

**Using Ecocentric Literature in the Middle School Science Class:  
Can We Encourage Eco-awareness Without Resorting to "The Sky Is  
Falling"?**

*Blake Learmonth*

The metaphor of apocalypse (is) central to ecocentrism's projection of the future of a civilization that refuses to transform itself according to the doctrine of the web.

Apocalypse is the single most powerful master metaphor that the contemporary environmental imagination has at its disposal...the rhetoric of apocalypticism implies that the fate of the world hinges on the arousal of the imagination to a sense of crisis

--Lawrence Buell, *The Environmental Imagination*

Even the small steps we have managed to take Out There have let us look back on the beautiful blue bubble that is Earth and realize our consanguinity. That icon ('Earthrise on the Moon') has probably played a greater part in ending the cold war, and alerting millions to the risk of ecological catastrophe than any careful writings.

--Stephen R. L. Clark, "The End of Ages"

**Academic Setting**

With the all of the hoopla surrounding the year 2000 — collision-course comets, and a few not-so-unusual occasions of planetary alignment the question, "Is the world going to end?" was all too common in my middle school science classroom

last year. Stranger still was the class refrain "We're all gonna die," which seemed to explode spontaneously from several of the students whenever the question came up. Even after several repetitions, my slightly tongue-in-cheek answer, "Yes, the world **is** going to end, and yes, we **are** all going to die," produced gasps. Each time, I quickly added, "but not any time soon." There seems to be a true fascination with the end of the world among my students. It may well have been stimulated by all of the very public pseudoscience surrounding the arrival of the year 2000 or the popularity of films like *Armageddon* and *Deep Impact*, not to mention an assortment of mutant lizard, earthquake, tornado, and volcano disaster films, but whatever the source, impending doom was real to them.

## **Student Population**

This curriculum unit is intended for use in my eighth grade Van Buren Middle School Earth Science classes. Van Buren students are an extremely diverse group. Our district covers a long, narrow, east-west strip in Albuquerque's Southeast Heights, spanning both the most economically depressed and most affluent neighborhoods in the city. Seventy-six percent of our students receive free or reduced lunches through federally funded programs and a significant number receive Title I services in reading and/or math. In terms of race and national origin, the students are equally diverse. Slightly over fifty percent identify themselves as Hispanic and less than twenty percent as Anglo; African Americans, Native Americans, and Asians round out the group.

Many of our students are dependents of military parents; this factor, when combined with economic factors, gives our school a very high mobility, or very low stability, rate. Less than forty percent of our sixth graders are still at Van Buren in the eighth grade, and it is not uncommon for the same student to withdraw and return several times. Many languages other than English are spoken by our students, and typically ten or twelve of my 150 plus students speak little or no English when they enter school.

As Van Buren Middle School's population slowly declines, the school's structure of interdisciplinary teams has slowly broken down; we are returning to a conventional junior high school model, with seven forty-five minute classes. Language arts and Literature classes are usually taught in blocks, but science classes and those of other disciplines are autonomous. This change puts the responsibility for interdisciplinary planning on the individual teacher. Special education students are fully included in science classes, although the inclusion model varies from year to year.

## **Goals**

Most broadly, the goal for the unit is to encourage environmental awareness by augmenting the science class curriculum with a study of both fiction and nonfiction environmental literature. Hopefully, broadening the scope of available materials will make addressing different learning styles an easier proposition. By providing

exposure to a variety of materials and activities and specifically addressing propaganda techniques, we will explore environmental issues without exclusively relying on the apocalyptic "Sky is Falling" paradigm that I mention in the title. Although the sense of imminent environmental peril is, according to Buell, "essential to stimulating the environmental imagination" (Buell 305), there is enough controversy in environmental thinking to spark debate, to encourage students to see that environmental issues are important to deal with even if the end of the world is not eminent. Science fiction has the ability to disorient students, to set up scenarios that are just far enough out of their daily experience to require mental recalibration<sup>1</sup> or a paradigm shift that will change the way they look at the environment. Ursula Le Guin's *The Word for World is Forest* for example, promotes egalitarian<sup>2</sup> thinking by the unrelenting presentation of three-foot-tall, green, furry creatures, who inhabit a forest planet, as "people." They call themselves "people," the narrator calls them "people," the only group denying them personhood is the unenlightened Terrans (Earth people) who have come to destroy their planet.

I would like for students to be exposed to a variety of environmental literature including factual debate of environmental issues such as pollution, extinction, and global warming, using those issues to practice forming opinions and supporting them with facts. The discussion will be based in the different paradigms of *ecocentrism* and *anthropocentrism*. The ecocentric paradigm revolves around the idea that environmental decisions should be made with the best interests of the whole, interconnected, environment as the primary concern. The anthropocentric paradigm centers on the needs of humans. These paradigms are often, but significantly, not always in conflict. In *Desert Solitaire*, Edward Abbey suggests that the preservation of wilderness is easily reconciled with the anthropocentric paradigm: "A man could be a lover and defender of wilderness without ever in his lifetime leaving the boundaries of asphalt, powerlines, and right-angled surfaces. We need wilderness whether or not we ever set foot in it. We need a refuge even though we may never need to go there" (Abbey 162).

From environmentally oriented fiction students should be able to discern the main point, which is often the "moral of the story." We will directly address the question, "Why are we reading this while we are studying the environment?" Through fiction students will explore the concept of apocalypse as both an end and a beginning, by comparing fairly dismal post-nuclear-holocaust fiction, Ray Bradbury's "There Will Come Soft Rains," for example, with stories offering more hope for the future, like Lawrence's *Children of the Dust*. There may also be an opportunity compare fictionalized disasters with those proposed by writers of apocalyptic non-fiction. *Silent Spring*'s introductory chapter could, ironically, serve as an example of both genres as well as an example of several techniques of propagandists (Carson 1962).

One of our official missions as teachers in the Albuquerque Public School system is to teach students to recognize and evaluate propaganda; to help them recognize

when they are being manipulated (DCCSS 25). Learning to recognize that an appeal to their sense of disaster, an appeal to their fears, is a signal of manipulation is an important part of creating an awareness of propaganda. Additionally, it seems that there is an attitude, which pervades our society, that suggests that if a situation is really bad it has to be someone's fault. Some disasters or catastrophic conditions may be due to natural change or an unfortunate combination of circumstances. Hence, it is important for students to acquire the information and critical thinking skills to sort out the differences between disasters caused by humanity and "natural" disasters.

Acquiring a concept of time on a geologic scale is also a requirement of a middle school earth science curriculum (DCCSS 28). Time as a concept has serious, but sometimes conflicting implications to environmental thinking. Our concept of time is deeply tied up with the natural cycles of the Earth-Moon-Sun system, which produces repetitive cycles, the awareness of which is inescapable. This direct connection contributes to ecocentric thinking. On the other hand time, pictured as linear and on a geologic scale (Scientists believe that the earth is about 4.6 billion years old) is unfathomably long, which may leave students either feeling insignificantly small by comparison, or hopeful from a "time heals all wounds" point of view. Exposing students to different concepts of time should help them to see time differently from the day-to-day, short-term linear progression view that pervades modern Western thinking.

We have a conflicted mission in middle school science, which requires us to teach that change is an integral part of all living systems. No value judgment, change is just a given (DCCSS 28). We are also encouraged to instill an ecocentric viewpoint in our students (DCCSS 28), and herein lies the conflict: Most environmental literature, particularly adolescent and young readers' eco-literature strongly suggests that either halting change at this point in time or actually reverting to an earlier state would be a good thing. Nobel Prize Winner Kary Mullis<sup>3</sup> depicts the bureaucratic side of this attitude in *Dancing Naked in the Mind Field*:

"Did somebody convince us that...we are now masters of the planet and guardians of the status quo? That the precise climatic conditions that happen to exist on earth today... should be here forever, *in sricula seculorum*?<sup>4</sup> *All the good species are here now*. None shall perish and no new ones are welcome. Biology is no longer allowed: The Environmental Protection Agency and the Intergovernmental Panel on Climate Change are now in charge. *Evolution is over*" ( Mullis 205, his italics, my note 4).

Students should be exposed to a variety of environmental literature and begin to form supportable opinions about humanity's role in the evolution of our ecosystem.

Students should be able to see the connection between science concepts such as food chains, food webs, ecosystems, and biospheres and environmental philosophies, particularly Native American philosophy, which stress interdependence of all living things.

As a final goal, specific to students living in the Southwest and other arid regions, students should become aware that an ecocentered life in the desert requires a different approach than in less arid climates. Planting a tree is an almost universal symbol of "green" living, but may not be appropriate in a "brown" local. The "greening" of the American desert is the antithesis of ecocentric thinking; ecocentered thinking requires a sense of place.

## **Narrative**

### **Recalibration: Literature in the Science Classroom**

Improved literacy is a national goal of education and an articulated goal of the Albuquerque Public Schools. Additionally, it is obvious that all teachers, in all disciplines, are involved in teaching literacy, so the idea of incorporating literature into science class is not revolutionary. Science textbooks frequently include literary selections. Each volume of the Prentice Hall "mini" texts that my school uses, for example, includes three topical pieces of literature, usually a biography, an article, and a science fiction short story (What Became 133). I have used reading and writing creation stories to contrast with the science creation story in my class for years. I hope that someday my students will be so used to writing and reading in all of their classes that I won't hear, "Isn't this science class?" when we start units that contain reading and writing.

Using literary sources in a science class provides an opportunity to present science materials in a manner unfamiliar to many students. "Environmental literature launches itself from the presumption that we do not think about our surroundings and our relation to them as much as we should" (Buell 261). Science fiction, particularly, has the ability to present environmental situations in a disorienting fashion, which requires a paradigm shift, or mental recalibration, and distances students from their preconceptions. By using debate, journal writing, graphic arts, and creative writing in science class I hope to offer students with different learning styles an opportunity to succeed and to foster the idea in my students that they can use their entire "tool kit" in dealing with educational situations, not just the specific tools most common to the compartmentalized subjects.<sup>5</sup> As an example, to support that goal, my students are encouraged (actually, required) to use the *scientific method* as a tool to solve problems in their home life or in another teachers' classrooms.

### **Background: Relevant Themes in Environmental Literature**

There are a number of environmental themes, the study of which fits with the goals of this curriculum unit, including:

- The definition of nature
- Ecocentrism versus anthropocentrism,
- Alarmism, propaganda and the coming of the apocalypse, closely tied to, "Whose fault is this mess, and how do we get out of it?"
- The role of technology,
- The implications of geologic or "deep" time.

The appropriateness of the notion of "greenness" as an icon for environmentalism, "terraforming" the desert.

What is Nature?

Defining nature seems as if it would be an easy to do. Every one knows what nature is. The initial, I would suggest simple-minded, view of nature is that it is all of that "out there," not created by or touched by a human being. Basically nature is the whole global ecosystem or biosphere except us, before us. Emerson separated the concept of nature into a common version and a philosophers' version. "*Nature*, in the common sense, refers to essences unchanged by man; space, the air, the river, the leaf" (Emerson 36). "Philosophically considered, the universe is made of Nature and the Soul." This leaves the physical human as part of nature, but separates out the spirit (Emerson 36). Or maybe by nature "We mean the integrity of impression made by manifold natural objects" (Emerson 37). Edward Abbey, in his own words, turns the last of the Emersonian (and Platonic and Hegelian) ideas "On their heads":

Men come and go, cities rise and fall, whole civilizations appear and disappear—the earth remains, slightly modified. The earth remains, and the heartbreaking beauty where there are no hearts to break. Turning Plato and Hegel on their heads I choose to think, no doubt perversely, that man is the dream, thought an illusion, and only the rock is real. Rock and sun" (Abbey 243, 244).

Killingsworth and Palmer bring into serious question the idea of lost nature, particularly as depicted by eighteenth century romantic writers. The romantic point of view:

was already nostalgic when it was formulated in the late eighteenth century. By that time, the frontier was restricted to only the most remote climes and most parts of the "natural" world (certainly those known to Rousseau or Wordsworth, for example) Had been thoroughly terraformed by centuries of human intervention" (Killingsworth and Palmer 25).

Douglas Adams stretches our view of the "natural" to the point of annihilation in

his science fiction comedy *The Hitchhiker's Guide to the Galaxy*, when his intergalactic travelers meet Slartibartfast, the terraformation "architect" who won an intergalactic award for "doing" the fiords in Norway when the Earth was built as an experiment billions of years ago. Poof! "Nature" ceases to exist as something untampered with by humans, recalibration in the extreme! (Adams 162).

The Western/ European outlook, which seems to make nature man's creation, contrasts dramatically with the Native American view of nature as seen in Leslie Silko's *Ceremony*. Nature for the Native Americans is an interconnected web, (personified for Silko in the Spider Woman, creator of the universe) and man plays an integral part in that web. The idea of disconnecting man from the web of nature would seem absurd from a native point of view (Silko 1).<sup>6</sup> In *Ceremony*, Silko's main character has returned from the Bataan death march suffering from post-traumatic stress syndrome. He is convinced that drought being suffered by his New Mexico community has been caused by his cursing the rain on the march. Western, Army medicine has failed him completely and he has sought out the help of a native healer, who spoke to him in the Laguna language:

"But you know, grandson, this world is fragile." The word he chose to express "fragile" was filled with the intricacies of a continuing process, and with the strength inherent in spider webs woven across paths through sand hills where early in the morning the sun becomes entangled in each filament of the web. It took a long time to explain the fragility and intricacy because no word exists alone, and the reason for choosing each word had to be explained with a story about why it must be said this certain way. That was the responsibility that went with being human (Silko 35).

And in the poem/story that runs throughout the novel:

The way  
I heard it  
was  
in the old days  
long time ago  
they had this  
Scalp Society  
for warriors  
who killed  
or touched  
dead enemies.

They had things  
they must do  
otherwise

K'oo'ko would haunt their dreams  
with her great fangs and  
everything would be endangered.  
Maybe the rain wouldn't come  
or the deer would go away.  
That's why  
they had things  
they must do  
The flute and dancing  
the cornmeal and  
hair-washing  
All these the things  
they had to do

(Silko 37,38 formatting is from the original text).

Similarly, in the conclusion of *Silent Spring*, Rachel Carson breaks away from the common or philosophical European depiction of nature describing it as, "...the fabric of life—a fabric on one hand delicate and destructible, on the other miraculously tough and resilient, and capable of striking back in unexpected ways" (Carson 402). Ironically, modern science, which grew out of the same European philosophical traditions that allow man to be viewed as separated from nature, seems to be more in synch with the Native American (and, incidentally, pre-Christian European i.e. pagan) philosophy. Science curriculum, even at a middle school level is clearly aligned with the concept of nature seen as an interconnected web (DCCSS 27,28 [Life Science]) (CS & B #11 s-14).

Anthropocentrism vs. Ecocentrism

(See definitions of anthropocentrism and ecocentrism in "Goals" above)

Though apparently in opposition, balancing the logical outcomes of ecocentrism and anthropocentrism is an attainable goal. However, balancing is not going to be easy since environmental literature is characterized by extremes. The following is from Ted Mosquin's article *The Fearful Notion of Being Reasonable*, (from Ted Mosquin Ecocentrism home page, <<http://www.ecospherics.net/pages/MosqFearfulNotion.html>>). I find it to be a chilling example of oversimplification of environmental issues and a "this is right, this is wrong, end of discussion," attitude (which Mosquin attributes to Aldo Leopold).

*Unreasonable (Anthropocentric):*

"a deep devotion to raising human beings by the billions"

"harnessing or destroying Nature to expand human progress is good"

"all economic growth is good"

"new subdivisions are good"

"megaprojects are justified"

*Reasonable (Ecocentric):*

"the planet already has 10 times the number of humans it needs"

"destroying Nature is bad; restoring Nature is good"

"economic growth is killing us"

"additional subdivisions are destructive of human and ecological values"

"megaprojects cause more harm than good" (Mosquin 2).

It seems to me, that the dichotomy between ecocentric thinking and anthropocentric thinking is not always so clear. A person who was firmly convinced that the universe was out there to serve the needs of humanity (anthropocentric) could logically deduce all of the statements from "Ecocentric" part of the above list. It is a bonus for those who promote environmental consciousness that many of the tenets of ecocentrism make sense from an anthropocentric (human centered) or even egocentric point of view. Only from ignorance (hence the responsibility of education) is it possible to maintain the independence of humans from Spider Woman's web (Silko 1). As a science teacher, I am reluctant to portray science's view of reality as the "Truth," and in my classes I am quick to point out that the beliefs of scientists have changed dramatically over the years. Nevertheless, the concept of an interdependent ecosystem is here to stay, and even the most self-centered persons, if properly educated, should be able to see that their actions in the environment can and do effect them. It doesn't matter if one has a linear Western/European, man outside of nature vision or a Native American/ Eastern view of man as an integral part of the system. For example, much of the success of apocalyptic literature like Carson's *Silent Spring* is its appeal to both of the above consciousnesses; one can resist the use of dangerous pesticides because they are simply bad for nature, killing birds and fish along with the bugs (bugs that wouldn't be there, or wouldn't be a problem, except for agriculture) or one can be motivated to restrain the use of deadly chemicals out of self-preservation: there is no point in killing the bugs if the chemicals also kill us! (Carson 22).

Ecocentrism and anthropocentrism come into real conflict only at the extremes. Extreme ecocentrism logically concludes biotic egalitarianism, that is, that all living things and possibly the physical, mineral Earth have an equal right to exist and be included in the moral equations used to make environmental decisions. For example, in New Mexico at the time of this writing, the Rio Grande Silvery Minnow is threatened by the removal of water from the Rio Grande to irrigate agricultural land. There are those who would contend that the farmers have no more right to exist than the minnow.<sup>7</sup> The extreme anthropocentric view holds that man is the master of the universe and other entities exist solely to serve man. This is the classic environmental "bad guy," who even when aware of the damage he does, remains unrepentant. Often citing *Genesis* as justification. The crazed military logging boss in Le Guin's *The Word for World is Forest* exemplifies this

outlook. Here is the logging boss's take on his men's recreational hunting or rare animal species: "I could stop 'em. But look, it's the men I'm looking after; that's my job. And it's the men that count. Not the animals. If a little extra-legal hunting helps the men get through this godforsaken life, then I intend to blink. They've got to have some recreation"(Le Guin 4). Contrast the preceding with deep ecologist, Gary Snyder's suggestion that the Earth's human population be reduced to "ten percent of current [1990] population," which would "guarantee space for all including wildlife"(Snyder 177).<sup>8</sup> If one emphasizes the extremes, it is hard to see what kind of actions should be taken to preserve one's self or the biotic community, but somewhere between the two extremes is a huge area where self-interest (unless blinded by ignorance) and environmental interests coincide and where teaching can take place.

### Alarmism, Propaganda, and the Coming of the Apocalypse

Much of the force behind modern environmentalism and eco-activism depends, ironically, on the anthropocentric idea that whatever is wrong in the environment; it is our fault, and our job to fix it. Additionally, it is important to the promotion of an ecocentric viewpoint for people to believe that if we do not dedicate our effort into mitigating the effects of our existence on this planet, that the result will be disastrous, even apocalyptic.

This alarmist point of view is common in both environmental literature for adults and literature designed for younger audiences, and is reinforced by media who seem to believe that a story is not newsworthy unless words like, "terrible, disastrous, devastating, and terrifying" can be applied to it. Peruse the environmental section in your public library (363.7 or so) you will find titles like *Toxic Nation*, *Hothouse Earth*, *The Hole in the Sky*, *Drinking Water Hazards*, *The Poisoned Well*, *Fighting Toxins*, *Toxic Terror*, *Environmental Overkill*, *Imperiled Planet*, *High Tech Holocaust*, *Trashing the Planet and Our Drowning World*, adorning everything from seriously technical looking volumes to large format "coffee table" books full of spectacularly beautiful photos of what will soon be lost and spectacularly ugly photos of garbage dumps and disasters. It seems that publishers believe that provocative, alarmist titles sell books. Killingsworth and Palmer see these books as salvoes in environmentalism's war against "big business, big government and big science" (Killingsworth 22). They suggest that:

The most influential apocalyptic narratives do not undertake a wholesale attack on the ideology of progress or its attendant faith in science, technology, and liberal democracy. These texts appear (once one gets past the titles) not as the rhetorical equivalent of total war but as shock tactics to win the hearts and minds of the general public at crucial historical periods in which the need is perceived to extend and broaden commitments to the environmental movement (Killingsworth 22) (my

parenthesis).

Writers of environmental literature may, in fact, believe that the situation that they are writing about is so dire and so important that scaring the public into awareness is the appropriate course of action. If the apocalypse is not upon us no one will care enough to do anything (B 285). This situation is closely analogous to the literature of educational reform. Advocates of educational change, even those on opposite ends of the political spectrum, are interested in convincing the public that there is a crisis in public education, despite a fairly large body of research that says that although not perfect, the public education system is doing a pretty good job of teaching kids (Schrag 1997). If there are just some problems that need work rather than an emergency, elected officials are not likely to fund radical alternatives to the existing system.

As I mentioned in "Student Goals" above, teaching students to recognize and evaluate propaganda is a requirement in both science and language arts. Using environmental writings for source material has several advantages. It will help to point out that propaganda is not "evil"; it may well be used to persuade people to do good things as well as bad. "The word propaganda refers to any technique that attempts to influence the opinions, emotions, attitudes, or behavior of a group, in order to benefit the sponsor" (Donn July 2000). Propaganda may encourage a person to do something that is good for that person, not just for the "sponsor" of the propaganda, but that is not the purpose of the propaganda, just a side effect. In studying environmental works as potential propaganda students will get reinforcement of the environmental vocabulary and concepts.

Websites dedicated to studying propaganda are quite common on the internet (a search on "propaganda" or "propaganda lesson plans" produces thousands of useful sources) and almost all include descriptions of types of propaganda. The types most likely to be found in environmental literature are: **appeal to fear, use of emotionally charged words, testimonial or appeal to authority, and bandwagon** or "everyone is doing it." For example, "Recycling is easy; everyone is doing it!" **Use of symbols**, particularly those that have obvious positive or negative connotations is also frequent. "Green" has become the symbol for environmental activism, and unless one lives in a desert, Green is strongly associated with growth and healthy living things, similarly, garbage dumps are almost universal negative symbols used, for example, in science class videos about pollution and recycling (without much thought to the environmental disasters that would result from not having them.) (---. 117).

Rachel Carson's incredibly influential book *Silent Spring*, is a great example the use of propaganda. It first portrays rural America as a pastoral paradise, "There once was a town in the heart of America where all life seemed to live in harmony with its surroundings" (Carson 13). The next few pages are full of positively charged emotional words such as: "prosperous," "white," "green," "beauty," and "abundance." As the horrible transformation of paradise is laid out, the words

change to: "evil spell," "witchcraft," "maladies," "grim specter," "browned," "withered," and "death" or "die" (used repeatedly) (14,15). The disaster didn't really happen in any real place, we are informed, but could have happened anywhere and individual disasters actually happened "somewhere" (16). Fear is called upon as she describes places where poisons are found concluding with, "They occur in the mothers' milk and probably in the tissues of the unborn child"(93); and in the conclusion to chapter 10 Carson states, "As matters stand now, we are in little better position than guests of the Borgias" (252). As it turns out, Carson's propaganda had very positive effects, (unless one takes a chemical manufacturer's point of view): DDT was banned in America and Europe shortly after the book was published, and laws controlling the use of pesticides were dramatically strengthened.

There are numerous examples of the apocalypse in fiction, particularly science fiction. H.G. Wells *The Time Machine* (1895) ends with the literal end of the world with the sun as a red giant. Starting in the early 1900s the most common end of the world theme was war, chemical war inspired by the horror of WWI. And, later, nuclear war from the end of WWII and The Cold War, with stories such as "There Will Come Soft Rains," by Ray Bradbury in which a very hi-tech house "lives" on after its occupants have been vaporized, casting their negative shadows on a charred outer wall of the house, and Arthur C. Clarke's "If I forget thee O Earth," which tells the story of Moon-dwelling survivors from Earth, a father and son, who make a pilgrimage to watch the Earth rise and observe parts of the Earth, "gleaming with an evil phosphorescence: and he remembered. He was looking on the funeral pyre of a world—upon the radioactive aftermath of Armageddon. Across a quarter of a million miles of space, the glow of dying atoms was still visible, a perennial reminder of the ruinous past. It would be centuries yet before the deadly glow died from the rocks and life could return again to fill that silent empty world" (Clarke, A. 77). More recent works such as *Jurassic Park* and *Andromeda Strain* emphasize a "don't mess with Mother Nature" theme.

The young adult science fiction work *River Rats*, by Caroline Stevermer and Bruce Sterling's *Distraction* are an example of a sub-genre, of apocalyptic science fiction in which the apocalypse is reduced to setting or background. In both works the environment has been seriously modified. In *River Rats*, the recent past is referred to as "The Flash" and seems to be a combination of nuclear war and chemical disasters; the Mississippi "river water looks brown and greasy, like real bad gravy, only thinner. If you drink it you die" (Stevermer 1). In *Distraction* it seems that all of the worst-case scenario disasters have happened. Global warming has raised the seas, flooding large parts of America; pollution and intentionally caused chemical disasters abound; and with government mostly broken down, genetic experimentation is an every day thing, with both positive and gruesome results. The main character, a political campaign wizard, has a "background problem"; though clearly a person by all standards, he has no parents and is not exactly *Homo sapiens*. The environmental message in both these stories is clearly that you

wouldn't want to live there, and should try to avoid contributing to such disasters, but the strange accessory message seems to be that "life goes on." *River Rats* is a Huckleberry Finn style quest adventure where some of the small agricultural villages along the river seem like nice little towns from a hundred years ago; people living the life of pastoral simplicity. The degraded environment is omnipresent in *Distraction*, but life, politics, science, relationships, international strife, as well as class, race and regional rivalries just go on. Technology in *Distraction* keeps creating new disasters and also new solutions. Finally, the apocalypse as cliché is exemplified by the title of Anthony Burgesses work, *The End if the World News* (Seed 8,9).

### The Role of Technology

Particularly with respect to the environment, technology is a double-edged sword, both creator and destroyer; understandably, writers of both fiction and non-fiction environmental literature seem seriously conflicted as to their feelings about technology. Leo Marx announced the conflict wonderfully with the title of his 1964 book, *The Machine in the Garden*, a perfect metaphor for dichotomy between technology and Nature. What is the machine? Is it anything man-made invading the Garden of Eden? Is it a hoe or spade or roto-tiller working in the small pastoral plot that feeds a family? Or is it the crop duster that is spraying tons of deadly chemicals, "Indiscriminately from the Skies," as in the title of chapter ten of *Silent Spring* (Carson 213). There was and to some extent still is the belief that because of science and technology life on earth would continue to get better and better. This belief finds support according to Killingsworth and Palmer, from surprising sources, "Far from abandoning technology to go and live in caves, most environmentalists, even the radicals, are scientifically educated and support their claims with scientifically generated information" (Killingsworth 26). After hundreds of pages documenting the terrors wrought by mad scientists and chemical companies Carson concludes, in the final chapter of *Silent Spring*, that the new, right-headed, science of ecology might be the key to undoing the damage done by the previous generation of wrong-headed technology. A similar theme plays out in the science fiction of Louise Lawrence in *Children of the Dust*. After chapters of depressingly dismal description of the immediate aftermath of nuclear war in Briton, the novel begins to jump forward in time. Two groups survive the blast, remnants of the technocrats in high-tech bunkers, who survive for decades with their faith in technology and their genes intact, until time and lack common sense causes the gradual degradation of their insulated world. The "techies" have clung to rigorous academics, and have driven their children to advanced degrees at young ages, but ultimately have produced a society with a crumbling infrastructure where there are theoretical physicists, but no electricians and architects, but no one who knows how to "make bricks" (Lawrence 77). The Bunker dwellers refer to the other survivors as outsiders, which is both a literal description and a word laced with xenophobia, and "racism." After several generations (plagued by disease and mutation) the outsiders have adapted or evolved physically to fit in to the radically

different environmental situation that exists outside the bunkers.<sup>9</sup> Socially they have evolved into an egalitarian, agrarian society that is in every way the opposite of the bunker dwellers'. In the end, the bunker society collapses and the Techies have to depend on the kindness of the Outsiders, who they at first perceive as inferior primate throwbacks. Eventually the "superiority" of the evolved outsiders, both as human beings and as creatures adapted to the new conditions, becomes clear. The outsiders, though, realize that their pastoral paradise is doomed to stagnation, and they invite the bunker dwellers to participate in the new society by contributing their technological ideas. So, pastoral simplicity saves the day, but technology is seen as a necessary ingredient for the future (Lawrence 176).

As Killingsworth and Palmer point out in discussing the "widely read" book *The End of History and the Last Man* by Francis Fukuyama "once instituted, science cannot be undone" (Killingsworth 26), and in Fukuyama's words: "Modern natural science ... is so powerful for both good and evil that it is very doubtful that it can ever be forgotten or un-invented under conditions other than the physical annihilation of the human race" (Fukuyama 88) If we are stuck with science and technology, and it seems that we are (unless we do something **really** stupid) the trick seems to be to use science and technology in an ecocentric way. Science is a powerful force; technological information is growing exponentially. With that, the potential for disaster and the potential for salvation also grows. With the long history of humans not thinking through the implications of the technology that they have created, writers like Jules Verne, Mary Shelley, H.G. Wells, and more modern fiction and non-fiction "writers everywhere have continued to cite *Homo sapiens* as the great enemy of human society" (Clarke 21). Technology doesn't kill people; people kill people (and birds and trees and...)! Maybe *we* are the machines in the garden.

## Time and Cycles

An understanding of time is important in both my Earth Science and Life Science classes. In the former the cyclical element of our time sense, which is so tied to the celestial mechanics of our tilted, orbiting, spinning planet and its faithful moon, is manifest. The sometimes unfathomably deep, geologic time, is essential to the concept of evolution, which comes close to being the foundation for biology or life science. The implications of time in ecocentric thinking are often contradictory. The cyclical, daily, monthly and seasonal changes connect us to the biosphere, while the immensity of the universe in terms of time and space, seems to point out our insignificance.

In *The Environmental Imagination*, Buell dedicates a full chapter to the use of seasonal metaphors in environmental or nature literature, pointing out that: "In environmental prose, the seasons have been a particularly favored organizing principle. Among American books, Susan Cooper's *Rural Hours*, large portions of Thoreau's *Walden*, Celia Thaxter's *Among the Isles of Shoals*, John Muir's *My first Summer in the High Sierra*... Aldo Leopold's *Sand County Almanac*,... Annie

Dillard's *Pilgrim at Tinkers Creek*... and Edward Abbey's *Desert Solitaire* all follow seasonal ordering. ... For the seasons next to the alternations of day and night are the environmental cycle most perceptible in every day life (Buell 220). Nuclear "winter" is a common theme in apocalyptic novels like *Children of the Dust* where the seasons are distorted by the rash actions of humans, but the concluding hopeful chapter occurs in the spring. The seasons are sometimes modified by natural forces, with an effect on literature, Mary Shelley's *Frankenstein* was written in 1816, "a year without a summer", when the huge volcanic eruption of Mount Tambora in the Dutch East Indies filled the atmosphere with so much ash that summer never really happened; there was snow in New England in July for example, and it has been suggested that the gloominess of Shelly's novel reflects that dismal summer (Expague, "Year Without a Summer").

Through observation of time related natural cycles, particularly systematic careful observation, people become connected with their environment. By encouraging students to experience the cycles directly through scheduled observations and journals they will become more aware of their connection. It should also be interesting for students to be exposed to literature describing seasons for different locals, since seasons vary dramatically from region to region. New Mexico to me seems to have three seasons: summer, hot and thunderstormy; fall, clear and crisp; winter, startlingly clear and cold. Spring seems to exist only as alternating days of winter and summer, unified only by the wind. As reported by Buell, John Muir in *My first Summer in the High Sierra* stated "emphatically" that "In the great central valley of California there are only two seasons—spring and summer" (Buell 230). The tropics are frequently described by visitors as having no seasons, although local people will probably object, pointing out that the seasons are just more subtle in the lower latitudes.

The immensity of geologic time has a different, often disorienting effect. It fights any human tendency toward *Hubris*, the belief that, godlike, we can control our fate or the fate of nature (Mullis 203). Big numbers are disorienting, and geologic time involves some very big numbers. The age of the Earth, for example is 4,600,000,000 years; a Earth's history time line with a scale where one millimeter equals one year stretches 4600 kilometers (2700 miles). At the same scale, all of human history fits easily on a classroom wall, with an individual lifetime being about the width of a human hair. Trying to put human environmental impact on desert environment in perspective Edward Abbey, states: "Growth for the sake of growth is a cancerous madness, Phoenix and Albuquerque will not be better cities to live in when their populations double again and again. ... No matter, it is of slight importance. Time and the winds will sooner or later bury the Seven Cities of Cibola, Phoenix, Tucson, Albuquerque, all of them, under dunes of glowing sand over which blue-eyed Navajo Bedouin will herd their sheep and horses" (Abbey 160). It may be reassuring or alienating to understand that even if we eventually cause our own extinction, the Earth will ultimately recover. Rather than becoming extinct we may evolve like the radiation-mutated people in *Children of the Dust*

into something new, "*Homo superior*" (Lawrence 220).

### Green Metaphor in a Brown Local

"Green" is an almost universal icon for environmental awareness and in most locations, that works; symbolic of healthy, well-watered plants, happily pumping oxygen into the atmosphere. From Johnny Appleseed to modern Earth Day celebrations planting a tree has become a cliché for environmental action. However, not all environments on Earth are green; some of us live in deserts and have to overcome the stigma of "brownness." Paul and Anne Ehrlich use "brown" and "brownlash" as anti-environmental icons, calling "efforts to minimize the seriousness of environmental problems, "brownlash" (Ehrlich 1).

Since greenness is such a common-sense metaphor for environmentalism, it is hard to overcome the destructiveness of green thinking when it is applied inappropriately to a desert ecosystem. Albuquerque, New Mexico, for example, is a desert community of approximately three fourths of a million people, centered along the once mighty Rio Grande <sup>11</sup>. People have lived in the Rio Grande Valley for thousands of years from prehistoric Pueblo people whose possible ancestors settled in the area after the last ice age, to colonial Spaniards whose livestock helped to create the truly brown desert that surrounds Albuquerque today.<sup>12</sup> Early settlers, both Native and European, settled small communities in the naturally green "bosque" along the river. After World War II however, Albuquerque expanded rapidly east and west from the Rio Grande into the dry desert. New arrivals "terraformed" the desert with non-native trees and grasses and watered their one-half acre replicas of their former homes with water pumped from an underground aquifer then thought to be boundless. The result: much of Albuquerque has lost its desert character; many of its sprawling subdivisions could be dropped into a Midwestern city without being noticed; the "boundless" aquifer is being depleted (better science has discovered that it never was boundless) as Albuquerque's population heads for a million; there simply isn't enough water to support a "green" lifestyle. In addition, pollen from thousands of non-native trees pollutes the air and stimulates the allergies that people tried to escape from by moving to the Southwest.

The idea that the desert is a "wasteland needing to be terraformed" is common in literature, in Willa Cather's *Death Comes for the Archbishop*, the New Mexico desert (near the native communities of Laguna and Acoma, is portrayed as unfinished:

This mesa plain had the appearance of great antiquity and of incompleteness; as if, with all of the materials for world-making assembled the Creator had desisted, gone away and left everything on the point of being brought together, on the eve of being arranged into mountain, plain, and plateau, the country still waiting to be made

into a landscape (Cather 95).

The idea that the desert is somehow unfinished would, no doubt, come as a shock to the Native residents of Laguna and Acoma, or for that matter to Edward Abbey, who describes the desert by writing, "This is the most beautiful place on earth" (Abbey 10).

With the realization that the water supply in Albuquerque was limited came the idea that the "greening" of the desert just couldn't go on. In *Desert Solitaire*, Edward Abbey writes about water in the desert:

Water, water, water....There is no shortage of water in the desert but exactly the right amount, a perfect ratio of water to rock, water to sand, insuring that wide free open, generous spacing among plants and animals, homes and towns and cities, which makes the arid West so different from any other part of the nation. There is no lack of water here unless you try to establish a city where no city should be (Abbey 159).

Environmentally aware people in desert communities have begun to find converts among the general community and politicians and even developers, who have discovered the environmental awareness is a commodity that can be sold, to the idea that rather than finding new sources for water conserving water should be a community goal. Xeriscaping, landscaping with native plants and a plan that is designed to catch and save water, is beginning to catch on in desert communities, although there is still resistance to "the desert look" among recently transplanted, wet-climate residents, who although they have **chosen** to live in the desert, still seem to want to transform their little part of it into Midwestern suburbia. It would seem that it is important to recognize that no one environmental metaphor will really work for all places. In teaching environmental awareness, one must be aware of the local environment and its uniqueness. Planting a tree in coastal Oregon may be environmental restoration; planting the same tree in the desert of New Mexico may be environmental degradation.

Whether students are motivated to environmental thinking by fear of causing the end of the world, out of respect for other living things through concepts like biotic egalitarianism or from recognizing that their self interest is served by avoiding carelessness in an environmental web that includes them, environmental literature will allow them to explore important environmental concepts outside of the typical science curriculum.

## **Implementation**

### Unit Summary

The following lessons are designed to be used in conjunction with a teacher's established environmental science lessons, including lessons on: biological

diversity, food webs and chains; water, carbon, and nitrogen cycles; ecosystems, biomes, and niches; astronomical cycles related to time (Earth's orbit, the Moon's orbit, and the tilt of the Earth on its axis which causes seasons). The unit's duration is one nine-week grading period of an eighth grade Science class.

### Ongoing Unit Activities

"Daily Do," a daily journal writing activity prompted by a daily quote that students will respond to in their "Science Journals." Edward Abbey's *Desert Solitaire*, Thoreau's *Walden*, and *50 Simple Things You Can Do To Save The Earth* are good sources for thought-provoking quotes.

Daily reading: "Down the River" by Edward Abbey from *Desert Solitaire* or some other high-interest reading slightly above the students' average reading level. I read to my students, but if classes have good readers, students could present the daily reading. Homework: sunrise-sunset and moon phase journals (possibly with brief weather reports).

### Sample Lessons

#### *Introductory Lesson*

Focusing activity: Show a clip from the movie *Blade Runner*, *Mad Max*, *The Fifth Element*, *The Matrix*, or some other science fiction film that depicts a seriously degraded environment. Use the clip to start up a discussion of what students believe the environmental future will be like and whether or not they believe that they can impact that future.

Materials required: appropriate video clip

Assessment: evaluate and guide discussion, use writing activity to evaluate understanding ("Daily Do" journal activity for the next day could reflect discussion).

#### *Debate*

Students will be divided into two groups each with two teams to develop strategies to support the opposing arguments presented in Ronald Bailey's *Eco-Scam: The False Profits of Ecological Apocalypse* and Paul Ehrlich's *Betrayal of Science and Reason*. (one group) as well as *Fifty Simple Things You Can Do to Save the Earth* and Robert Hunter's *Simple Things Won't Save the Earth* (second group). Both teams of both groups will research their side of the topic, prepare main arguments, search out and supporting evidence. Using the actual texts and excerpts provided by the teacher.

During the actual debate, the non-debating group will serve as judges, evaluating the knowledge and the use of supporting evidence of the debaters.

A rubric for evaluating debaters will be provided for students.

Materials required: copies and copies of excerpts from the above listed texts.  
Assessment: students will assess each other; teacher will evaluate and give feedback on both the quality of the debate and the quality of the judging.

### *Seeing Different Possibilities*

After reading post apocalyptic stories and/or novels and completing science lessons on food webs and food chains, students will finish a story from a point after an environmental disaster. They will either offer a solution that leads to a hopeful conclusion or a chain reaction that leads to a true, end of the world, apocalypse, or some combination of the two.

Emphasis will be placed on understanding cause and effect and interconnectedness.

Options for presentation of student ideas could include: written conclusions, storyboard, comic book style, illustrated versions could be offered to students who prefer to present their ideas visually. This could also be done as a group project (particularly if classes contain students with drastically different reading abilities or non-English speakers), which included both writing and illustration, or even in play form for dramatically inclined students.

Materials required: texts for reading (see annotated bibliography below, check your science textbooks; many current texts include literature, often science fiction either with the topic chapters of in an appendix). Prompt, either excerpted from an existing story of created by the teacher. Drawing materials and paper.

Assessment: Evaluate products for quality, logical thinking, and creativity.

### *What Are You Afraid Of?*

Focusing activity: From either personal experience or a report from someone who experienced growing up in the 1960s and 1970s, describe the fear of nuclear war that led to so many science fiction stories similar to Louise Lawrence's *Children of the Dust* (If world or U.S. history is the subject for your students' Social Studies class, this could easily be an interdisciplinary activity).

As an introduction to a lesson on propaganda, students would brainstorm things that frighten them. This could be followed up by research, probably using the Internet to compare their fears with the actual likelihood of the bad thing happening. Kids would work from their class's list of fears. Some fears could be dealt with statistically; for example, "How likely are you to be struck by lightning, bitten by a shark, or hit by a car?" Other fears would require a more narrative approach.

Since "Appeal to Fear" is a commonly cited devise of propagandists the above lesson would segue nicely into a discussion of propaganda.

Materials required: Internet connection or library reference materials.

Assessment: Evaluate research of student fears.

### *Predicting a Future*

Using the "Daily Do" journal entry from the "Introductory Lesson" above as reference, students will brainstorm ideas of what the future will be like in their hometown, twenty, fifty, one hundred, or one thousand years in the future. From this information they will create a fake diary of a teenager living in that period which describes their daily activity and gives a feel for the conditions that exist in the chosen time period, particularly the environmental situation, with references to the causes of the differences that exist. Diaries can be bound and illustrated by students who excel at creativity in presentation as well as content.

Materials required: Book making supplies, paper for pages, cardboard for covers, markers for decorating.

Alternative activity: the same lesson could be used to produce a newscast from the future, reporting on daily life and environmental conditions. Newscasts could be presented to the class or video taped.

Assessment: evaluate diaries for creativity and plausibility, particularly look at student's ability to explain why their future is the way it is.

### **Documentation**

#### Notes

1. Buell, on page 261 of *Environmental Imagination*, talks about "recalibration" of familiar landscapes producing an "undiscovered country." Similarly, I'm talking about recalibrating the perceptive tools of the students to create a disconnect between their preconceptions and new ideas.
2. Environmental egalitarianism or *biotic* egalitarianism suggests that all living things, possibly even "Nature" itself, deserve equal status in environmental decisions.
3. Nobel Prize for Chemistry, 1993
4. For ever and ever.
5. The compartmentalization of subjects in middle school should have gone the way of the dinosaur. Unfortunately that has not happened; in many schools The Schedule still takes precedence over the acknowledged benefits of interdisciplinary teaching.
6. I found the "web of life" very hard to cite in Silko; it pervades the entire text. I am hesitant to generalize a

"Native American" point of view for at least two reasons: first, there are thousands of American tribes and many Pueblos; their beliefs, in as much as outsiders know about them, are not consistent from group to group, second, there is the possibility that anthropologists have gotten the beliefs wrong. Native Americans have experienced centuries of invaders, both prying into their religions and actively trying to destroy them. There is at least the possibility that anthropologists, like tourists in Maine, have been intentionally sent down the wrong road.

7. Conversely, one could make the case that the Silvery Minnow has no more right to "artificial" protection than the farmers. Let "nature" including the humans, take its course, if the fish can't adapt they are "history."

8. Ten percent of the current population, not a ten percent reduction in population. Snyder does not advocate or even imagine the possibility of accomplishing this quickly, he says rather that reducing population to 1650s levels could only be accomplished over "centuries."

9. Famous poisoners of 15<sup>th</sup> and 16<sup>th</sup> century Europe; poisoned guests at their dinner parties.

10. In a Science class, the likelihood of evolution taking place in a few generations would have to be discussed. However the accelerated mutation caused by radiation does add some plausibility.

11. Prior to the construction of several "flood control" dams by the Army Corps of Engineers, and the channeling of much of the river's water into irrigation ditches, the Rio Grande was a wide powerful river, its spring flooding enriching the riverside cottonwood forest or "bosque" with rich silt and inspiring valley residents to describe its sound as a deafening roar.

12. The desert environment of New Mexico today, with tumbleweeds and deep arroyos is not the natural desert that existed here in the pre-European period. The area around Albuquerque, for example was grassland with few deep arroyos before livestock, first sheep and then cows, were allowed to overgraze the land, causing erosion and loss of most of the native grass. Tumbleweeds are accidental exotics that invaded in the

1920s.

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Abbey, Edward. *Desert Solitaire: A Season in the Wilderness*. New York: Ballantine Books, 1968.

Abbey's chapter "Down the River"

could be read in its entirety to or by middle school or older students; it is an exciting, easy to read, adventure with strong environmental messages. Other sections of the book could be used as excerpts for journal prompts. This is a very "desertcentric" text, great for setting environmental thinking in a non-green environment.

Adams, Douglas. *The Hitchhiker's Guide to the Galaxy*. New York: Ballantine Books, 1979.

I would not normally have considered this as "young adult" science fiction, except that I have seen several of my middle school students carrying this book around (presumably reading it). It is a wonderfully irreverent look at Earth from an extraterrestrial's point of view. Through humor, Adams gives a quirky look at several environmental issues including: The destruction of the Earth, not by something people have done, but because it is in the way of a space freeway; the origin of the Earth, made in a planet factory as an experiment; and biotic egalitarianism, the lab rats have been experimenting on us.

Bailey, Ronald. *Eco-Scam: The False Profits of Ecological Apocalypse*. New York: St. Martin's Press, 1993.

This book is a wealth of information refuting the "we are all gonna die" outlook, presenting the other side of issues like global warming. It is not a particularly easy to read text, but could be used as a reference tool, particularly for a debate.

Bradbury, Ray. "There Will Come Soft Rains." *Technology*. Boston: Houghton Mifflin Co. 1989. 55. This short story, has a strong anti-war message and brings up issues of technology in a unique way (our technology out lives us). A hi-tech house continues functioning after nuclear war kills its occupants.

Carson, Rachel. *Silent Spring*. Thorndike, Main: G.K.Hall & Co. 1962.

*Silent Spring* is an eco-alarmist classic.

Though it contains some difficult "technobabble," it is easy reading and even fairly young students will get its point. The message is strongly anti misuse of technology, but not anti technology. Dire consequences of pesticide and other chemical use are described, but the conclusion is hopeful.

Clarke, Arthur C. "If I forget thee O Earth." *Technology*, Boston: Houghton Mifflin Co., 1989. 72.

An Earth colony survives on the moon after nuclear war has destroyed the Earth. A father and son team travel across the Moon's surface to view the rising Earth and remember their roots and dream about returning some day. Easy reading and kid-centered plot.

The Earth Works Group. *50 Simple Things You Can Do To Save The Earth*. Berkley, CA: Earthworks Press, 1989.

The title says it all, this easy to read book is a collection of everyday things that a person can do to live more gently in the environment. Some specific suggestions may not be appropriate for all locations.

Ehrlich, Paul R. and Ann H. Ehrlich. *Betrayal of Science and Reason*. Washington, D.C. : Island Press, 1996.

This book has a wealth of information refuting authors who have suggested that, although there are environmental problems, the situation is not dire. Both the style and vocabulary are technical, so except with advanced readers, using excerpts is probably advisable.

Hunter, Robert J. *Simple Things Won't Save the Earth*. Austin, TX: University of Texas Press, 1997.

This book centers around the rubber production industry and points out the economic and political forces that fight environmental thinking. Some fairly difficult vocabulary, although some sections are easy reading and concepts are presented simply.

Lawrence, Louise. *Children of the Dust*. New York: Harper and Rowe Junior Books, 1985.

If you use this book in class, it is important to get kids through the first few chapters, which are very depressing

(for good reason). On the other hand, they are very kid-centered. Set in England after a nuclear war, the book has very strong anti-war message and in later chapters, a strong environmental message. Conclusion is hopeful for the future.

NASA Website.

<<http://ails.arc.nasa.gov/Images/Astrobiology/G69-44-6559.html>>

Great site for space photos, Earth rising photo referred to above.

Le Guin, *The Word for World is Forest*. New York: Berkley Publishing, 1972.

This science fiction story is set in a forest world that is being destroyed by invading Earth people. The environmental message is clear, mixed with feminist, anti-war and celebrate diversity/respect other cultures messages.

Silko, Leslie M. *Ceremony*. New York: Penguin Books, 1977.

Although I have seen this book on several class reading lists, there are several problems worth considering: Some Native Americans might find the story, particularly the long creation story poem that runs throughout the book, offensive, not in its presentation of the characters, but in the telling of stories that are not for the public; there is some sexual content, totally integrated and appropriate for the story being told, but nonetheless, some parents may object to this content. The story of a Native American WW II veteran suffering from post-traumatic stress syndrome jumps around in time and space in a way that reflects the conflict within the main character, but that some readers find disorienting. There is a clear environmental message in terms of the importance of all creatures (including humans) affecting the environmental web.

"What Became of Africa's Animals," and "Prisoners Under Plastic," *Ecology: Earth's Living Resources and Ecology: Earth's Natural Resources*. Upper Saddle River, NJ: Prentice Hall, 1997.

These two stories, one about living under a dome after the Earth's environment has become too polluted for survival and one about all of Africa's animals all living in what is basically a theme park, are easy to read; have

clear environmental messages and are great discussion starters. They are also available in the Spanish versions of the same texts.