams

**29 Traditional Ecological Knowledge, Border Theory and Justice.....** 337  
Lyn Carter and Nicolas Walker

**30 Considering the Consequences of Hybridity: Protecting Traditional Ecological Knowledge from Predation.....** 349  
Deborah J. Tippins, June George, and Stacey Britton

<b>31 On Critical Thinking, Indigenous Knowledge and Raisins Floating in Soda Water</b> .....	357
Christopher Darius Stonebanks	
<b>32 Rethinking Models of Collaboration in Critical Pedagogy: A Response to Stonebanks</b> .....	377
Cory Buxton and Eugene F. Provenzo, Jr.	
<b>33 “What Is Ours and What Is Not Ours?”: Inclusive Imaginings of Contextualised Mathematics Teacher Education</b> .....	385
Bal Chandra Luitel and Peter Charles Taylor	
<b>34 Responding to Glocalisation and Foundationalism in Science and Math</b> .....	409
Dawn Sutherland and Denise Henning	
<b>35 Australian Torres Strait Islander Students Negotiate Learning Secondary School Science in Standard Australian English: A Tentative Case for Also Teaching and Assessing in Creole</b> .....	415
Philemon Chigeza and Hilary Whitehouse	
<b>36 Are We Creating the Achievement Gap? Examining How Deficit Mentalities Influence Indigenous Science Curriculum Choices</b> .....	439
Jennifer Lance Atkinson	
<b>37 Indigenous Stories: Knowledge Is Sometimes Where You Least Expect to Find It</b> .....	447
Lauren Waukau-Villagomez and Curry S. Malott	
<b>38 Ways to a Waterhole</b> .....	455
Jennifer D. Adams	
<b>39 Ecodemocracy and School Science: How Projects of Confluence Guide the Development of the Ecosociocultural</b> .....	461
Michael P. Mueller and Deborah J. Tippins	
<b>Name Index</b> .....	481
<b>Subject Index</b> .....	489

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Michael L. Bentley is retired from the science education faculty of the University of Tennessee. He has taught at the elementary, middle-school, and high-school levels and has also worked in science museum education, school administration, and state-level curriculum supervision. He is a founder of the Community High School in Roanoke, Virginia. His latest book is *Teaching Constructivist Science, K–8: Nurturing Natural Investigators in the Standards-Based Classroom*.

Elizabeth A. Brandt is a professor of anthropology and linguistics at Arizona State University. Her research includes indigenous knowledge systems and the social constraints on knowledge structure and dissemination, traditional ecological knowledge, patterns of land use, land claims, and gender. She does collaborative community-based research on issues of traditional cultural properties and protection of culturally significant places. She also works on issues of culture, language, and education.

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Jamie Calkin is an adjunct professor who teaches science education courses for elementary teachers at the University of Georgia. He is also an accomplished artist. Formerly a high-school science teacher, Jamie began his art career while in graduate school; his dissertation was an arts-based narrative inquiry into co-teaching science using the visual arts.

Lyn Carter currently lectures in science and technology education to undergraduate primary and secondary teacher education students at the Australian Catholic University in Melbourne. She also lectures in postgraduate education particularly in the areas of research methodologies and contemporary issues in curriculum. Her current research focuses on the broader influences on science education, and the use of cultural theory as a way of expanding research within science education. She has published extensively in prominent international science education journals.

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George Glasson is a professor of science education and coordinates the secondary science education program at Virginia Polytechnic Institute and State University in Blacksburg, Virginia. He has conducted research and developed curriculum on ecological sustainability and culture in Malawi since 2003. His research is framed



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As a science teacher at Kawanakoa Middle School David D. Maika'i Hana'ike has coordinated more than 50 field trips designed to incorporate indigenous Hawaiian culture into place-based instruction. His work with colleagues supports greater understanding of culturally diverse and "at-risk" students from Pacific Rim countries. David has tracked his family's DNA to the Amis tribe of Taiwan where he has worked with educators on instruction relevant to Taiwan's aboriginal people.

Denise K. Henning is the president and vice-chancellor of the University College of the North and a committed educator who has become a leader in administration in higher education. A Cherokee/Choctaw originating from Creek County in Oklahoma, she has a deep passion for equity and inclusion in higher education. Her research includes Aboriginal graduate student persistence and completion, Aboriginal women's issues, and reducing the disparity of mathematics, science, and literacy attainment of Aboriginal students.

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Paige P. Jackins is a doctoral candidate in environmental studies at Antioch, New England where her work is focused on environmental literacy, multicultural education, and critical pedagogy of place. A former secondary environmental science teacher and mentor, she is currently a member of the education faculty at the University of Phoenix, where she teaches pre- and inservice teachers with an interest in English language learning.

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Miyoun Lim is an assistant professor in science education at Georgia State University. Her research focuses on issues of equity and social justice in education, place-based education with an emphasis on the urban context, and connected science education. Drawing on ethnographic and participatory methodologies, she works collaboratively with urban students, educators, and schools to promote connected science teaching and learning and environmental sustainability.

Kurt A. Love is an assistant professor of education at Central Connecticut State University. He focuses on ecojustice, feminist, queer, and critical pedagogies in science education and education in general. His research includes examining hegemonic pressures that prevent new teachers and student teachers from implementing transformative and emancipatory pedagogies.

Johnny Lupinacci is a high-school mathematics and science teacher in Dearborn, Michigan, and an instructor of social foundations of education at Eastern Michigan University. He is a founder and production editor of *The EcoJustice Review* and codirector of the Center for EcoJustice Education. He is committed to educational reform that uses ecojustice theory and pedagogy.

Bal Chandra Luitel is a doctoral student at the Science and Mathematics Education Centre (SMEC), Curtin University of Technology, Australia. He has been working in Nepal as a teacher educator for about a decade. Guided by multiple paradigms of postmodernism, integralism, and criticalism, Bal's research aims at developing a transformative philosophy of mathematics education in Nepal.

Curry Malott is a professor of education at D'Youville College in Buffalo, New York. He has served as an educational consultant for Menominee Tribal School and Menominee High School on the Menominee Indian Reservation in Wisconsin. His most recent books include *Teaching Native America Across the Curriculum: A Critical Inquiry* with Chairwoman Lisa Waukau and Lauren Waukau-Villagomez; *Policy and Research in Education: A Critical Pedagogy for Educational Leadership*; *Critical Pedagogy in the 21st Century: A New Generation of Scholars* coedited with Bradley Porfilio; and *Critical Pedagogy and Cognition: An Introduction to Postformal Psychology*.

Sonya Martin is assistant professor of science education in the Goodwin College of Professional Studies at Drexel University. Her research focuses on urban science teacher education and teacher preparation. In particular, she examines cogenerative dialogues and video analysis as tools for engaging classroom science teachers and their students in research to improve science teaching and learning in urban classrooms.

Rebecca Martusewicz has been a teacher educator at Eastern Michigan University for 21 years. She is director of the Southeast Michigan Stewardship Coalition, developing community-based-learning framed by the theory and practice of ecojustice with regional schools. She is coauthor of *EcoJustice Education: Teaching for Diversity, Democracy, and Sustainability* with Jeff Edmundson and Johnny Lupinacci.

Maria S. Rivera Maulucci is an assistant professor of education at Barnard College, Columbia University. Her research focuses on how teachers learn to teach for social justice and explores identity, agency|passivity, emotions, and the social context of teacher learning. Her work explores how teachers strategically activate material, cultural, social, and symbolic resources to resist the marginalization of science and emotions preservice teachers navigate as they engage in the process of becoming social justice educators.

Teddie Phillipson Mower is the director of the Center for Environmental Education and program coordinator for environmental education at the University of Louisville. Her research interests include intellectual and ethical development as it relates to navigating controversial issues, multiple worldviews, and the natural world. Her work with formal and nonformal teachers and teacher candidates emphasizes critical thinking skills, science for all learners, local relevancy, and issues of justice.

Michael P. Mueller is an environmental philosopher and science education professor at the University of Georgia. His philosophy focuses on how privileged cultural thinking patterns frame our relations with others including nonhuman species and physical environments. His research includes ecosociocultural theory, ecojustice, citizen science, nature schools, teacher preparation, and youth activism.

Tina Williams Pagan is a doctoral candidate in the Department of Mathematics and Science Education at the University of Georgia. Her interest in nature and local environmental issues prompted her studies, research, and outreach educational efforts in the field of water resources. Her dissertation research focuses on how science organizations can draw on local knowledges in addressing contemporary environmental issues.

Jennifer Ponder is an assistant professor in the Department of Elementary and Bilingual Education at California State University, Fullerton. She teaches social studies and science methods courses in the credential and graduate teacher education program. Her research interests include service learning, youth activism, democracy and education, ecojustice, and the infusion of fine arts into the curriculum. She is particularly interested in working with teachers and their students to examine social and environmental issues, and take action in their communities and beyond.

Eugene F. Provenzo, Jr. is a professor in social and cultural foundations at the University of Miami. The author of a wide range of books in cultural studies, literacy, technology, and educational history, he is particularly interested in the history of science and the development of scientific and historical thinking in children. With Cory Buxton, he has coauthored *Science Education for Elementary and Middle School Teachers: A Cognitive and Cultural Approach*, and has also recently completed with Buxton, *Place-Based Science Education*.

Wolff-Michael Roth is Lansdowne professor of applied cognitive science at the University of Victoria. His general interests include the study of knowing and learning across the entire life span, especially in the domains of science and mathematics. He engages in low carbon generating practices, grows all of his vegetables and many fruit and berries year-round, and has reduced garbage to one can per year. His recent publications include the edited volume *Science Education from People for People: Taking a Stand(Point)* and *Dialogism: A Bakhtinian Perspective on Science and Learning*.

Bradley D. Rowe is a doctoral student in the school of educational policy and leadership at Ohio State University. His areas of scholarship are in philosophy of education, environmental ethics, and educational policy.

Gary Schnakenberg has been a public high-school teacher for 23 years in southern New Hampshire. He teaches interdisciplinary courses, AP human geography, and has worked as an instructor in the geography department at Keene State College. He is currently pursuing a Ph.D. in geography at Michigan State University in the "nature and society" program, examining interactions between smallholder agriculture and economic globalization in Jamaica.

Steven Semken is an ethnogeologist and geoscience education professor at Arizona State University. His research centers on the significance of place, culture, and affect in Earth science teaching and learning, and is situated in the diverse

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Ajay Sharma is an assistant professor in the Department of Elementary and Social Studies Education at the University of Georgia, Athens. His scholarship focuses on studying classroom discourse in K-12 science classrooms and science teacher education programs from the perspectives of justice and equity. He is also interested in exploring implications of climate change and neoliberalism for science education and the democratic agenda of schooling.

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# Prologue

**Michael P. Mueller and Deborah J. Tippins**

When Deborah first approached me about this book project, I was excited that we might have the opportunity to hinge together these three fitting discourses in environmental and science education. As many individuals know, the discourses of ecojustice, place-based education, and indigenous knowledge systems often remain marginalized within the national and international school environments across the USA and the world. There are definitely exceptions where common grounds are sought. Unfortunately, however, tensions remain about whether the environment should play a significant role in what students learn in schools, or whether science education should stick with the historical modes of inquiry. Deb and I both share a passion for the Earth and cultural diversity, so this project certainly builds on what we have developed a deeper love for. It is also exciting to work with Michiel and Jen who share our interests and bring even greater attention to these natural ecologies.

This book weaves together vibrant dialogues developed in ecojustice, place-based education, and indigenous knowledge systems' literatures for cultivating conversations about the significance of a more holistic way of thinking about people and the Earth in relation. We anticipate this conversation enlarges the spectrum of thinking within cultural studies and environmentalism. It reminds us to pay more attention to those things that we take for granted in our lives. The chapters that follow are part of a forum of exchange, as those who are passionate tell their stories about ecojustice, place, and indigenous knowledge, and explain their challenges or elaborate ideals. Whenever possible, we asked the authors represented in the book to read generously and provide a caring and thought-provoking deliberation. We invited a wide range of researchers, pedagogues, scholars, teacher educators, and practitioners both in the school and policymaking arenas. This book will hopefully further develop many fruitful departures for the authentic benefits of living in relation with others and the land.

## **The Complexity of Weaving Narratives**

The guiding philosophy for this book is ecojustice. It is informed by place-based (science) education theory and activities, and indigenous knowledge. Since ecojustice is the youngest and most theoretical doctrine, we begin with it and show how

place-based education and indigenous knowledge provide complexity and clarity for ecojustice theory. Educating for ecojustice is a way of learning about how we frame the world around us and why that matters. Ecojustice comprises anthropological and sociological understandings of cultural groups (Bateson 1972). It also concomitantly comprises many millennia of traditional knowledges which concurrently developed with ecology. In this sense, the ecological sciences draw on a resource of collective ways of knowing about how to mediate worldviews that have adverse influences and impacts. At the beginning of the book we are met with the poetry of Arthur Stewart. In his writing about “ecologists,” he notes:

We studied sand-dunes and the tendency of fish to move  
 with flow, the population dynamics of goldenrod,  
 teasel, lupine, geckos, whip-tail lizards,  
 scissors-tail flycatchers, foxes,  
 those capable  
 and incapable of flying,  
 indeed an entire suite  
 of wet, dry and wiggly things.  
 Now suddenly it seems  
 each day the sun rises a bleary slab  
 of orange or pick under a smear of clouds. I think  
 yes, we really should give homage.  
 to Santa Rosalia: we really should  
 bow and give thanks  
 to Our Sacred Sister, the long-haired  
 Sweet Lady of Perpetual Notion (2003, p. 83).

Stewart illuminates what it takes to protect and conserve the Earth and pays homage to the responsibility and humility of communion. He describes this wise idea as Perpetual Notion.

Perpetual Notion also affects participatory democracy. Joshua Blu Buh (2009) brilliantly writes about the impossibility of separating ecology from democracy by using an example of environmental history of eradicating Fire Ants:

The job of the scientist was not to battle nature, but to elucidate natural processes and find ways to accommodate human life to the rhythms of nature. This view of the relationship between science and nature was seen to serve democracy in several different ways. Some saw the protection of nature as the promotion of spiritual values above economic ones, and thus a means for creating a better citizenry. Some felt that wildlife was one of the nation’s most important natural resources and thus its conservation was a way of maintaining the country’s strength. Others felt that living in accord with nature proved the vitality of democratic institutions. If insecticides, say, were used without regulation, killing wildlife, that meant that agricultural agencies had gained too much power and warped the political process, silencing those who voiced a concern for wildlife. A rich, varied natural world was evidence of a strong democracy, in which policies were set to appease competing factions. The USDA’s favoring of agriculture over wildlife in the fire ant wars represented a threat to American democracy. (p. 354)



Correspondingly, Gregory Bateson (1972) envisioned Perpetual Notion would be essential to larger ecological policy choices and that we ought to evaluate knowledge based on the degree in which diversity is represented within the policymaking process. He suggested that adversarial ideas should not be abandoned, but rather limited (or restrained) with regards to how affective they are. For example, Bateson suggested that if we were to restrain technological progress, population increase, or the impact of human “hubris over nature,” we would be better off as a species living with finite resources. Despite Nature’s way, we make decisions to limit how we deal with the unpredictability of unforeseen uncertainty in Nature. In other words, we ought to adapt to Earth’s evolving preeminence and this Perpetual Notion takes more than science to understand, which is why we invited many diverse voices to participate in this conversation.

Diverse cultural assumptions are complex and might even be considered multifaceted when evaluated for associated influences. By analyzing endorsed worldviews and how they influence actions, we can pay closer attention to what might be invisible otherwise. In essence, analyzing assumptions makes the “invisible more visible,” which in turn reminds us of the now explicit behaviors that we endorse. Considering these behaviors, for example, we might restrain ourselves from relying on the worldwide Internet for finding new sources of knowledge and learning cultural skills. Rather we might turn to our community for these knowledges and skills. We might increase the time we spend talking with our neighbors or travel to the local farmer’s market to purchase groceries. Analyzing cultural assumptions through cultural studies and other forms of educational research can rejuvenate our love for one another.

A brief point on ecojustice, for clarity. Note that ecojustice is not social and environmental justice – its priorities span the globe. On the one hand, environmental justice does not do justice to ecojustice. It seldom explores beyond ideas regarding adverse social problems limited to the ways in which humans live with particular environment conditions and ills. On the other hand, social justice has been too focused on unclear social and environmental concerns for people. While there are many problems facing humankind, social justice has actually exacerbated, say, the ways in which natural resources are used and also thereby increased anthropogenic environmental disruptions. This anthropocentrism can be seen unfolding and attributed to the way people in countries such as India and China are after the same sorts of justice or “standards of living” that have been afforded to people in North America for many years. Why should people living in these countries be denied the opportunities to justly live a quality of life granted to a few? It seems counterintuitive to deny others the same lifestyle lived by those who are in more economically advantaged countries. Questions that emerge are complex and have to do with the ways in which humans are thought of as this way or that way, or “what counts,” in relation with the ways people value values in economically advantaged nations (middle-class norms). The questions go beyond what can be analyzed with forms of social justice that are still reaching for larger participatory democracy.

This book initiates the conversation around many facets of ecojustice broadly, and gives new directions for approaching these difficult topics proactively. Most educational questions span the globe; issues of justice can be derived from almost every neighborhood, city, forest, stream, or mountainside. We learn by engaging in physical geographies in different ways, not always generalizable yet definitely educational.

Thus, education is the goal of ecojustice philosophy. Ecojustice recognizes the appropriateness and significance of learning from dynamic place-based (science) experiences and indigenous knowledge systems rather than depending on less affective ethical imperatives for the much needed impetus for environmentalism (Mueller 2009). When schooling is acknowledged as a small part of the larger educational domain in which we live and learn, then we turn to the knowledge, activity, and practice embedded within communities. The larger educational domain provides all that we need to show personal and shared agency, environmentalism, and sustainability. There is no need to indoctrinate individuals into a “green agenda.” Rather, we strive to learn from the education of community people, those who possess a differentiated status of knowledge and skills. These traditional knowledge and skills will take many different forms, and thus, can be found in every place that has a “local” worldwide. Educating for justice needs educators who are willing to engage with questions of how to live in relation with others and Earth’s others in perpetuity.

*We anticipate and hope this book will further develop interesting conversations around which we might travel as science educators.*

Given these ideas, this book offers some generative Perpetual Notion for furthering the conversation and developing homegrown talent, narratives, and ecologically influenced knowledge, skills, and events. Ecojustice provides a platform to champion regional places and global relationships around coffee, literacy, materials, schools, and so forth. There are a plethora of other examples that this book will charge, and we would use this book as a nuanced lens for evaluating ideas.

If nothing else, let the debacle begin! There is plenty of room for absurdity, humor, irrationality, irony, and scrutiny for interested scholars. How do we become more aware of, say, what it takes to be on this big blue Orb? Stewart (2003, p. 36):

if I let my hair grow tangling  
 and cast off this coat and step  
 out of these shining shoes  
 could I become that wild  
 green man in autumn barefoot,  
 eating locusts, tasting the rich  
 lather of fermenting honey—  
 could I feel the hard storm coming and see  
 more clearly than I see now?

Then it is the charge that this book provides a space for cultural studies and environmentalism not marginalized within the dominant literature. In some cases,

this book plugs an alarm clock for individuals who are complicit with sleeping in while the Earth's environment "heats up!" (i.e., changes). This book provides a nuanced lens for evaluating and resolving a few complicated educational problems and community conditions, while protecting and conserving the most threatened narratives.

These narratives if lost, would affect us in ways that will be discussed more fully in the third section on indigenous knowledge, where children and their teachers share some of the responsibility for setting things right through place-based work. (Please note that the terms "Aboriginal," "Indigenous," "Native," and "Elder" are capitalized depending on the use by the author within each of the individual chapters and rejoinder.) The second section on place highlights these practices associated with schooling and provides important experiential understandings needed to argue for education centered largely on justice when integrated holistically. With a diversity of voices coming together to initiate these conversations around the confluence of ecojustice, place-based (science) education, and indigenous knowledge systems, this book is an important starting point for educators in many facets of life. Throughout the book, the weaving has been done conspicuously and we anticipate this book brings into better focus a vibrant role for the Earth's ecosystems, within ecosociocultural theory and participatory democracy, which engenders a new era of peace.

Please join in this conversation for justice, place, and wisdom.

## Breaking Free

We are bound

to this Earth, our island home,  
 by the logic of our domination: by leafy  
 shades of green and gray, by walls  
 built up, torn down, rebuilt,  
 made permeable  
 (oh, if we work hard connecting  
 youth with age, mysteries  
 with fact) – yes! – made permeable  
 by living well between place and being,  
 centering where locale arises, where thought  
 originates – pause there  
 a moment before flying  
 across lands, rivers, streams,  
 the dry and stony ground  
 of one place giving rise  
 to forests, and dark forests  
 giving rise beneath you to hills, and those at last! To rough-shouldered mountains  
 juxtaposed, multifaceted, teeming with wild

beliefs, concerns, the Earth  
 turns slowly,  
 blue orb in black space; it remains  
 gracious: it feeds us,  
 pities us, stirs us, holds up  
 the mirror of what we do.  
 Learn by doing and teach  
 through the heart:  
 science, our great construct, is not  
 value neutral. Lean forward and taste it:  
 oil, spark, salt and cinnamon; hear it,  
 a hundred thousand voices; speak it  
 in your own tongue, negotiate  
 each new idea, a bright coin.  
 Arthur J. Stewart

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# Chapter 1

## The Need for Confluence: Why a “River” Runs Through It

Deborah J. Tippins and Michael P. Mueller

In the recently released *The World of Science Education: Handbook of Research in North America* (Roth and Tobin 2009), Regina Smardon (2009) provides a brief history of sociocultural and cultural-historical frameworks for science education. Smardon’s key point is to bring together sociocultural and cultural-historical activity theories in science education to analyze the complexity of cultural staying power, change, and individual and collective agency. This book builds on sociocultural theory by enlarging the conversation around the ecosociocultural confluence of eco-justice, indigenous knowledge systems, and a sense of place, and demonstrates how they also lead to a greater participatory democracy. Creating participatory democracy through cultural studies and environmentalism is in line with this mission of confluence, situations where we participate and advocate through actions.

### Considering Confluence

Our lives are filled with many examples of confluence. Science-fiction writers and readers gather annually at their confluence convention to share new visions and ways of expressing their literary ideas. At the Biannual Confluence Conference sponsored by the Chesapeake Bay Foundation participants discuss the significance of resource conservation. Confluence is a theme central to the annual meetings of the Surface Design Association. And recent developments and innovations in communications technology have led to the creation of Confluence, a social networking platform. It is no coincidence that the notion of confluence, defined in the classical geological sense as “the flowing together of two or more streams,” has inspired

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creativity across diverse aspects of society. In the same way that streams and tributaries flow together to create a mightier current, we draw on our understanding of confluence to bring together three powerful currents – ecojustice, place-based education, and indigenous knowledge systems. Scientists often acknowledge gravity as the instigator of processes that draw moving water and runoff materials downhill, forming streams, tributaries, and rivers that shape the surface of the Earth. Near the source of rivers, water may flow out at a moderate rate. But as more runoff and tributaries are drawn into rivers, a confluence is created and the rate of flow increases until the water eventually slows and forms a floodplain where it empties into a lake or ocean. The journey of a river mirrors the way we envision the intersection of ideas in this book. By examining the confluence of ecojustice, place-based education, and indigenous knowledge systems, we hope to invoke new insights, create fresh patterns, etch out new channels, and forge a deeper flow of ideas. It is the intermingling of these currents that will allow ideas to merge and make visible assumptions and relationships previously hidden. Through the intersection of experience represented in this book, we hope to foster unique questions and invite further inquiries.

## **The Need for Confluence**

In terms of the educational literature around ecojustice, place-based education, and indigenous knowledge systems, there are currently few articles and books written about them in an integrative way. A significant problem for these ideas is that although they play a major part in what we do as science educators, they remain in the margins of science education and environmental literatures. However, there is an increasing interest in these topics within cultural studies and environmental literature.

Historically, science education research has not always recognized and captured the diverse ways in which all science educators are teaching within the larger educational domain. In the attempt to isolate and analyze educational phenomena, we have not always been educated to think in terms of confluence or uncertainty. With great trepidation, we may now be forced to consider the world as a web of multidimensional and interrelated phenomena that require us to recognize and deal with the possibilities of uncertainty.

Our educational quest for certainty has influenced efforts to produce generalized science understandings which can be applied to any location. However, solutions to some of today's complex educational, environmental, and sociological issues are elusive, formulated outside the wider concerns of justice, place, and indigeness. Test-driven curricula, for example, are rooted in a fragmented worldview with little concern for the affective, emotive, and intuitive science understandings essential to solving pressing problems of the world. In one sense, this book questions accepted narratives, exploring ways to renew our sense of injustice and reconnect ourselves with nature.