Why Garden in School?

Carter D. Latendresse

The Catlin Gabel School

Abstract

This paper is an argument for gardening in schools, focusing on two months of integrated English-history sixth grade curriculum that explores the relationships between a number of current environmental problems—notably hunger, water scarcity, topsoil loss, and global warming—and the land-use practices that led to the downfall of ancient Mesopotamia. This paper suggests that world leaders today are repeating some of the same mistakes that caused desertification to topple the Sumerian empire. It then explains how our sixth grade class explores solutions to the existing emergencies by studying Mesopotamia, ancient myth, gardening, and contemporary dystopian fiction. Finally, this paper posits a new cosmology that might help to remake western civilization, saving it from the threat of present-day ecological crises.

Why Garden in School?

Part I: Four Enduring Understandings

During the fall months in my 6th grade English class, I teach gardening, ancient flood stories, contemporary dystopian literature, and ancient Mesopotamia. My colleagues and I ask our students to look backward to identify essential characteristics of the first human civilizations, so that they might look forward and imagine remaking Western civilization in the 21st century. During these lessons, my history teacher partner focuses on the development of agriculture in the Neolithic Age (8000 BCE to 3000 BCE), the rise of Sumerian city-states, the four empires of Mesopotamia, and the characteristics of ancient civilizations. In my English class, my curriculum parallels and interweaves with these topics at crucial points, especially around issues of soil, water, food, climate, environmental justice, and the stories we tell ourselves as humans to orient ourselves to Earth, to one another, to the other animals, and to the cosmos. Sixth grade students and teachers at our school can often be found outside during September and October, harvesting apples, grinding wheat, learning about bee keeping, planting overwintering lettuce, or baking pita bread in the garden cob oven. Several people have asked, "What does the garden have to do with English or history class?" or "Why do you garden in school?" This essay is an attempt to answer these questions.

The sixth grade teaching team begins its unit from the principles enunciated in the seminal curriculum design text, *Understanding by Design*, by Grant McTighue and

Wiggins (2005). The authors show that the best teaching is, paradoxically, in preparation for college while it is also, at the same time, as John Dewey (1897) says, part of an informed "process of living and not a preparation for future living" (Article Two: What the School Is section, para. 2). We strive to present riveting, relevant, future-thinking curriculum that is rooted in solving the problems and celebrating the wisdom that exist today. The problem-based teaching with a backward design process outlined in *Understanding by Design* offers us a good model on how to remain, simultaneously, college preparatory and focused on today's most pressing issues. The garden is our place of intersection for the teaching of ancient history, the novel, writing, economics, politics, anthropology, religion, myth, and science. Pedagogically, we have nine reasons for teaching the Sumerian empire in our organic garden behind the middle school building. These nine reasons grow up out of the four enduring understandings we want our students to chew on for the rest of their lives.

The first enduring idea or understanding is that the aims and desires of most people on Earth have been fundamentally similar since hunter gatherers first domesticated crops and animals in Iraq 10,000 years ago, *and* we can empathize with those people because we too desire, at bottom, the same things, which are connection and belonging. As humanities teachers, we do not present what some might term a traditional history curriculum to our students that focuses on names, dates, generals on battlefields, or famous men elected president. Such a presentation presupposes that the victors of confrontations make history, and that conflict, violence, and the will to power are the unconscious driving impulses scaffolding the metanarrative of the human species. Instead, influenced by new scholarship focusing on empathy, mirror neurons, the lives of

women, the colonized, and ordinary people throughout history, we begin by asking, *Whose stories get left out of history, and why?*[1] We unearth representative stories that could stand for the great silent majority of human history, and we presuppose, along with Jeremy Rifkin (2009, p. 9-26), that the deepest unconscious desires of Homo sapiens include companionship in towns that provide nutritious food, clean water, and safe homes for our children. By studying Mesopotamia, we get a snapshot of people putting these desires into action when they created the world's first cities.

Our second enduring idea that we want our students to return to throughout their lives is that there exists today a phalanx of interwoven problems facing the human species—global warming, hunger, biodiversity loss, deforestation, poverty, water scarcity, topsoil depletion, each of which is exacerbated by overpopulation. While these global issues may feel both overwhelming and unapproachable, during the autumn of the sixth grade year, we teach that several of these problems are causal, one giving way to the other, and all have their roots in practices one can find in Mesopotamia. Such practices included clearing the land of trees, erecting massive irrigation systems, then farming monocultures, which led to erosion, then desertification, and then later empire collapse.

Ten years ago, *Time* magazine, in its August 26, 2002 edition, released a Special Report entitled *How to Save the Earth*. "Up to a third of the world," the authors noted, "is in danger of starving. Two billion people lack reliable access to safe, nutritious food, and 800 million of them—including 300 million children—are chronically malnourished" (Dorfman & Kluger, 2002, p. A9). The authors also presented startling statistics on water

[1] Important texts for us for what I'll call historical predisposition include *White Over Black*, by Winthrop Jordan; *A People's History of the United States,* by Howard Zinn; *Hidden from History*, by Martin Duberman; *The Chalice and the Blade,* by Riane Eisler; and *Weaker Vessel,* by Antonia Fraser.

scarcity: “At present 1.1 billion people lack access to clean drinking water and more than 2.4 billion lack adequate sanitation. ‘Unless we take swift and decisive action,’ says [then] U.N. Secretary-General Kofi Annan, ‘by 2025, two-thirds of the world’s population may be living in countries that face serious water shortages” (Dorfman & Kluger, 2002, p. A10). Whereas *Time* magazine did not then connect the dots on the ecological problems it investigated, other writers since that time have.

J.R. Rischard’s (2002) *High Noon* was similarly foreboding but more thorough. The former vice-president of the World Bank gave us twenty years to address twenty pressing and mutually destructive environmental concerns such as global warming, deforestation, biodiversity loss, fisheries depletion, and water shortages. One wonders how far we’ve come in half our twenty years. Joining the chorus, the eminent historian Jared Diamond (2005) likewise proposed, in his book *Collapse,* his own list of eleven similar and overlapping ecological problems that require immediate attention: problems such as—pardon the repetition—deforestation, coral reef destruction, fisheries depletion, erosion and topsoil loss, the end of peak oil, lack of potable water, toxic chemical pollution, global warming, and overpopulation (Diamond, 2005, p. 487-496). Similarly, Clive Ponting (1991) argued that each empire, whether Sumerian, Egyptian, Roman, or Mayan, follows the same paradigm, already alluded to, during its downfall: deforestation, erosion, monocropping, overwatering, desertification, and eventual collapse.

What we want our students to investigate, as part of this second enduring understanding, is that these problems are interconnected. Global warming, peak oil, the global food crisis, poverty, the loss of healthy local economies, and biodiversity loss are mutually-supporting spokes of a wheel that continues to roll over the backs of billions,

especially in the southern hemisphere. “It is wrong to grow temperate-zone vegetables [as monocrops for export, such as bananas] in the tropics and fly them back to rich consumers,” Vandana Shiva (2008) writes, articulating some of the sometimes hidden interplay between injustice and ecology. “This uproots local peasants, creates hunger and poverty, and destroys local agro-biodiversity. . . . Since vegetables and fruits are perishable, transporting them long distances is highly energy-intensive, contributing to climate change” (p. 128). Throughout the years, Shiva has continued to elucidate the point that the global food industry perpetuates economic and environmental injustice for local, most southern hemisphere economies that export monocultured cash crops such as sugar, bananas, coffee, cotton, chocolate, and tea to more wealthy countries overseas. Healthy local economies and ecosystems overseas are compromised, even ruined, by the industrialized global food system.

Carolyn Merchant (1989, p. 52) and Shiva (2008, p. 105) likewise note the tendrils connecting seemingly disparate issues: when lands are cleared for monocrop exports, pesticides and inorganic nitrate fertilizers are typically poured into the diminishing soil, which then invites pests and disease—as monocultures have easier genetic codes to crack than biodiverse fields—which in turn increases the need to clear and deforest more land for cultivation. So-called free trade agreements and exporter-friendly loaning institutions—such as the World Bank and the World Trade Organization—conspire to wrest land from local subsistence farmers so that the multination agribusiness corporations can buy out smaller farmers and expand.

Noting the preceding, concerned parents might worry that their children will look around the world—at India, Mexico, Ecuador, Indonesia—and assume that we in the U.S.

are foisting our relative strong economy on other nations and therefore insisting that the errors of Mesopotamia be repeated in other modern countries today. We teachers share this concern, but we lean toward the notion that people, in their deepest recesses, seek belonging and connection rather than power and exploitation. In addition, we resist the hard-hearted theory of British economist Thomas Malthus (1999), who in 1798 proposed that population growth would outrun the ability of the world to produce food. Overpopulation, he said, would lead to war, famine, disease, and other calamities that would curtail human reproduction in a kind of macabre, unsentimental balance. Instead of simply cataloguing wrongdoing across the world and assigning blame, shrugging our shoulders in an unfeeling social Darwinism—which is counterproductive, in the end, to the creation of the empathic civilization[2] that we hope to create—we sixth grade teachers like to move quickly to our third enduring understanding, which seeks to empower the students with problem-solving strategies.

The third enduring understanding we unpack for our students is that just as the current aforementioned global problems are interwoven and therefore seemingly intractable, multiple solutions will be employed this century on an international scale, and we, paradoxically, might most easily help on campus by studying local, organic food, responsible water use, and enlightened community engagement. If we grow organic vegetables at school, for example, in raised beds using low-evaporation drip irrigation, using seed we've collected from the previous year, and then we later harvest and eat that produce at lunch in our salad bar, we show the students how to support healthy, local, biodiverse economies—and overseas farming economies, by extension, who might

[2] The phrase is Jeremy Rifkin's from his book by the same title.

convert their fields back to feeding their own peoples—while also reducing the use of inorganic fertilizers and pesticides, as well as diminishing global warming that follows energy-intensive global packaging, refrigeration, and shipping.

Paul Hawken (2007) states that the movement to establish a more sustainable world "has three basic roots: environmental activism, social justice initiatives, and indigenous cultures' resistance to globalization, all of which have become intertwined" (p. 12). We in the sixth grade teach all of these topics during our fall Mesopotamia unit so that our students begin to see that environmental movements are really about social justice and health, at bottom, just as biodiversity is about local sustainability.

Various historians and social theorists suggest ways to live in post-oil economies. Indeed, the genre has become a nonfiction subgenre, claiming whole sections in bookstores.[3] In addition, leading intellectuals, such as Richard Tarnas (2012), are pointing to ecovillages, intentional communities, and small, independent schools such as Catlin Gabel as ways to address a coming crisis of living in the world with more people and dwindling fossil fuel reserves, since smaller nontraditional living and educational sites can more deliberately incorporate the use of alternative energy sources and the new paradigms that are needed to sustain them.[4]

What becomes clear after reviewing the three enduring understandings—human desire creates multilayered problems requiring multilayered solutions—is that the vision

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[3] See http://www.csmonitor.com/Books/chapter-and-verse/2010/1108/10-must-read-energy-books.

[4] In a lecture hosted by Oregon Friends of Jung, at the First United Methodist Church in Portland, Oregon, on April 21, 2012, Tarnas pointed to the following groups as offering sane, sustainable paradigms for the future: Jungian Societies, Waldorf Schools, the New Economics Institute, Esalen Institute, Bioneers, Pacifica Graduate Institute, Findhorn Foundation, and the California Institute of Integral Studies.

of human history we are presenting is paradoxical. Surely, the overall quality of life for most people on the planet today is more comfortable, safe, and enjoyable than it was for people living in the city of Ur in 2500 BCE. Smallpox vaccinations, electricity, indoor plumbing, telephones, computers, automobiles, and a thousand other technological innovations have bettered the quality of human life since the great cities of Mesopotamia fell and were reclaimed by the desert. However, we also live in an age of contradiction, during a time of converging ecological emergencies, and climate scientists might easily join Hamlet in his enigmatic assessment:

> "What a piece of work is a man! how noble in reason!
> how infinite in faculty! in form and moving how
> express and admirable! in action how like an angel!
> in apprehension how like a god! the beauty of the
> world! the paragon of animals! And yet, to me,
> what is this quintessence of dust?" (Shakespeare, 2.2.295-300)

How should we synopsize these seeming contradictions? The students live on a beautiful, amazing planet, but one that is engulfed in growing environmental calamities. It's our job as educators to resist dichotomous, simplistic thinking; rather, we strive to admit the complex truths and to problem solve collaboratively across coalitions and issues. It is also our job to resist cynicism, hopelessness, and paralyzing guilt as we explore these topics with our students. When we look to the past with our students, we can see the choices our ancestors made when they settled around reliable food sources in

the Middle East at the end of the last ice age, building the world's first cities, and we can imagine remaking our future cities this century with smaller carbon footprints.

Our curriculum design around Mesopotamia and the garden is to explicitly connect issues while resisting reductionist mono-issue, silver-bullet thinking. We do not proceed with the idea that a hydrogen economy will replace the topsoil, the fish in the ocean, or the trees being clear-cut in the Amazon. At the same time, we don't deny it won't help. We agree, in short, with Paul Hawken's (2007) premise, in his book *Blessed Unrest*, that there is a massive social justice and environmental conservation movement afoot without one monolithic mission statement or central leadership. This movement is systemic, global, and broad, focusing on many issues and comprised of thousands of groups—for clean air, better public education, water conservation, and bans on GMO in food, for example. Despite the fact that there does not exist some central agency dispensing strategy and dogma, their aims intersect around two main principles: social justice and environmental conservation, which both lead to our last pedagogical goal.

Our fourth enduring understanding is that the stories a culture tells itself about its origins, its purpose, and its future will determine to a large extent that culture's ability to survive the tests of time. Another way of saying this is that the stories we tell ourselves will help us to imagine the solutions we will need to fix the problems we have created. We teachers find that we are able to present both the intersecting problems and the possible solutions by retelling the oldest stories humanity has told itself about its creation, its place in the cosmos, its meaning and purpose. I therefore teach *Gilgamesh* (McCaughrean, 2003), the first of all written stories, from Mesopotamia. I also teach *Genesis* (*Holy Bible*, 2003), perhaps the world's most influential narrative, plus a host of

Greek myths, from the beginnings with Gaea and Uranus, through Cronos to Zeus, Prometheus, and Pandora, finally culminating with Deucalion and Pyrrha (Baker & Rosenberg, 1992). Similarities jump out when the three narrative strands are laid side-by-side: Gods create the world, including humanity; humans either lose or try to gain eternal life and fail; Gods become displeased with humans and send a flood, killing all except for a favored few, who survive in a boat and then go on to repopulate the world with the Gods' blessings. The fact that the oldest stories all focus on an ecological catastrophe that is not dissimilar to the one featured on our nightly news today is not lost on our students. They see, for example, that global warming is melting the polar ice caps today, threatening coastal civilizations with flooding. This isn't a grim news story "out there" somewhere or a tall tale easily relegated to a bookshelf labeled "myth and legend." NOAA reports that half of Americans live within fifty miles of the coast (2011). If the ice caps melt, hundreds of millions worldwide will become ecological refugees. Studying the ancient stories in the contexts of both the founding of human civilization and our current ecological predicaments makes sense, then, as we want the students to analyze the old stories in order to eventually imagine new narratives for the coming century that will include heroic deeds of collaboration in order to create a just global village.

In addition to studying the world's oldest stories, I also teach contemporary dystopian literature to explore a number of possible reactions to potential environmental troubles of the future. The science fiction and fantasy novelists have been at the vanguard of imagining solutions to life's problems for over a century. The students are directed to probe the reasons for civilization collapse in their novels and to imagine resurrections based upon sustainable principles involving soil, water, food, housing, and energy

production. I also pair the dystopian novels and civilization creation projects with nonfiction reading of four *National Geographic* articles on the first civilizations, food insecurity, topsoil loss, and water scarcity.[5] Students are asked to image themselves creating their own civilizations in the next century, given certain definitions for advanced civilization *and* all of the ecological challenges we are facing right now.

Taken together, these four enduring understandings undergird our nine reasons for teaching in the garden. We want to provide students with the backstory for how we got to 2012 as a human species, emphasizing that the study of human history should elicit our empathy rather than condemnation. We also want to provide our students with interpretive lenses with which they can analyze both our current human impact and utter reliance upon Earth. Last, we want to offer students the schemata to remake a more sustainable, just, and enjoyable civilization for the world's citizens in the 21st century.

Part II: Nine Reasons for a Garden

When we present the following nine reasons for our study of Mesopotamia in the garden, we do so in the problem-solution format so that our eleven and twelve year-olds do not feel overwhelmed by the quandaries of history, society, and science, and so that they might exercise their innovation and collaboration during their civilization-creation

[5] Available titles for the 2011 dystopian novel unit included *The House of the Scorpion,* by Nancy Farmer; *The Giver,* by Lois Lowry; *Shipbreaker,* by Paolo Bacigalupi; *Hunger Games*, by Suzanne Collins; and *City of Ember*, by Jeanne DuPrau. The nonfiction articles include "Fresh Water," by Barbara Kingsolver; "Our Good Earth" and "The Birth of Religion," by Charles Mann; and "The End of Plenty," by Joel Bourne, Jr.

group work, thereby feeling efficacious while creating solutions for what ails us today. I will therefore present the nine reasons here in that same problem-solution fashion.

The Water reason

Problem: In his landmark book *When the Rivers Run Dry,* Fred Pearce (2006) tells the story of the Sumerians in the Fertile Crescent 7500 years ago, how they build the first giant irrigation systems using river water from the Tigris and Euphrates. They dug large canals and erected gigantic levees to protect themselves from the spring floods. However, the world's first writing, cuneiform, done on clay tablets, notes that 3800 years ago their once great farm system was failing, the southern Mesopotamian "black fields becoming white" and "plants choked with salt" (Pearce, 2006, p. 186). The empire had to switch from wheat to barley, which is more tolerant of salt than its predecessor. The barley eventually failed as well, as "the salt chased civilization through Mesopotamia as mercilessly as any barbarian horde" (Pearce, 2006, p. 187). Pearce goes on to compare Mesopotamia to Angkor Wat in Cambodia, noting that great ancient civilizations emerged in environments where controlling the water was the highest priority. These ancient worlds, sometimes referred to as *hydraulic civilizations* in class*,* are unlike the more modest and oldest continually settled city of Jericho in Palestine, which has sustained farming on a smaller scale for 9000 years due to a spring producing 20 gallons a second (Pearce, 2006, p. 185). The grander cities of Mesopotamia were vulnerable to desertification, climate change, and silt built up in their waterways. Jericho, on the other

hand, supplies a sustainable, if less impressive because less massive example for future generations.

What do the water problems of Mesopotamia, the students want to know, have to do with us today in Portland, Oregon, where it seems to rain for eight straight months every year? According to Maude Barlow, co-founder of Blue Planet Project, the National Resources Defense Council (NRDC) has published the alarming statistic that forty U.S. states are currently threatened by water scarcity. Not only are we vulnerable nationally to water shortage, but worldwide, lack of clean water is the leading cause of childhood death (Barlow). When pondering these threats, one begins to see that the misuse of water has continued unabated from the ancient world to present day. Take, for example, the wastefulness of the typical meat-based diet. "To produce just one pound of beef takes thousands of gallons of water. . . and this is [in] a world in which two-thirds of all people are expected to face water shortage in less than a generation" (Lappé & Lappé, 2002, p. 15).

Solution: The Sierra Club (2012) has a website on water conservation that we share with our students, asking them to think about using some of the strategies presented there in their own homes. Strategies include installing a low-flow showerhead, replacing the lawn with drought resistant plants, using drip irrigation in gardens rather than sprinklers, and watering with saved gray water. (Top Tips section, para. 13, 20, 22, and 26; and Other Considerations section, para. 2).

Here on campus, we have installed drip irrigation in our raised beds in order to reduce water evaporation. We have also installed an instructional rain barrel off of our

cob oven roof in the garden that waters a tulip and lily bed so that students can see a water reclamation project in action.

The Dirt reason

Problem: In his article "Our Good Earth," Mann notes that "today more than six billion people rely on food grown on just 11 percent of the global land surface," while just "a scant 3 percent of the Earth's surface [is] inherently fertile soil" (2008, p. 92). Clearly, in order for the world to feed itself, it has to conserve the living, fecund, very thin skin of this planet.

In the first and still most thorough study of global soil misuse, scientists in the Netherlands at the International Soil Reference and Information Centre (ISRIC) estimated in 1991 that humans have degraded, in ways described in Part I of this essay, 7.5 million square miles of land, an area that equals the U.S. and Canada combined (Mann, 2008, p. 90). Food riots have broken out every year over the globe for the past decade, due mainly to this degradation of the world's soil.

Not all hope is lost, however. Rattan Lal, a soil scientist at Ohio State University, says that amending the world's damaged soils with vast amounts of carbon can address several issues simultaneously. "Political stability, environmental quality, hunger, and poverty all have the same root. In the long run, the solution to each is restoring the most basic of all resources, the soil" (Mann, 2008, p. 90). Save the soil, put the people back to work, and allow them to feed their families—these are the recommendations of the ISRIC.

Solution: To preserve soil, water, and to reduce global warming, Bill Benenson's (2009) movie *Dirt,* in a more prescriptive way than the ISRIC, recommends the following*:* Farm a variety of crops organically rather than monocropping with herbicides and pesticides, which is typically done in conventional agriculture. Further, we should fertilize with cow dung and compost rather than with nitrogen-heavy chemical fertilizers. The film also recommends collecting and trading seeds, planting trees, employing people to green urban spaces, joining a CSA for vegetables, and shopping for local seasonal produce at farmer's markets when possible.

Here on campus, we show our students the film, and we harvest organic vegetables from our garden for our lunch salad bar, later composting back into our garden. The circularity of this system allows us to preserve the health of our soil and to teach invaluable lessons on soil conservation.

The Bee reason

Problem: During an interview on You Tube with the director Jon Betz and producer Taggart Siegel (2010) of the movie *Queen of the Sun,* Jonathan Kim (2011), the interviewer, points out that Colony Collapse Disorder (CCD) sweeping the bee world over the last five years has profound consequences for humans, as 70% of human food comes from pollination by honey bees, including broccoli, apples, soybeans, citrus, and grapes (Kim, 2011). *Queen of the Sun* suggests several factors for the cause of CCD,

from viruses to funguses to pesticides to mites to monocropping to giving the bees antibiotics. Scientists do not have a consensus; however, early data suggests that trucking bees to pollinate monocultures, such as almond orchards in California and apple orchards in Oregon, weakens bee hives because orchards lacking biodiversity draw an inordinate level of pests, which prompts the orchardists to spray immense amounts of pesticides, which the bees ingest, and which weakens to bees' immune systems. Michael Pollan states in the film that this industrialized farm system eventually degrades into monocrop deserts, contributing to CCD.

Solution: We need to keep bees on biodiverse gardens, farms, orchards, and campuses across the country, to normalize the presence of honeybees and to help children to distinguish between the honey bee and the much more aggressive wasp or yellow jacket, which are drawn to our picnics and our lunch meats.

The sixth grade team has been working with a Portland-based beekeeper to keep two hives in the Catlin Gabel School apple orchard to pollinate the trees on campus and to raise honey for our cafeteria. Learning about bees by interacting with them on a biodiverse campus is an important way for students to mitigate CCD and to ensure the continuance of pollination by honeybees.

The Population reason

Problem: There were 36 million people in Europe in 1000; 45 million in 1100; 60 million in 1200; and 80 million in 1300. In three hundred years, the population of Europe

more than doubled, which required more land to be cleared for food production. This was made possible by a relatively warm climate across Europe from 800 to 1200. Forests originally covered 95% of western and central Europe, but the need to feed the burgeoning population reduced the forests to about 20% (Ponting, 1991, p. 121).

World population first reached one billion in about 1825, and it had taken 2,000,000 years to do so. That population reached two billion by about 1925. The third billion only took 35 years, in 1960. The fourth was added by 1975. The jump from 4 to 5 billion only took another 12 years (Ponting, 1991, p. 240). If one looks at a graph of world population from 1700-2000, one is immediately struck by the fact that it resembles, in an eerie but understandable way, the dramatic spike in Earth's surface temperature during that same historical period. The fact of modern global warming was first brought to the world's attention by Houghton et al. (2001) with the publication of their Intergovernmental Panel on Climate Change's (IPCC) Third Report entitled *Climate Change 2001—Scientific Basis.* Most people remember Michael Mann's "hockey stick" graph of 20th century climate change from Al Gore's (2006) documentary film *An Inconvenient Truth* (Bender, Burns, and David), showing how the 1990s were the warmest decade on Earth in one thousand years. Mann's graph was peer reviewed by the IPCC and used as a basis for Figure 1, "Variations of the Earth's Surface Temperature over the Last 140 Years and the last millennium" in the 2001 report (Houghton et al., 2001, Summary for Policy Makers section).

What, one might wonder, does population have to do with global warming? The common denominator here is oil, which was first drilled in the U.S. in 1859 in Pennsylvania. Oil helped the human species to triple in one century from two to six

billion. Over a billion acres of land across the globe was brought into food production between 1920 and 1980 (Ponting, 1991, p. 244). Once the land was planted and harvested, the international food trade blossomed with two oil-backed innovations: the first being ocean and railway transport, the second being refrigeration. "The nineteenth century marked the end of several thousand years of largely self-sufficient agriculture . . . and the transition to an era where much of the food consumed in the industrialised (sic) countries was imported" (Ponting, 1991, p. 245). At the same time, greater mechanization of tilling, harvesting, storage, and transport led to a sharp decline in the number of farms. In the U.S. alone, farm numbers fell from 7 million in 1930 to 3 million in 1980, while over half of the produce was produce grown and distributed by just 5% of the total number of farms (Ponting, 1991, p. 246). The lesson here is that with the sharp increase in world population came a correspondingly steep rise in the fossil fuels used to feed that population as well as an absurdly precipitous decrease in the number of people farming sustainably in a biodiverse way for subsistence. Every year we add approximately 70 million more people to Earth, which requires, given our industrial food economy, greater inputs from machines, fertilizers, and pesticides—all oil-based, all contributing to land, air, and water degradation and global warming (Elbel & Stallings, 2009).

Solution: The challenge remains to feed a ballooning world population without polluting the world that needs to feed that population. There isn't one answer here. Intersecting solutions, as proposed by the National Geographic Society's (2012) *Eye in the Sky* project, include the following: One, preserve the soil by rotating crops and farming organically with a variety of crops on each farm, which can reduce the need to clear more woodland for agriculture. Two, contour plow, which reduces water-polluting

runoff. Three, governments should limit or ban the use of DDT as an insecticide because of its spread through food chains. Four, affluent nations should eat less meat so that the grain and water that are given to cows can be redirected to humans who are hungry and thirsty.

Here at school, in addition to sustainability, another one of our mission objectives is global education. To that end, the fifth grade teachers teach the book *What the World Eats,* by Faith D'Aluisio and Peter Menzel (2008). Their photo-documentary allows students to compare and contrast the food that twenty-five families in twenty-one countries purchase and eat in one week. The text and teachers highlight the connections between family income, family size, geography, food availability, and diversity in diet. As a result of this study, students begin to internalize the connections between their families and the families of a billion others across the globe.

The Climate change reason

Problem: The United Nations Intergovernmental Panel on Climate Change (IPCC) has been telling us for twenty years that climate change is real, that the planet is getting hotter, that this warming causes extreme weather events, and that global warming, especially in the last hundred years, is human-induced (Henson, 2006, p. 273). Though there had been some spurious anti-scientific debate over global warming ten years ago, in their 2007 IPCC report, editors Pachauri and Reisinger confirmed, through further research, that this century's precipitous spike in global warming is due to human

greenhouse gas emissions (Summary for Policymakers Section; Subsection 2: Causes of Change).

Last winter, PBS News Hour (2011) released a slideshow online entitled "Weather's Dozen," which presented photographs of twelve extreme weather events in the U.S. during 2011, including tornadoes, heat waves, droughts, and floods. Each of the disasters exceeded a cost of one billion dollars in damages. The slideshow also presented a bar graph comparing financial costs of these disasters from each year over the last three decades. One sees that on this last slide, the National Oceanic and Atmospheric Administration (NOAA) reported that 2011 was the costliest year ever recorded for extreme weather damage (PBS Newshour, 2011, slide 13).

The planet's climate has changed, and each year floods, tornadoes, and heat waves strike more and more people, which also, in a cruel irony, ravage the world's nonrenewable fossil fuel energy sources. In the last two years, weather, plate tectonics, and geography have conspired to join forces in disasters involving our three main energy sources: the BP oil spill of 2010, the Upper Big Branch Coal Mine in West Virginia in 2010, and the Fukushima Daiishi Nuclear Power Plant in 2011. Scholars note that as long as people seek nonrenewable energy sources in hard-to-get-to places, given the unpredictable and increasing nature of extreme weather events, that more disasters like these are inevitable. Today, oil companies have to tread into environments, like the Gulf of Mexico or the Arctic Circle, that are unstable since they are in regions that host either hurricanes or drifting ice sheets. Acknowledging the risks, some analysts have called this energy policy "Energy Extremism," since more disasters like the BP oil spill will inexorably follow with energy strategies that require drilling in environmentally unstable

regions (Klare, 2010, p. 30-31). The world's fossil fuel markets and the governments that court those markets seem oblivious to science and history—lessons that teachers and middle school students find mind-boggling.

Solution: I present Tim Flannery's (2005) book *We Are the Weather Makers* for my students because it lays out both the threats and a wide variety of solutions to global warming that our students and school community might follow. Our goal as sixth grade teachers is to move our students from ignorance to knowledge, from hopelessness to compassionate action. Some of Flannery's extensive suggestions include the following: buy a hybrid car or take public transportation; buy Energy Star appliances; install solar panels on roofs; insulate homes well; change all light bulbs to compact fluorescent light bulbs; plug all electrical devices into power strips, and then turn off the power strips at night; switch plans with power companies to draw from renewable energy sources; recycle; don't use plastic bags; resist buying products made with petrochemicals; eat locally, seasonally, and organically; turn off the tap when brushing teeth; use recycled paper; and cancel junk mail.

Here at Catlin Gabel School, our Facilities Director sends out monthly "Energy, Waste, and Water Reports" that detail electricity use, gas use, and water use, along with landfill by weight, recycling by weight, and compost by weight for the buildings on campus. We teachers and students are therefore able to chart our contributions to global warming throughout the year, and we are all aiming for zero waste and reduced carbon footprints.

The Nutrition reason

Problem: The book *Forks Over Knives* alerts us to the fact that "two thirds of adults [in the U.S.] are either overweight or obese, and obesity rates for children have doubled over the last thirty years" (Stone, 2011, p. 4). Obesity, therefore, has been rightly identified as a national health crisis, but what is perhaps less well known is that certain populations are at greater risk than others. The obesity epidemic is complicated, but the inner-urban neighborhood eyeball test can be as instructive as the arcane spreadsheet of a distant PhD when analyzing this issue.

What we see when visiting inner city neighborhoods in Portland is corner alcohol stores and fast food chains, not grocery stores offering nutritious fruits, vegetables, and whole grains. What is more, the poor don't have places to play—very few parks or community centers. Further, in the inner city schools, PE is being cut, while the stories of unhealthy food in the public schools are ubiquitous. How exactly does childhood obesity connect to poverty and to ethnic background?

Poverty is racial, as a 2011 study of poverty by race and ethnicity in Portland showed. A staggering 52% of African American children live in poverty in our city, followed by 34% of Hispanic American children, 15% of Asian American children, and 10% of White children (Castillo & Wiewel, 2011). Noting that many of these children living in poverty also live in neighborhoods without farmer's markets and grocery stores, one can also easily surmise that nutritional food and healthy diets are not as accessible to non-white Portland children. For our purposes of looking at food and gardening, we can conclude that not only is poverty racial, so is childhood obesity (Boak, 2007). Recent

studies that take into consideration ethnic background in the U.S. find that Hispanic, Native American, and African American populations have higher rates of childhood obesity than Asian Americans and those self describing as White (Caldwell, 2009, para. 1-2).

Clearly, when we start looking at nutrition in our classrooms, our lenses have to expand to include ethnicity, income, demographics, and neighborhoods. That said, the fact also remains that all American children, regardless of ethnic background, street address, or family income level, are at risk of obesity and type II diabetes. There is something in our culture that is funneling our children toward these unhealthy ends.

Solution: The authors of *Forks Over Knives* tie together nutrition, cooking, the ethical treatment of animals, and greenhouse gas reduction strategies, and they have a simple message for improving our nutrition: eat a vegan diet that is plant-based and consisting of whole-foods. The closer the plant is to its original state in nature, the better. Their vegan diet, they claim, will erase obesity without compromising daily caloric, nutrient, or protein requirements. What is more, a transition to a vegetarian diet free of all meat, fish, dairy, and eggs will help to heal the soil, water, and climate ills facing our world. The authors point out that, at the current rate of population increase, Earth will hold nine billion people by 2050. The majority of those people will be born in China, India, and Africa, and as their incomes rise, they will eat more meat, cheese, and milk products. “The United Nations’ Food and Agriculture Organization (FAO) predicts that meat consumption will more than double by 2050, and milk consumption will grow by 80 percent during that period” (Stone, 2011, p. 35). While advocates of animal-based

proteins argue that these increases are logical and beneficial for people's health, the fact also remains that eating a variety of vegetables, legumes, unrefined grains, seeds, and nuts can supply a person's daily protein requirements (Mangels, 1999). Another more obvious argument against eating more meat and drinking more milk in an ever-enlarging factory farm model are the deleterious effects upon soil, water, and climate.

The United Nations has found that farm animals create 20% of all human-induced greenhouse gases (carbon dioxide, methane, and nitrous oxide). However, "if every American simply reduced chicken consumption by one meal per week, the carbon dioxide savings would be equivalent to removing 500,000 cars from the road" (Stone, 2011, p. 40). People can also help to conserve water by eating less meat. The April, 2010, *National Geographic* magazine special issue on water has created a poster entitled "Hidden Water" that shows that "a human diet that regularly includes meat requires 60 percent more water than a diet that's predominantly vegetarian" (McNaughton et al., 2010). In addition to water use, raising animals for food also "accounts for about 55 percent of soil erosion" (Stone, 2011, p. 39). To recap: we could reduce obesity and greenhouse gas emissions, while also preserving topsoil and water resources, if we ate less meat and animal products. What is stopping us?

On campus, our Director of Food Services regularly comes into our sixth grade classroom to teach lessons on growing, purchasing, and cooking with local produce. These classes are favorites among our students, as they get to do what all sixth graders want to do in school: eat! The sixth grade is also a leader class on campus for growing organic fruits and vegetables for our daily salad bar, enacting the principles of good nutrition, topsoil preservations, and water conservation.

The Globalization of food reason

Problem: The opening words of the movie *Food, Inc*. (2008) sum up the current industrial food system this way: "The way we eat has changed more in the past 50 years than in the previous 10,000, but the image that's used to sell the food is still the imagery of agrarian America" (Kenner & Pearlstein). There are 47,000 products in modern average American supermarkets, which offer food out of season from all over the globe, encouraging the delusion that the world does not have seasons, that food is not tied to the earth, the weather, or to the seasons (Kenner & Pearlstein). The reality is that our current industrial food system is a factory, not a farm, with a small handful of multinational corporations controlling food from seed to plate. When the global food system is scrutinized in terms of global warming, it is unmasked as a main polluter: "Our food production—our fossil-fuel driven industrial model—[is] one of the biggest culprits, responsible for about one-fifth of human-caused greenhouse-has emissions" (Lappé & Lappé, 2002, p. 19-20).

Let's look at the situation with chickens. Three or four companies control the beef, chicken, and pork in the U.S., and their goal is the same product every time. The chicken conglomerates today house chickens cheek to beak in giant feedlot barns without light, where they are unable to move around, and they are given antibiotics to stave off the eventual sicknesses that come from poor diet, nonexistent physical activity, and standing in their own feces. All that said, the chickens are bigger now in less time than they were 50 years ago (Kenner & Pearlstein). The same scenario outlined here could

describe the life of most cows and pigs in the U.S. The meat we are eating from these factory farms is of inferior quality, and the lives of the animals are not being honored in even this most basic of humane ways.

Other companies, such as Monsanto, are busily engaged in seeking to gain control of the world's food sources via genetically modified seeds. It is true that Monsanto's genetically modified (GM) seeds helped millions avoid starvation in the 1970s, especially in India, during the so called "Green Revolution," when high-yielding varieties of rice and wheat, along with tons of NPK chemical fertilizers, gave a few decades of bumper crops. Those same GM seeds and fertilization practices, however, have stripped micronutrients from Indian soil, as the high-yielding varieties were also ravenous, drawing up zinc, manganese, iron, and other micronutrients that healthy soil need to support crops. What is more, decades of dumping chemical fertilizers and overwatering have also poisoned the soil with toxic levels of fluorine, aluminum, boron, iron, molybdenum, and selenium (Shiva, 2008, p. 102). Monsanto and other GM companies are responding by increasing their lab technicians' time to come up with new seeds and fertilizers that they believe will feed Earth's swelling population in the 21st century.

The promise established during the early years of the Green Revolution has faded into a bizarre world of the global food economy, where companies that make herbicides are selling us food seeds, and where we are industrializing the food at the cellular, genetic level. Let's go back and trace the history to figure out an alternate path.

In 1970, Monsanto created Roundup. In 1980, the U.S. Supreme Court extended patent law to cover "a live human-made microorganism" (Barlett & Steele, 2008, p. 158). From 1980, when there were zero genetically modified crops being grown in the U.S., to

2007, the amount of land planted with G.M seeds rose to 142 million acres planted in the U.S. and 282 million acres across Earth (Barlett & Steele, 2008, p. 160). In addition, during the 1980s, Monsanto began buying seed companies. Today, Monsanto is the largest seed company in the world (Barlett & Steele, 2008, p. 160). In the 1990s, Monsanto seized upon the opportunities opened by the 1980 Supreme Court case and began patenting life. The Green Revolution turned into the Gene Revolution. Today Monsanto owns 11,000 patents (Butler & Garcia, 2004). Deborah Koons Garcia (2004), director of the movie *The Future of Food,* believes that the company knows that whoever controls the seeds, controls the food. She speculates that Monsanto does not want biodiversity or food diversity; rather, she says, it wants to buy then patent all the seeds, then take those seeds off the market. Then they will produce only their Monsanto Roundup Ready seeds. Other analysts have come to the similar conclusions about this company, though we as teachers present these conclusions as theory while withholding the company name to protect community members who might work there.

From our perspective in the sixth grade, we are less interested in eviscerating certain companies than discussing farming practices as they relate to Mesopotamia. Therefore, we point out that "farmers who buy Monsanto's Roundup Ready seeds [again, we withhold the company name] are required to sign an agreement promising not to save the seed produced after each harvest for replanting, or to sell the seed to other farmers. This means that farmers must buy new seed every year" (Barlett & Steele, 2008, p. 158). Such a practice of agreeing to deliberately let seeds go to waste reverses food growing practices since the founding of the first towns in the Fertile Crescent 9,000 years ago.

The connections between Monsanto, biodiversity loss, dying local economies, and poor nutrition are also becoming more evident, especially upon acknowledging that 70% of processed food—with its high salt, fat, and high fructose corn syrup levels—has a GMO in it. Perhaps not surprisingly, given the army of lobbyists that agribusiness has on Capitol Hill, it's also against the law to label GMO foods in the U.S. (Kenner & Pearlstein, 2008).

Solution: Knowing that the leading manufacturers of carbon dioxide emissions come from transportation and coal-burning power plants for electricity generation (Flannery, 2005, p. 23 and 62), Vandana Shiva's indictment of the global food industry that ships temperature controlled vessels around the world is rigorously logical. The solution we tell our students is to eat whole foods, not processed foods; local foods, not food from thousands of miles away; organic foods, not GMO food products; seasonal foods from the Northwest, not bananas from Ecuador in the wintertime. We realize that the children do not purchase the food that there families eat, but if they were to enact these practices, not only would they be allowing farmers to return to more healthy food production methods, they would also be encouraging millions of farmers across the world to save seeds and feed their families and communities with locally grown, organic, healthy food.

In their book *Animal, Vegetable, Miracle,* Barbara Kingsolver and her family (2008) recount a year of living in Kentucky eating in this way, which necessitated learning to can and pickle, eat more roots in winter time, and reach out to trade with neighbors who raised the apples, beef, and lamb that her own family could not. Farmers

and writers like Wendell Berry have been modeling this practice for years, and we encourage our students to return to it, whenever possible.[6]

On campus we teach a *Sweetness of Apples* lesson (Reed & Stein, 2009) from the PBS series *The Botany of Desire,* based upon the book by Michael Pollan (2002). We harvest apples from our own orchard, and then purchase some other organic northwest varieties from a local market, New Seasons, which lists, on their produce bins, the grower name and orchard location. Students not only connect their diet to their campus, they can easily calculate the food miles accrued for the morning lesson.

The Oil reason

Problem: As sixth grade teachers, we recognize the urgency and our responsibility toward our students. One of my objectives during the Mesopotamia unit is explore two closely aligned myths: 1. Our world can support consistent and unlimited economic growth, even when China and India begin using the same amount of energy, per capita, as the U.S.; and 2. Oil, coal, and natural gas use can continue in the same way.

In order to assist the deconstruction of the myth of unlimited economic growth, I show Paul Gilding's (2012) TED talk entitled "The Earth Is Full." Gilding points out that we would need one-and-one-half earths to provide us with the available fossil fuels to maintain our energy usage for our current global economy.

The second myth is trickier to tease apart, as our daily lives seem to argue for its validity. I woke up in my heated house, had a toasted bagel baked across town, took a hot

[6] Berry is a national treasure. Some of his many books include *Bringing It to the Table* (with Michael Pollan), *The Unsettling of America,* and *What Are People For?*

shower, and then drove my heated car on well-lit streets to a heated, well-lit school. Where is the fossil fuel shortage?

I tell my students that many scientists and journalists, like Kenneth Deffeyes (2005) and Tim Appenzeller (2004), believe that "peak oil," first predicted by M. King Hubbert (1969, p. 196), is upon us. I explain to my students that since oil is a non-renewable, finite resource, there is day called "peak oil day" when oil producers reach their maximum amount in history they can extract from the ground and refine. That day is peak oil day, and every day after begins the decline of oil on this planet until its eventual depletion. The International Energy Agency in Vienna, Austria, notes that 2006 marked the all-time high of 70 million barrels a day of oil using conventional crude oil production methods (Inman, 2010, para. 2-4).

Other writers, such as James Kunstler (2005), draw far-reaching conclusions from this concept: "The oil peak phenomenon essentially cancels out further industrial growth of the kind we are used to" (p. 28). What Kunstler means is that because our global economy is predicated upon the reliable supply and use of oil and gas, and because that supply will begin decreasing until it is gone in the near future, our global economy as we know it is, at best, destined to have to change, and, at worst, doomed. Kunstler goes on to show how the billions of people in the recently developed nations who now seek the automobiles, electricity, and materials goods that the EU and USA have had for the last forty years will push global warming, biodiversity loss, and biosphere pollution to their breaking points.

We're smart, though, many argue. Scientists will figure out how to solve these problems. Again, Kunstler doesn't think so. There will be no one technological fix, he

says, to the intersecting problems of overpopulation, global warming, and the end of peak oil. Even with the combination of compatible technologies such as carbon sequestration, solar power, wind power, geothermal power, and hydroelectric power, the net energy output cannot match our current needs in the U.S., to say nothing of the energy needs of the rest of the world. He takes nuclear power off the table as foolhardy and unsustainable, and given the events of last spring in Japan as chronicled by BBC News online (2012), his omission seems wise (Kunstler, 2005, chap. 4). Noting the irony that non-fossil fuel energy systems, such as wind turbines, require burning more fossil fuels to produce and maintain the so-called *green* energy systems, Kunstler nonetheless urges us to move toward clean energy sources, regional economies, and lifestyles that are congruous with the planet's diminishing energy resources.

While more politically moderate studies suggest that the global economy might slow down but rebound with new technological advances, the fact remains that we have already crested Hubbert's Peak in the past five years (Deffeyes, 2005, p. 3). Furthermore, it is essential to remember that the remaining oil and natural gas under Canadian tar sands or oil shale in the western U.S. "could provide as much oil as the world's current reserves, but the current methods of extraction are hugely greenhouse-intensive and environmentally problematic—not to mention expensive" (Henson, 2006, p. 289). Simply put, the world's cheap, easily harvested oil is gone—and with it, the days of the global industrial food system are numbered as well.[7]

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[7] Other writers also point out that the U.S. has evoked some antagonism around the world from its political support of the despotic Saudi regime in exchange for continued, cheap access to the bulk of the world's crude oil reserves. See Chapter 11 of Rachel Bronson's *Thicker Than Oil.* Still others suggest that both U.S. military strategy during foreign wars *and* the decisions to maintain hundreds of overseas

Solution: At Catlin Gabel school, we not only teach Peak Oil and alternative energy in our studies of economics, science, history, and literature, we enact it with our symbolic "Empty the Lot Day," which is a day that faculty, staff, students, and parents seek to reduce our school's carbon footprint and do our part to keep the air clean for everyone. We encourage people to bike, walk, carpool, and take public transportation to work, charting the progress year to year, and incentivizing the process throughout the year by providing lunch tokens to teachers who carpool, bike, walk, or take public transportation to campus.

The Hunger reason

Problem: One in six Americans will struggle with hunger today (Levy, Mueller, Cochran, Hand, & Two Bulls, 2012, para. 1). This is a disquieting statistic, made even starker by the reminder that adults who struggle to feed themselves cannot often feed their children. In fact, "according to the USDA [U.S. Department of Agriculture], over 16 million children lived in food insecure (low food security and very low food security) households in 2010" (Feeding America, 2012). One's heart fills with grief wondering, *Is there simply not enough food to go around?*

Frances Moore and Anna Lappé (2002) counter this question, though: "For every human being on the planet, the world produces two pounds of grain per day—roughly

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bases are both predicated upon securing that access to oil. See Chapter 3 of Kevin Phillips's *American Theocracy* and Chapter 4 of Chalmers Johnson's *Nemesis.* Whatever one's conclusions, it's clear that both fossil fuel use and fossil fuel access come at great environmental and political costs.

3,000 calories, and that's without even counting all the beans, potatoes, nuts, fruits, and vegetables we eat, too. This is clearly enough for all of us to thrive; yet nearly one in six of us still goes hungry" (p. 15). What then, *is* the cause of all this hunger?

Joel Bourne, Jr. (2009) notes that global population is booming, but so is global warming and deforestation of land for more production zones. We know how this pattern goes, if we follow Diamond (2005) and Ponting (1991). Acting as mitigates on grain production across the globe, are three other factors: one, global warming is sharply curbing harvests of rice, corn, wheat, sorghum, cassava, and sugar cane across the world; two, staple crops such as corn and soybeans are being fed to livestock as the desire for meat and milk products skyrockets among the millions of new middle class citizens; and three, more and more trees are being cleared to make way for fields that are being converted to biofuels in a well-intentioned response to global warming, which is, in a grimly ironic catch-22, causing erosion, topsoil loss, and desertification, thereby creating more hunger (Bourne, 2009). This is exemplar of the vicious circle involving the triad of hunger-overpopulation-global warming, I tell my students, and it will be the greatest challenge of their lives when they get older.

Solution: Our 5th grade teachers are tackling these issues head-on, teaching the children about local food systems as an antidote to the global food supply chain that is bad for the climate, the land, and the people. In 5th grade, they have the students research CSAs, farmers markets, farm to school programs, the 100 Mile Diet, and the Low Carbon Diet. They use *Chew on This* (Schlosser & Wilson, 2007)*, The Omnivore's Dilemma: Young Reader's Edition* (Pollan, 2009)*,* and *What the World Eats* (D'Aluisio & Menzel,

2008) to teach local food systems, biodiverse farming practices, sustainable agriculture, and nutritious eating with a low carbon footprint.

In the middle school, including the sixth grade, we continue the work of our lower school colleagues by doing monthly service projects with Portland based community groups, such as The Blanchet House, Urban Gleaners, and the Oregon Food Bank, who are all working to end hunger in Oregon.

I also advocate, in my classroom and in the garden, a turn away from grain for livestock, and land for monocrops or biofuels, and instead a return to the practice of smaller, biodiverse farms that feed families and communities. Biodiverse, organic fields have healthier soils than those used for conventionally farmed monocrops, and organic, biodynamic farmers cause far less erosion and topsoil loss, use far less water, and do not causes long-term soil toxicity as farmers using conventional chemical farming practices do. Looked at in the short-term, organic, biodiverse farms may appear less productive than the larger, conventional chemical monocrop farms, as the former are smaller and seemingly less bountiful. However, looked at in the long-term, the organic biodiverse farms actually do more to address hunger and environmental stability in the world, as their practices preserve soil, do not contaminate drinking water, and do less to add to global warming. Connecting hunger and global warming, I also share with my students Vandana Shiva's (2009) research, which "has shown that using compost instead of natural-gas-derived fertilizer increases organic matter in the soil, sequestering carbon and holding moisture—two key advantages for farmers facing climate change" (p. 56). When we talk with our students about hunger, we do not simply talk about access to food, although access certainly is a factor; we also talk about climate change, population,

geography, vegetarian vs. omnivore diets, local vs. global food supply, short-term bumper crop vs. long-term sustainability, and chemical vs. organic farming. All of these issues are relevant, obviously.

Part III: Mesopotamia and the Garden

Very early in our unit on ancient Mesopotamia, we show the students a twenty-minute video segment featuring writer and host Michael Wood (1991), who points out that the world's first cities were developed in Iraq, in old Sumer, in the south of Mesopotamia, which means, in Greek, "the land between the two rivers," the Tigris and Euphrates. The first law, science, astronomy, schools, literature, map of the world, writing, calendar, wheel, wheel-turned pottery, and war were in Iraq. "The history of Iraq," Wood says, "is rich in splendors and sorrows, the most gifted of civilizations, and yet the most tragic, the first attempt by humankind to bring people together in organized societies with a measure of happiness." We want to affirm our first enduring understanding—that people seek meaning in closeness, in relationship—before we turn to the catastrophes that we humans visit upon our planet and ourselves. We therefore point out that the Bible names Iraq as the cradle of the human race, containing the great cities of Ur, Nineveh, Babylon, and Uruk, which are some of the most famous in the history of the world, and source of some of the greatest stories in the world: the creation, the flood, the great ark, the Garden of Eden, the Tower of Babel, and the heroic quest for everlasting life. *Gilgamesh* was, in addition to being the first story ever written in 2500 BCE, also the king of the world's first great city, Uruk, in southern Iraq.

We continue the celebration of the place so that the students can rise above the sterile, shallow, and sometimes racist TV news representations of Iraq. Today the marsh Arabs of southern Iraq, we show them in another short video segment, are trying to take back their reed bed towns from the genocidal attempt by Sadam Hussein to wipe them out. In a *60 Minutes* (Pelley, 2009) feature that re-aired this past year, Azzam Alwash, an Iraqi-American engineer, returns to the land of Mesopotamia and reminds us that the marsh people of southern Iraq are named by the books of *Genesis* and *Gilgamesh* as the first people created by God, and their land has been identified as Eden.

After hopefully giving some profound depth to the region in this way, we return to our second and third enduring understandings—that multilayered, sequential problems of the past are repeating themselves today, and that they insist upon broad-based, commitments across a number of issues. Before turning our attention back to the beginning, though, we point out that today all that remains of the world's first cities are sand storms and barren dessert. Now Uruk is mounds of sand and bones, a crumbling wall just visible under sand drifts, and a temple mound ziggurat that once held a great statue of the goddess Inanna. Uruk's population, as already alluded to, doubled within a few decades, and the population's hunger destroyed the fertility of the earth and their capacity to feed themselves (Wood, 1991).

How did it all happen, and why is Mesopotamia so significant? we ask. It all started with good dirt, water, and wheat, we tell our students, as we stand in our school's garden in early September next to a bed of ripened and harvest-ready red spring wheat. We then cut, thresh, winnow, and grind the wheat in a lesson my colleagues and I learned at the Edible Schoolyard Project in Berkeley, California, a few summers ago. Our

Director of our Food Services visits and does two lessons on cooking with local ingredients, and we being our study of chapters 3-6 of the textbook *History Alive! Ancient World* (Frey, 2004) that we use as a supplemental resource. The students see how adopting crop agriculture and domesticated animals in settled communities was the most fundamental shift in human history. Hunting and gathering in groups of 30 – 100 were egalitarian, but the settled agrarian communities of Mesopotamia saw the rise of specialization within society and "the emergence of religious, political and military elites and a state with the power to direct the rest of society. At the root of these social changes was a new attitude to the ownership of food" (Ponting, 1991, p. 53-54).

Soon after creating the flour, the students and I fire up the cob oven and use the flour to make a pita bread in a piece of technology very much like the ovens used in Mesopotamia five thousand years ago. Meanwhile, the students continue to distinguish between the hunting and gathering groups—who viewed food sources, whether plant or animal, as available to the entire group, owned by none—and the settled agrarian towns of Mesopotamia—who grew crops in fields and herded flocks, thereby coming to view these living beings as resources and property.

The main advantage of agriculture over hunting and gathering, the students learn, as they are chomping away on the tabouli and hummus and pita we make for our Mesopotamian feast, was that once the einkorn wheat, emmer wheat, or barley seed was saved and replanted, and once goats and sheep were domesticated for the milk and manure 10,000 years ago, the crops, grown year after year in wonderfully augmented soil, would produce surplus. The surplus wheat allowed the farmers to feed non-farming families that included craftsmen such as potters, weavers, masons, and toolmakers. One

of the early tipping point moments, though, was when "ruling groups, probably religious at first and then political, rapidly took over the distributive functions. Societies emerged with large administrative, religious and military elites able to enforce the collection of food from peasant farmers and organize its distribution to other parts of society" (Ponting, 1991, p. 54).

Priests and warriors then emerged. What is interesting to us in the sixth grade is that the complex social arrangements and emerging hierarchies allow us to ask our students which jobs should be valued more than others, and in what ways do the jobs cooperate with one another to build a functioning society. Students are asked to research one of the city-states in Sumeria and create an artistic advertisement that entices others to move to their location. Each group, representing a different city-state, puts together a Visitor's Center style presentation with at least two pieces of information, geographic and social, which are unique to their city-state.

More strands are woven in: we also teach that the great civilization of Mesopotamia was built on cereal, but the grandeur of the civilization was made possible by the intersections of water, draft animals, grain, and writing. The world's first intensive agriculture system, J. Donald Hughes (2001) argues, was made possible by the ox-pulled plow and irrigation, which facilitated surplus yields and an expanded non-farming urban population (p. 36). Similarly, Jeremy Rifkin (2009) points out that the most successful large scale domestication of plants and animals, wherever it was in the ancient world—the Middle East, India, China, Mesoamerica—was made possible by "large engineering projects . . . including the establishment of elaborate hydraulic systems to irrigate fields" (p. 33). Digging canals and underground aqueducts to supply the fields with water were

huge engineering projects. Ponting adds that the first farming was "dry farming," precariously reliant on rainfall; however, in 5500 BCE, in the east of the Mesopotamian empire, irrigation was developed. The technology was mainstreamed and then thousands of irrigation workers had to be fed and housed, which required surplus food and buildings. Therefore the food production, food storage, home building, pottery, and irrigation industries developed apace in Mesopotamia in mutually supportive ways. To stretch this out to its end, one can also see that because the surplus was able to feed non-farmers, potters emerged that allowed farmers to store their seed for years, and the metallurgical arts developed gold, copper, silver, lead, tin, and, most important for empire expansion, as Jared Diamond (1999) shows in *Guns, Germs, and Steel*, iron.

To emphasize the hydraulic aspect of Mesopotamia, a feature most of us ignore when we think of the deserts of the Middle East, my teaching partner has her class create an Irrigation Treaty between the aforementioned city-state groups that answers the following questions: 1. Why must city-states cooperate to maintain the system? 2. What actions must each city-state take to maintain the system? 3. What consequences will happen for those city-states that do not follow the treaty?

After focusing for periods of time on food of the region, city-state uniqueness, and water, we present Rifkin's notion that the writing of Mesopotamia, called cuneiform, was developed as a way to "oversee and supervise the vast complex operations required to maintain the whole hydraulic enterprise. Record keeping allowed Sumerians to track all of the operations, including monitoring the day-to-day storing and distribution of the grain" (p. 35). Ponting's analysis goes further into the inequalities of power-relations when he suggests that once the seeds were collected and the irrigation system was

established, writing was control for the religious and political elites, as they used writing to take over what he calls the "distribution functions" of the surplus food (p. 54).

Around 5000 BCE, Mesopotamia had a fairly uniform culture, with towns scattered along riverbanks between the Tigris and Euphrates, employing subsistence farming, hunting, and fishing to feed themselves. In southern Mesopotamia, however, beginning in around 4500 BCE, large temples began being built in eight large Sumerian cities, with populations of at least 10,000 people. This early urbanization with a central focus on massive, central temples, led to increased control over food production, storage, and distribution by the religious elite and specialized craftsmen, as the grain would be collected, stored, and distributed at or near the temple by the priests and their politicians. "Control of the surplus also involves determining who owns and works the land and who has rights to the food. From the start the temple played a key role in the organization" (Ponting, 1991, p. 57). Even in the first civilizations, we tell our students, the temple priests and administrators, in a move that prefigured the European feudal system by several millennia, came to own the land, collect the grain, mill it, and distribute it back, in rations, to the farmers who, ironically, had grown and harvested it. The power of the pen and the authority claimed from the gods invested the temple officials with their power to institute their own control and to visit targeted hunger upon those whom they chose.

By 3000 BCE, the city states were very stratified: slaves were on the bottom; most people were peasant farmers; craftsmen helped with irrigation, food collection, storage, transport, and distribution; administrators who could write tracked the food surplus; all the while, religious, military, and cultural elite secured their positions at the top (Ponting, 1991, p. 58).

Around this same time, beginning in 3000 BCE or so, private property was claimed by families, and by 2500 BCE the elite class of warriors, rulers, religious personnel and their administrators had risen to prominence by appropriating the agricultural surplus that they themselves could not produce. “Societies that were broadly egalitarian [hunter-gatherer] were replaced by ones with distinct classes and huge differences in wealth” (Ponting, 1991, p. 65).

At this point, we ask the student to do a compare and contrast activity between ancient Sumeria and modern America. How different is our society, with its top 1% and the other 99%, from ancient Mesopotamia? What would an Occupy Wall Street movement look like in Sumeria?

Also at this same time, I have started my contemporary dystopian novels literary circles unit that imagines ecological catastrophes of the 21st century. Simultaneously, too, students continue their reading of nonfiction and receiving mini-lectures on how Ponting goes on to detail, in ways that prefigure Jared Diamond’s argument in his book *Collapse,* exactly how the Sumerian empire falls. To recap: first, draft animals are used to plow fields, which are planted in flood plains of fresh water rivers, where massive hydraulic construction projects are undertaken to tame the seasonal floods and use a series of interconnected dikes, canals, and underground aqueducts to irrigate the fields. Nearby, settled communities develop with rising populations and surplus food that is used to feed non-farmers, including growing military, temple, and cultural elite, who claim ownership of the surplus food, using writing to track the food surplus. Then, these new elite classes employ military with metal to invade other lands for more surplus food to feed their

swelling populations. However, an irreversible strain has been put upon the land because the empire has outgrown its capacity to feed itself.

In a sequence of events already covered in this essay, more land is cleared of native trees and natural ground cover, which exposes the land to wind and rain erosion. Greater manure from animals is needed to make up for the topsoil loss, and greater water is needed from canals to irrigate stripped soils, since the natural biodiversity of the humus has been removed by erosion and the monocropping of wheat or barley decade after decade. Eventually the extra water drains but stacks upon the water table, causing waterlogged clay soils, the rising of deep minerals brought up in suspension, and the salinization of the land. The irony that we want our students to see is that the very majesty and success that we celebrate—abundance, cultural diversity, job specialization, surplus food—led to the first civilization's downfall. In order to support both the growing population of the Sumerian empire and the growing trade with other peoples, more and more land was pressed into service in shorter periods of time. "Farmers shortened the period of fallow, overplanted, plowed marginal lands, and intensified irrigation, practices which led to salinization" (Hughes, 2001, p. 27).

Not only do we explain this process of desertification as it happened in Mesopotamia, but we also teach that this dangerous process is today claiming 25 million acres of our world's fields each year (Pearce, 2006, p. 25). For our purposes, then, as sixth grade teachers, as we look backward into the distant past of Mesopotamia, we are also looking at our expanding world of deserts today—just as Jared Diamond finds disquieting similarities between the current salinization of Montana state's soils and the salt-caked fields of Mesopotamia (2005, p. 47-49). What's more, we also have to admit to

our students that in the near future, some reports suggest a worldwide population of 9.4 billion people in 2050, when my students are fifty years old (Suddath, 2011, para. 6). These swollen numbers will only ratchet up the need to convert more woodland to farm land and restart the process elucidated in this essay section—unless, of course, the students can think up another better way of feeding everyone.

We can follow the history of Mesopotamia as a kind of warning, then: in 3000 BCE Sumerian became the first literate society in the world, producing in 2500 BCE the first written story, *Gilgamesh,* which our sixth graders read. By 1700 BCE, due to high levels of salt in the soil of southern Mesopotamia, wheat production was gone. "Between 1300-900 BCE, there was an agricultural collapse in the central area [of Mesopotamia] following salinization as a result of too much irrigation" (Ponting, 1991, p. 72).

We remind our students of sequence of environmental missteps in Mesopotamia before sharing Vandana Shiva's five-step process that she uses in her book *Earth Democracy* (2005) to explain how the food corporations gained control of the contemporary industrial food system. The parallels between 3,000 years ago and today are unnerving:

1. The exclusion of people from access to resources that had been their common property or held in common.
2. The creation of 'surplus' or 'disposable' people by denying rights of access to the commons that sustained them.
3. The creation of private property by the enclosure of common property.

4. The replacement of diversity that provides for multiple needs and performs multiple functions with monocultures that provide raw material and commodities for the market.
5. The enclosure of minds and imagination, with the result that enclosures are defined and perceived as universal human progress, not as growth of privilege and exclusive right for a few and dispossession and impoverishment for the many. (p. 20)

Even though Shiva is critiquing the world of this decade and the seizure of family farms and waterways in India, Africa, and South America by giant agribusiness corporations like Monsanto, Cargill, Phillip Morris, Nestlé, Suez, Bechtel, and Vivendi (again, we leave out the names of these corporations, as our intention is not to guilt trip or demonize, but to think of solutions), it is startling just how precisely her analysis also applies to the fall of Mesopotamia and the Sumerian empire. One is reminded of George Santayana's pithy line, "Those who cannot remember the past are condemned to repeat it."

As a counterpoint to both current agribusiness and to the ancient seizure and commodification of the surplus Sumerian wheat and barley by the elite in that empire, we point our students to examples of what Vandana Shiva calls *earth democracy*, small farmers and local food communities who stand up to global food export corporations by insisting on healthy local economies while honoring indigenous knowledge and biodiverse food traditions. A local example includes Growing Gardens here in Portland, the organization that organizes "hundreds of volunteers to build organic, raised bed vegetable gardens in backyards, front yards, side yards and even on balconies. [They]

support low income households for three years with seeds, plants, classes, mentors and more" (Growing Gardens, 2012). On a national level, the Slow Food USA movement joins an international group of over 225 chapters that "envisions a world in which all people can eat food that is good for them, good for the planet, and good for those who produce it" (Slow Food USA, 2012). An exemplary international movement embodying earth democracy is the bi-annual conference in Turin, Italy, called *Terra Madre.* The last Terra Madre conference, in 2010, was attended by over 5,000 delegates from over 100 countries, and it featured seminars on a variety of topics including GMO foods, water rights, organic food, and the threats that globalization poses for indigenous cultures (Terra Madre, 2010). These three movements implicitly overlap in their commitments to combatting poverty, food insecurity, topsoil and water scarcity, and empty calories.[8]

These movements provide our children with avenues for healthy food choices in healthy communities; however, without a change of global consciousness, they may be fighting uphill battles their whole lives long. At this point in the unit, just after they have finished their dystopian novels, the students are asked in groups to create a civilization somewhere in the world right now that articulates policies for topsoil and water conservation, green energy sourcing, employment for the employable, economic justice, and quality education. They are told that if they choose the site of London, for example, they are to imagine that the place is empty; however, they have to explain why they

[8] I also return to favorite resources throughout this unit when needing reminders about balanced relationships between humans and their complicated biomes, including the following: *Gardening at the Dragon's Gate,* by Wendy Johnson (2008); *How to Grow More Vegetables,* by John Jeavons (2006); *Big Ideas,* by the Center for Ecoliteracy (2008); *The One-Straw Revolution,* by Masanobu Fukuoka (2009); *Gaia's Garden,* by Toby Hemenway (2009); *Growing Vegetables West of the Cascades,* by Steve Solomon (2006); *Seed to Seed,* by Suzanne Ashworth (2002); and the books and pamphlets of the Biodynamic Farming and Gardening Association.

selected that site. The last and perhaps trickiest civilization characteristic they have to provide is cosmology, or what the civilization tells itself about its relation to Earth's beginning, its bioregions, and its other animals.

At this point, to provide the students with a little background, I look backward one more time, this time to southeastern Turkey. Before Mesopotamia was founded, another astonishing event took place in 9600 BCE. The Ice Age has just ended and Hunter-Gatherers were finding more abundant vegetation and wildlife. Their wonderment led, simultaneously, to the birth of religion and to farming in Gobekli Tepe in southern Turkey, 500 miles northwest of Gilgamesh's great city, Uruk. There, near the town formerly known as Urfa, hunter-gatherers build the world's first temple, 11,000 years ago (Mann, 2011). Archaeologists had long assumed that agriculture had predated religion, as Ponting and Diamond assumed, but the discovery in Turkey in 1994 has changed the way historians view ancient life in the Middle East. The devotional space and figurines for worship suggest that religion, in fact, predates agriculture, or at least was contemporaneous with it rather than following it—which also suggests that the thirst for the divine, or instinctual awe of humans for the "mysterium tremendum," as Rudolf Otto (1958, p. 12) calls it, is hardwired into homo sapiens as we gaze up into the night sky and contemplate our place in the seemingly infinite cosmos. In any case, the students are asked to account for their cosmologies after they tell us where they get their jobs, justice, dirt, water, food, and energy for their new civilization.

I want to return now to the original question, "What does the garden have to do with English or history class?" In his book, *An Environmental History of the World,* J. Donald Hughes (2001), answers the question succinctly: "In Mesopotamia, of all regions

studied by ancient historians, there is the clearest relationship between environmental devastation caused by humans and the decline of cities and their civilizations" (p. 38). Simply put, we study Mesopotamia in our garden so that we can understand, with our minds, hands, and taste buds, what they did to both build up and then drive their empire to extinction. In doing so, we hope to analyze the entwined mistakes made several thousand years ago so that we can provide our students with mutually-supporting and variable alternatives to avoid such a miserable end in the coming century, as they face some of the same interlocking problems such as overpopulation, deforestation, desertification, water scarcity, and hunger.

We are intuiting here that new strategies and technologies aren't enough. Without new paradigms, new cosmologies, we can only borrow faddishly temporary liberal or conservative practices, but we cannot adopt reliable and flexible orientations that will remain sturdy enough and economically and environmentally just for all when problems multiply, overlap, and worsen across the globe. In short, we need a new story for our species, one about a global, empathic civilization, which brings me to the last section of this essay.

Part IV: The Future in the Garden

This last essay section, focusing on cosmology, or how we view ourselves in the cosmos, is necessarily more speculative than the preceding three sections, which focused on science and history. I am leaning here now toward pedagogy, poetry, art, gardening, and religion, as this time in history, with its interwoven issues of hunger, global warming,

desertification, and biodiversity loss, all cry out for new, less destructive operating instructions for our time on planet Earth. In order to save our species on this planet this century, our cosmology needs to shift in four crucial ways.

The first paradigm shift has to do with how we view human history. We need to begin to view human history as a history of land and water use. The story of any empire and civilization is the story of how it treats its dirt, water, and air. When empires collapse, as Jared Diamond shows in his book by the same name, and as Ponting illustrates in *Green History of the World,* it is because the people cut down their trees, overgraze their livestock, overplant monocrops, intensify irrigation, overfish their waters, allow erosion to strip the topsoil, and invite salinization. "There have been from ten to thirty civilizations," E.F. Schumacher (1973) writes, "that have followed this road to ruin" (p. 109). Diamond might put this number higher, but the fact remains that modern *environmental historians*—historians that read history as the story of human interaction with the land, water, and air—all find that Mesopotamia is the first and most obvious case study for road to ruin, which is another reason why we teach it. Switching our study of history to a greener lens will foreground the environment that supports or slays us.

The second cosmological shift that needs to occur is to move from a human vs. nature cosmology to human *as* nature cosmology. The way we explain it to our students is that we need to move from the ancient mythologies of Mesopotamia to something akin to the futuristic story of the blue people presented in James Cameron's movie *Avatar* (2009). The stories we tell our young are the lenses with which they see, which therefore determine their focus and what they *can* see. Think of *Finding Nemo* (2003)*, Happy Feet* (2006)*, Wall-E* (2008)*, Ferngully* (1992)*, Free Willy* (1993)*, Princess Mononoke* (1997)*,*

and *The Lorax* (2012). These movies and more like them are attempting to reset for children the notion that we are not just *in* nature, but that without nature we will perish, since nature is in *us*.

On the other hand, J. Donald Hughes and others have commented that the Old Babylonian epic of creation, *Enuma Elish* (Dalley, 1998), the oral creation story told contemporaneously with *Gilgamesh,* provides backstory for *Gilgamesh* and the later narratives of *Genesis* and *Deucalion*. These early Mesopotamian tales establish the people vs. nature conflict. J. Donald Hughes writes that "the motif of human struggle against hostile nature is prominent in the mythologies of Mesopotamia, where the first cities arose. . . . In *Enuma Elish* the world is shown to be the result of a battle between Tiamat, the female monster of chaotic nature, and Marduk, the male champion of the new order of the gods" (2001, p. 34). Marduk slays Tiamat, and, with violent imagery, is said to split her body in two, to create the sky above and the sea on earth below. He then banishes the wild creatures, identifying them as food and enemies of humans. Next he builds Esharra, a city of straight roads and glittering palaces, in the sky, home of the gods. The stories that the Mesopotamians told themselves are instructive for us today, as we have inherited the narrative legacy, perhaps most notably from *Genesis* and the later Greek myths, all of which borrowed from the earlier stories of *Gilgamesh* and *Enuma Elish*; more importantly, however, we have inherited a false and harmful cosmology that boasts of one patriarchal male hero after another triumphing over nature, which is an enemy, and, not coincidentally, symbolically figured as female.

We need to move away from a relationship with Earth that advocates patriarchal control of nature—which is seen, dichotomously, on the one hand, as either chaotic and

savage, or, on the other, as mechanistic and impersonal—for extraction of resources benefitting humans alone. Regardless of emphasis, both present a false human vs. nature model.

The false paradigm of savage nature to be dominated, Elaine Pagels argues in *Adam, Eve, and the Serpent* (1988), is enshrined for many by the millennia of aforementioned stories in the Middle East, culminating, perhaps, with *Genesis 1: 28-29*, where God tells Adam: "Be fruitful and multiply, and fill the earth and subdue it; and have dominion over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth. . . . I have given you every plant yielding seed that is upon the face of all the earth; and every tree with seed in its fruit; you shall have them for food" (*Holy Bible,* p. 1). This hierarchical paradigm of humans reigning over and above mysterious, tumultuous nature held sway until the Copernican revolution dislodged it in the 1500s and early 1600s, when Copernicus, Kepler, and Galileo proved that the earth moved around the sun and not vice versa. The heliocentric solar system decentered earth from primacy in the cosmos and therefore also called into question the notion from *Genesis* that humanity was ever given this planet by a god 3000 years earlier, when *Genesis* was written. If the earth wasn't fixed in the center of the cosmos and the heavens set for eternity, as centuries of priests and other teachers had taught, then a new narrative was needed, which modern science provided.

I here point out to my students that although the European conception of nature may have shifted historically after the Copernican revolution from nature-as-enigmatic-beast-that-needs-shepherding-by-humans to nature-as-clock, the conception of humans as standing apart from and above nature persisted across that divide nonetheless. Still, it is

also important to note, I also tell my students, that the Copernican revolution by in large ushered out the kinship that humans had also experienced for centuries between themselves and the rest of creation. Whereas prior to the 1600s people could align themselves imaginatively with other flora and fauna under the banner of creatures created by a divine Creator, after the 1600s, that trope was seriously called into question by irrefutable scientific discoveries such as the heliocentric heavens that flatly contradicted over a thousand years of inherited cosmology. The church's authority as intellectually authoritative was challenged, especially after Pope Paul V ordered Galileo in 1616 not to support the most compelling scientific discovery of his day, the heliocentric truth. If the pope as leader of the church could not accept math and science, many felt for the first time, then perhaps it was best to leave his teachings behind.

The truth won out, of course, despite the papal muzzle. That victory was also seen by many as Pyrrhic, though, for the cosmos became, in effect, desecrated, mathematical, and mechanistic, held together mysteriously by forces such as Kepler's laws of planetary motion and Newton's laws of motion, none of which were mentioned in scripture. The common cosmology, Merchant (1989) notes, "thus reordered the world in terms of a new metaphor, the machine. The cosmos was operated from the outside by God" (209). Science and industry joined ranks during the 1700s in an effort to not only understand the predictable regularity of this earthly machine but to create its own machines to mine from the earth the metals, minerals, textiles, timber, and food that humans needed. The divine receded back behind the clouds, and the scientists, merchants, and inventors became the new interpreters of material reality.

Still, it wasn't as though science had all the answers, either. Poverty and disease predominated during the build up to the Renaissance. People couldn't eat mathematical theorems or astronomical theories, and they labored through their relatively short lives with their families, finding, as people do, what happiness, hope, and sense of belonging they could. A vacuum, in any case, had been created during the critical centuries of the 1500s and 1600s, and into it rushed our modern worldview, which unfortunately perpetuated the human vs. nature false contrast.

Theodore Roszak (1969, p. 205-238), Richard Tarnas (1991, p. 395-310; 2006, p. 26-36), and Morris Berman (1984, p. 13-35) all chronicle the development of the second false human vs. nature narrative provided by science—viewing nature and the cosmos as mechanistic and impersonal—by tracing what Roszak calls the *myth of objective consciousness,* what Tarnas names the *modern mind,* and what Berman terms *modern scientific consciousness*. All three are writing about our current cosmology, which has been empirical and scientific for four hundred years, since Bacon and Descartes wrote in the 1600s.

Tarnas borrows Max Weber's phrase to say that the modern mind sees the cosmos as "disenchanted" (2006, p. 20), or empty of cosmic meaning, because humans assume that there exists a foundational divide between an internal subjective self and an external objective world. *Nature,* whether one conceives of it as threatening or mechanical, is simply "out there," the place we go camping, and it is propelled by either chance or savage necessity. Things happen in nature for outrageous reasons, for no reasons at all, or because they had to happen that way. Nature lacks intelligence and interiority in this paradigm; it is also blind and deaf to human perception, desire, and hope because it is

unfeeling, unresponsive. It cannot be said to harbor meaning at all, actually; meaning is something human beings attach to nature—indeed, to all of life. This disenchantment leads to an inevitable conclusion for humans that we are alone in an impersonal, purposeless cosmos scrubbed free of the sacred. "The soul of the world has been extinguished," Tarnas writes. "Ancient trees and forests can then be seen as nothing but potential lumber; mountains nothing but mineral deposits; seashores and deserts are oil reserves; lakes and rivers, engineering tools. Animals are perceived as harvestable commodities, indigenous tribes as obstructing relics" (2006, p. 32).

Roszak (1969) contends that even though we should, "we *don't* trust to the way of the world. We have learned. . . from the objective mode of consciousness . . . to think of the earth as a pit of snares and sorrows. Nature is that which must be taken unsentimentally in hand and made livable by feverish effort, ideally by replacing more and more of it with man-made substitutes" (249-250). People in modern times have become progressively more detached from the sources of their food, clothes, water, and shelter. We have also, as a byproduct of urban modernity and settling in cities, lost the sense of magic and wonder that came effortlessly to indigenous peoples living in close proximity to the land. Modern urbanites no longer bless the source of our survival; we teach our children, in fact, to avoid pastures, rivers, and forests and to think of them as dirty and uncultured, and, in an odd sort of illogic, as both unsafe *and* boring.

Berman also argues that the ecological problems that human have induced in the last 400 years have their roots in the Scientific Revolution of the sixteenth and seventeenth centuries, when the view of nature that had been commonplace for 99% of human history slowly shifted, over the course of one hundred years, to one that removed

humans from nature and turned nature, conceptually, into either a wrist watch or a set of resources to extract. “The view of nature which predominated in the West down to the eve of the Scientific Revolution was that of an enchanted world. Rocks, trees, rivers, and clouds were all seen as wondrous, alive, and human beings felt at home in this environment. The cosmos, in short, was a place of *belonging*.” The story of modern humanity for the last several hundred years is “one of progressive disenchantment. From the sixteenth century on, mind has been progressively expunged from the phenomenal world. . . . That mode can best be described as disenchanted, nonparticipation, for it insists on a rigid distinction between observer and observed. Scientific consciousness is alienated consciousness: there is no ecstatic merger with nature, but rather total separation from it” (1984, p. 2-3). Once people were removed from their ancestral homes, they felt no compunction to protect those homes, and the drilling, mining, and deforestation began on an industrial, international scale.

Writing not about philosophers or scientists, but about children today, Richard Louv (2008) likewise argues that children are alienated from the centers of their own being, in a syndrome he names “nature deficit disorder” (p. 10). Children fifty years ago used to spend much more time outside playing, hiking, riding bikes, climbing tress, playing ball games, skating, swimming, chasing each other. They felt more at home in nature—not as comfortable as children prior to the Scientific Revolution, perhaps, but more comfortable than children today. Because children spend more of their time today sedentary, inside, staring at electronically humming screens, Louv shows that attention disorders, anxiety, obesity, and depression have all risen to all-time highs.

The way out of this soulless, deadened boredom is to not only go outside *into* nature but to realize that we *are* nature, inextricably entwined with the whole. Roszak points out that "scientific consciousness depreciates our capacity for wonder by progressively estranging us from the magic of the environment" (1969, p. 252). To take back our inborn wonder, he suggests looking to poets and other visionaries such as Blake, Tolstoy, or Dante (p. 237) who utilize what he calls "magical vision" to see "the beauty of the deeply sensed, sacramental presence" in nature (252-253). The presence that is seen by the adoring eyes of the visionary awes the visionary, as she sees power and grace not only above, below, and around humanity, but permeating the insides of people as well. This cosmological shift allows one to see that we are manifestations of the natural through which nature expresses itself. We are embodied creatures with the capacities to taste and delight in plucking the summer's first ripe raspberries, listen in wonder to Bach's *Mass in B Minor* (1985), or witness with growing anticipation and then awed gratitude the birth of a child. Nature has given us the senses to invite and embrace the sensual world. There can be no shame in being animal or embodied in this new worldview. Vandana Shiva (2008), in her inimitable way, reminds us that, in any case, there is no post-food society (p. 38); in other words, we cannot, nor can any other animal, transcend our animal-body's requirements for food, water, and breath, much as we might want to do so. When we look at what we must have in order to survive, we realize we are nature. That we have taught children otherwise since Shakespeare's time is a great injustice.

I present this new world view, of humans *as* nature, to my students in many texts, including the poetry of Mary Oliver (2004; 2005), Walt Whitman (2011), and William

Wordsworth (1982), who, in his "Lines Composed a Few Miles Above Tintern Abbey," presented a vision of this re-enchanted world:

> ". . . For I have learned
> To look on nature, not as in the hour
> Of thoughtless youth; but hearing oftentimes
> The still, sad music of humanity
> . . . And I have felt
> A presence that disturbs me with the joy
> Of elevated thoughts; a sense sublime
> Of something far more deeply interfused,
> Whose dwelling is the light of setting suns,
> And the round ocean and the living air,
> And the blue sky, and in the mind of man" (p. 92).

Humans are nature and nature is human for Wordsworth, and we too need to accept this second cosmological shift in order to cease the plundering of the planet.

This human-as-nature pronouncement is not some naïve noble savage daydream, but science, actually. Our sixth graders study for a time the eukaryotes, or cells with nuclei, and their myriad organelles—mitochondria, Golgi apparatus, and the like. They note that these eukaryotes have assembled themselves over billions of years into an unfathomable array of life expressions on this planet—foxglove, foxes, pollywogs, and humans—all seemingly distinct, yet all, science shows us, incredibly similar at a cellular level. We've heard Jane Goodall (2010 a; 2010 b) telling us about the similarity between

primates and humans for decades, but most of us simply enjoy the new Disney movie *Chimpanzee* (Fothergill, 2012) without cosmological shift. Until we recognize the other flora and fauna of the world as siblings, the possibility of planetary ransacking will continue. The science of the 21st century will help us, though, for "to distinguish between human cells and those of newts, seals, or coyotes, one has to descend to the molecular level of the cell to find the odd dissimilarity" (Hawken, 2007, p. 171). This essential, foundational fact alters the hierarchical relationship established by the *Enuma Elish* and *Genesis* (exemplars of humans vs. nature paradigm #1), or by Francis Bacon's *Essays* (1986) and William Harvey's *On Motion and Blood in Animals* (1993) (exemplars of humans vs. nature paradigm #2). Humans are not separate from some external *nature out there*; rather, "we *are* nature, a realization that stopped Emerson dead in his tracks in Paris, and may it stop us in ours. We live in community, not alone, and any sense of separateness that we harbor is illusion. Humans are animals, albeit extraordinary ones, and have not special immunity conferred upon them" (Hawken, 2007, p. 171), ancient religious narratives notwithstanding.

The third cosmological shift is a move to rescue from the past our rootedness to Earth, the health of our own bodies, and our interconnection to one another. Berman says, in a memorable turn of phrase, that we have to "go backward in order to go forward . . . to recover our future" (p. 282). The shift, Tarnas says, is through an embrace of what he calls the "primal world view" (2006, p. 16-17), which has survived from Gobekli Tepe to present day in indigenous cultures, intelligent biodiverse farming communities, animism,

paganism, art, pantheism, poetry, and mystical branches of the major faith traditions.[9] The primal mind sees nature as being infused with the divine, as the sacred immanent in this creation rather than distantly hovering above it. The words of poets, saints, and visionaries are presented frequently toward the end of this unit in order to orient the students to this third cosmological shift; the work of the Romantic poets, the Transcendentalists, Rumi (Barks, 1997), and, perhaps *the* paradigmatic primal poet, Mary Oliver, all are featured. We focus, in particular, on three of Oliver's poems, giving them all close readings: "Peonies" (2004, p. 21-22), "Mindful" (2005, p. 90-91), and "Such Singing in the Wild Branches" (2005, p. 104-105). All three poems urge the readers to search for eternity in this hour right now and to look for the infinite in the grains of sand before us.

In this way, we try to rediscover that spirits and messages are seen all throughout creation, in the flow of the holy Ganges river, to the sacred Mt. Saint Helens' volcanic eruption, in the epic travels of humpback whales and great soaring speeds of the peregrine falcon, to the desperate attacks of polar bears whose homes and food are being lost to polar ice cap melt. "The primal world is ensouled," Tarnas explains (2006, p. 16). Not only does the world, as viewed with the primal mindset, send us messages (think New Orleans flooding), it also permeates our unconscious world as expressed in our dreams, poetry, painting, music, and prayers.

We experience this Great Spirit flowing through all things on a daily basis, I tell my students; we just have to be quiet and listen to the whisper within. There is a river of

[9] See the following: *Drawing Down the Moon,* by Margot Adler (2006); *Religion in Human Evolution, by* Robert Bellah (2011); *The Varieties of Religious Experience,* by William James (1997); and *Mysticism,* by Evelyn Underhill (1974).

words, I tell them as we sit down to write poetry, flowing always through our minds, originating at the start of the creation of the universe, fed by tributaries of ancestral memories from cultures around the world. I share with my students the William Carlos Williams (1963) lines from *Paterson*:

> "The past above, the future below
> and the present pouring down: the roar,
> the roar of the present, a speech—
> is, of necessity, my sole concern.
> . . . I cannot stay here
> to spend my life looking into the past:
> the future's no answer. I must
> find my meaning and lay it, white,
> beside the sliding water: myself
> comb out the language—or succumb" (p. 144-145).

Our job as poets and unique expressions of the cosmos, as Williams says, is to decipher and articulate how the universe wants to express Itself through us. This is obviously tricky terrain to navigate with eleven and twelve year-olds, as it plunges pretty quickly into the tangled thickets of mystical religious concepts, Jungian depth psychology, neo-Kantian philosophy, Romantic poetry, guided visualization exercises, and meditation activities—not your easily articulated average daily sixth grade curriculum. It simply feels a little too groovy for about half of them. We therefore try to ground the concepts of interconnection and primal mind in the garden and in images of nature.

To warm them up, my history teacher partner shows them the stunningly beautiful online TED talk on Gratitude by time-lapse photographer Louis Schwartzberg (2011). His beautiful images of flowers, butterflies, old growth forests and the rest are accompanied by voice-over sage insights that illuminate our connection to the world and to each other. It is clear to Schwarzberg that we all—young and old humans, butterflies, sunsets, flowers—live, move, and have our being in the same anima mundi. The soul of the world, he shows, is in us, around us, and binding us together.

One of my jobs as a teacher is to enliven that connection with nature within and without the child so that we ache to preserve it and therefore our chance at survival. I try to show that balanced relationships pervade, indeed define, naturally occurring ecosystems and gardens that are intelligently designed with permaculture principles. We try to dispel centuries of fear of dirt and insect. *No topsoil, no life,* we tell students, and *No honeybees, very boring food.* We teach that "not only are bugs, birds, mammals, and microbes essential partners in every kind of garden, but with clever design, they can work with us to minimize our labor and maximize the beauty, health, and productivity of our landscapes" (Hemenway, 2009, p. 9). We teach them about life cycles, collecting seeds, planting and transplanting from the greenhouse, companion planting, pollination, mulching, rain gardens, bioswales, native plant diversity, harvesting, cooking, eating, flower bouquet arrangement, good table manners, composting back into the garden, and the symbiotic relationships that pervade the cosmos. I am trying to reveal that "primal experience takes place, as it were, within a world soul, an *anima mundi*, a living matrix of embodied meaning" (Tarnas, 2006, p. 17). Reconnecting to the first civilization in ancient Iraq, with their reading, writing, gardening, food preparation, and eating, our students

embody the oldest desires of civilized humans striving for community. The world soul speaks to us out of the past, from the primal, as we harvest, thresh, winnow, and grind wheat in our garden, then enjoy the baked pita from our cob oven during our Mesopotamian Feast Day. On days like this outside, "human beings perceive themselves as directly—emotionally, mystically, consequentially—participating in and communicating with the life of the natural world and cosmos" (Tarnas, 2006, p. 17).

Roszak, Tarnas, and Berman are all careful, though, to point out that we cannot, given our postmodern urbanity and the advanced ecological destruction of our planet, totally embrace the primal of the distant past. It is too late for that. "Here, then, is the crux of the modern dilemma," Berman writes. "We cannot go back to alchemy or animism. . . ; but the alternative is the grim, scientistic (sic), totally controlled world of nuclear reactors, microprocessors, and genetic engineering. . . . *Some* type of holistic, or participating, consciousness and a corresponding sociopolitical formation have to emerge if we are to survive as a species" (p. 10). Roszak agrees that native, indigenous cultures may serve as models for us moderns, but we cannot copy them and hope to arrive at functional, sustainable worldviews dredged from museums or holy books. Instead, we need to cultivate—with one eye on social justice and one eye on environmental conservation—a new capacity to communion with the sacramental presence of the cosmos, which is just as present today as It was on any day of existence (264-268).

As a sixth grade teacher, I believe that the way forward that allows space for participating consciousness to co-evolve with new sociopolitical formations is already occurring, as Hawken points out in *Blessed Unrest*—and indeed, this dynamism has been a subtext to humanity's evolution all along; we have never been without it, actually. Still,

to expand that dynamism to a worldwide stage requires the fourth and final cosmological shift.

The last cosmological shift is a move to embrace all peoples, the world over, as part of the same human family in what Jeremy Rifkin calls a global "empathic civilization" or what Berman calls a "planetary culture" (p. 277). At first blush, after accepting our kinship with whales and fungi in the second and third cosmological shifts, this would seem an easier row to hoe. *Still,* I ask my students, *do we really have that much in common with Neolithic people or people on the other side of the planet today?*

Answering this question in the affirmative, I first show my students that our brains are connected to the brains of every other person on the planet. We are softwired for empathy, to feel instinctually what others feel. I show my students a *NOVA* (2005) video on mirror neurons, extrapolating that our inbred ability to involuntarily, unconsciously know and respond to the feelings of others is nature connecting to Itself through us. When I see joy or misery on the face of another, I instinctually feel the same way myself. Nature has programmed us this way so that our species might survive communally. Testing this notion, I then ask my students, *Isn't evolution about competition rather than cooperation?*

I then share some of Martin Nowak's (2012) research, which shows that "cooperation has been a driving force in the evolution of life on earth from the beginning" (p. 38). Nowak, as director of the Program for Evolutionary Dynamics at Harvard, utilizes mathematics and game theory to better understand the unconscious driving forces of evolutionary biology. He has found that the traditional pseudo-Darwinian understanding of human evolution—that nature is in constant bloody struggle

with only the strongest surviving and propagating—is simply incorrect. Instead, he identifies and details five mechanisms that allow cooperative communities to flourish and survive over time. Perhaps the most surprising of his discoveries is that humans decide to help strangers based upon that stranger's reputation as someone who has helped another person. We scratch the backs of those who have scratched those of others. Driving this unconscious human impulse, Nowak speculates, is the feeling that if we help a stranger in a time of need, others will see and will help us when we fall into need ourselves. Certainly we see this type of group bonding in other groups of mammals, but what makes humans the most helpful species to each other is our language, which allows us to extend our stories of empathy and compassion and thus our social networks around the world. We *do,* in fact, relate to Neolithic people and to our contemporaries in Bhutan, for example. This ability to see ourselves in others and reach out to help them is not only vital to the survival of individual cultures, civilizations, and empires; our storytelling and providing goodwill to strangers is also "central to our adaptability as a species. As the human population and the climate changes, we will need to harness that adaptability and figure out ways to work together to save the planet and its inhabitants" (38-39).

This fourth shift is not simply mental, therefore, but one enacted with a change in daily material living conditions. We speculate with our students that in order to survive the interwoven ecological challenges of this century, human beings may have to create a matrix of semi-autonomous nearly self-sufficient communities of around 500 people each that are socially, economically, and environmentally just—that, indeed, as Hawken reminds us, these three nodes of justice all fail if one fails. What will these communities look like?

Berman's future "planetary culture" would have extended family living together, the young, middle aged, and elderly in the same houses, on the same land, emphasizing community rather than individuality and competition (p. 277). An irony here, of course, is that, recognizing the empty promises of globalization to achieve global justice, Berman advocates the local and autonomous as a global solution, echoing the bumper sticker *Live Simply So That Other May Simply Live.* Jan Martin Bang (2005) has written and taken photographs of twenty such "ecovillages" in his book by the same title. Such deliberately small-scale living arrangements, Bang reveals, have always existed, since Mesopotamia, and they are making a comeback, given how fossil fuel dependent globalization has imperiled life on Earth. A growing number of people are hungry to live self-sufficient lives in groups on organically farmed land, where the community shares chores, property, birth, death, childcare, birthdays, and bounty.

Thom Hartmann (2004) calls these communities "intentional communities," and he argues that the most successful communities are the ones "with a shared vision that is put into *action*" (p. 316). He is not talking about the failed religious experiments of millennialism, the back-to-the-land communes of most people in the 1960s, or the armed, politically extreme militias movements. Hartmann clarifies that the "primary key to successful, long-term community is that the group of people are interdependent for their survival or livelihood" (319). The communities with the most successfully employed fourth cosmological shift are the ones that meet "vital social and spiritual needs as well as providing for the life-support needs (food, shelter, and sometimes employment) of their members" (320). Sometimes the community works together, sometimes lives together,

and sometimes lives and works apart; however, in all cases, the community works to provide goods, services, emotional support, and friendship to each other.

On a larger, societal level, Berman would have an embrace of diversity, whether this applies to biodiversity and protection of endangered species, or to marginalized cultures and dying human languages. The larger societal cosmology would "be preoccupied with fitting into nature rather than attempting to master it" (Berman, 1984, p. 278). The goals would include clean air, water, and soil. Politically, we would decentralize and move to smaller institutions of regional, autonomous, and local control. Community hospitals, food cooperatives, neighborhood associations, community centers, strong neighborhood schools, and community gardens and farms would proliferate. The paradigm shift in cosmology would be marked by intense study of and adherence to the manifold principles advocated by feminism, ecology, cultural diversity, and spiritual renewal.

Rifkin's model for a future global civilization starts somewhere in Berman's neighborhood, then quickly expands to promote the adoption of what he calls "biosphere consciousness" (p. 475) via Internet connections. People used to empathize with their family members and nomadic tribes before the founding of Mesopotamia. With the founding of cities, however, in Sumeria, and the specialization of labor, followed by the influx of new ideas brought in by trade, people's empathy expanded to include others in their own cities, as they began to think of themselves of citizens of Uruk, for example. The pains and pleasures of their fellow citizens became the province of each individual in the first cities, as she could easily imagine herself in the place of another in like social caste. Later, after the invention of Gutenberg's printing press in 1440, which catapulted

European literacy and allowed people to take in the news from other worlds that started being spread by the great seafaring colonizing countries of Spain, Portugal, the Netherlands, and England, people's empathy were enlarged once again to include the stories of peoples in foreign lands. Later, during the Industrial Revolution and the advent of nation-states following the convulsions of revolutions against monarchies, Europeans began thinking of themselves as Spaniards, Poles, and the like.

Today, Rifkin says, we stand at the gate of global consciousness, made possible by social networking technologies such as Twitter, You Tube, Facebook, and Wikipedia. Videos such as *Kony 2012* (Vandivort, 2012), for example, can go viral, and, as in the case of that particular film made in March of 2012, over 100 million people can be drawn to a social justice cause in less than a month. Rifkin embraces the promise of these electronic technologies as a means to help us learn about our fellow humans on earth and thereby deepen our empathy and connection to people whom at first glance might appear unlike ourselves. Nowak's research, remember, supports Rifkin's contentions, as human communities evolve biologically most successfully when they have information about other communities, their group's reputation is shared in a social network, and they are able to assist other communities in need in a public, open forum with other communities observing (38-39).

We are coming full circle here, back to our first enduring understanding which stated that people at bottom have always had, in all times and places, similar desires: the desire for food, water, and safe lodging for their children. Rifkin adds to this the fact that our technological connectivity today enables a new, global ecological conviction, biosphere consciousness. This new cosmological paradigm, which is "the only context

encompassing enough to unite the human race" (p. 593) gathers together people of all nations, ironically, under the banner of *fighting for survival* due to the complex threats posed by global warming, hunger, water scarcity, and the other predicaments detailed in sections one and two of this essay.

Rifkin wonders, though, along with the sixth grade teachers at Catlin Gabel—given the fact that climate change seems to be progressing just as quickly as technological innovations that allow the worldwide spread of this biosphere consciousness—if the technology will raise consciousness quickly enough to avoid the most heinous of global warming's possible impacts.

Initial returns bring Rifkin qualified hope. He traces the explosion of biosphere consciousness to 1979, the year James Lovelock's book *Gaia* was published. Earth, Lovelock proposed, was a self-regulating, evolving living organism that enables countless symbiotic relationships between species and geochemical processes to proceed within networks of interconnected ecosystems. When the organism's biochemical balance and ecosystem stability is threatened by an activity, such as uncontrolled burning of fossil fuels by humans, the very lives of the species within the interconnected ecosystems within the larger organism are threatened. This new view of our planet provided one of the most significant cosmological shifts since the Scientific Revolution. Readers were brought to understand that nature did not reside in objects, but in relationships, that concerned scientists should not remain distantly objective, but should involve themselves to participate within nature toward its conservation. Lovelock's vision of science, says Rifkin, "takes us from a colonial vision of nature as an enemy to pillage and enslave, to a new vision of nature as a community to nurture" (p. 600).

Rifkin identifies not only the Internet as an agent of positive change to spread the word about the community of nature; he also points to the American classroom as a place where the most synergistic alliances are being forged between biosphere awareness and empathic development. “Children are becoming aware that everything they do—the very way they live—affects the lives of every other human being, our fellow creatures, and the biosphere we cohabit” (Rifkin, 2009, p. 601). In the 6th grade, to this end, we ask the students to do energy, food, and water audits of their lives for one week, then we discuss solutions for not only reducing waste and carbon footprints, but we also explore solutions, as a group, for making sure other people on the planet and our fellow creatures get the food and water and habitat security that they need as well. We also take weeks reading nonfiction excerpts related to gardening and walking through the nine reasons why we garden using the problem-solution pattern explained in section two of this essay. Students finish the unit feeling that their daily choices, especially around food and water, really do change the world, both within their own bodies and in their communities.

The final cosmological shift wends its way here, then, to this final convergence: my sixth grade colleagues and I teach garden in school so that our students can create a new narrative to pass along to *their* great grandchildren about a day long in the past when school became a place for the following: to identify empathically with all living people, in order to ensure that the basic needs of all, regardless of age, sex, ethnic background, or geographical location, are being met; to affirm the deep interdependence between the land, water, climate, and living creatures of this world in order to halt further ecological devastation; to create carbon-neutral communities that are environmentally, socially, and economically just around the world; and, finally, to work collaboratively in a

biodynamic, organic, zero-waste garden without topsoil or water loss to produce healthy, abundant food so that we might save ourselves and this world that we so love.

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