# VISIONS MAGAZINE

# 2013 | 7th edition

VISIONS MAGAZINE is dedicated to the world we live in and the world we hope to create. *Visions* is a non-partisan, peer-reviewed publication that contains articles from disciplines associated with environmental studies. Just a few of these disciplines include communications, political science, economics, philosophy, religion, art, and English. Visions Magazine is a faculty-student organized and operated publication that features the works of Elon University students and student-faculty collaborations. The ultimate goal of *Visions* is to allow students to explore scholarly research, writing, and review in a professional setting. In addition, Visions provides publishing opportunities for students with interests in the environment and sustainable development.

#### Contributing to Visions Magazine:

*Visions Magazine* seeks compelling, interesting, well-written, creative contributions on environmentally related topics. Major contributions to the magazine should be grounded in scholarly literature and/or reflect the conventions of research and writing associated with a specific academic field of study. All submissions must receive positive blind peer reviews before consideration for publication.

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# Contents

### Editorials

- 2-3 Disposable Culture Brett Evans
- **4-6** In Defense of Animal Rights *Lauren Remenick*
- 7 Community and Art Kathryn Jeffords

### **Creative Writing**

- 8 Sleepless Nights and Songs William Wollman
- 9 With Pine and Air Stephanie Butzer
- 10 Like Feathers Jacqueline Alnes

### Features

11-13 The Dust Bowl Down Under: Southeastern Australia's Water Crisis

Lauren Remenick

14-19 Coral Reefs: A Deeper Look Kara Durante

### Reviews

- 20-27 Eaarth: Making a Life on a Tough New Planet by Bill McKibben Reviewed by Avery McGaha
- 28 Full Body Burden: Growing Up in the Nuclear Shadow of Rocky Flats by Kristen Iversen Reviewed by Ali Broadstone
- 29-34 Another Turn of the Crank by Wendell Berry Reviewed by Brittany Siciliano



Photos by Dan Enders



### **Disposable Culture**

Article and photos by Brett Evans

Brett Evans is a senior Religious Studies major from Purcellville, Virginia. As part of his research for the Elon College Fellows and Lumen Scholars programs, Brett studied abroad twice in India for a total of seven months. He has held leadership roles in Elon's Sierra Club and Theta Alpha Kappa. In his spare time, he enjoys gardening, cooking, and hiking.

One of the first things most foreigners notice on arriving in India, whether they admit it or not, is the ubiquitous trash. The beauty of so much teeming life, the vibrancy of colors in all directions, the rich and intricate cultures, these boons are also among common initial impressions. However, the trash is immediate and pervasive. Compared to more developed countries, much less of India's trash problem is out-of-sight or out-of-mind. It hits all of the human senses. We see the piles of refuse, smell the plastic burning, taste it as it passes through our mouth on the way to our lungs. We hear the crackle of the trash fires, feel the itch of irritating chemicals in the air.

When confronted by trash-culture shock, the unthinking, seemingly automatic responses from many foreigners focus on disposal. "Why aren't there more trash cans?" Or, "Why don't they have dumps?" Maybe, if they are feeling particularly superior or indignant, foreigners might say, "How do Indians live like this?" The assumptions underlying these questions are that there are solutions to the trash problem and Indians need to adopt the ways that more developed countries have used to deal with it. Rarely is there a different, radical appraisal of the situation — one which attempts to address its roots rather than its results.

To a more neutral observer, it might seem that, in regards to trash, the primary difference between India and more developed countries is that India does not currently have the means to hide the problem. After all, the use of wasteful plastic packaging on all sorts of consumer and food products is not an India-specific behavior, nor is the habit of ordering food from restaurants delivered in single-use parcels. In fact, these trends have existed to a greater degree and for much longer in more developed countries. Moreover, they seem to be thought of as indications of the degree to which a country is developed. According to this line of reasoning, the greater quantity and access to disposable products, the more progress a country has made and the higher quality of life its citizens will eniov.

Yet, perhaps, what makes many foreigners so uncomfortable about the trash is that it exposes the ridiculousness of belief in this correlation. Might it, instead, show the earliest and most grotesque sign of a country "developing" disposable cultures? In India, this disgusting and absurd element of modern thinking, the notion of disposability, is laid bare for all to see and for none to ignore. There is not yet a hideyhole in which to place the problem where public awareness and consciousness can politely forget it.

It is precisely for this reason that I believe many foreigners so quickly become upset about the trash and the apparent lack of efforts to curtail "the problem." It is always easier to critique another than to examine one's own issues. So often, we feel the need to point out what is wrong and identify the solution. Yet, so often, we do not want to accept the fact that the problem we have seen so clearly in the other is also embedded within our own cultures, only possibly deeper and hidden by practices and customs which are blindingly familiar to us.



**Redistributing the Problem.** High-emission trash vehicles carry some of the trash from the city to the surrounding rural areas — some of which are designated for this purpose, others not. This tractor is unusual in that its load is partially covered. Frequently, loose trash blows or falls out of these vehicles, leaving a trail of refuse behind them and distracting and even harming other users of the road.



### Individually Wrapped and Single-use items.

Another new trend in India, processed snack food and drinks can be bought on every corner. Each provides only one serving and is packaged in plastic. Once used, these wrappers can be found lining the sides of most streets.



#### Nowhere to Go.

Due to inconvenience associated with and lack of access to waste management services, many plastic byproducts end up on the street, next to homes, and in other open spaces. These piles of artificial and toxic materials are set aflame, inadvertently consumed by domestic and wwild animals, and eventually moved to another location outside of the city.



#### Parceled food.

A relatively recent phenomenon in India, carry-out food has become increasingly popular among those who can afford to purchase meals from restaurants. Rather than go through the effort to make a meal at home or walk to a nearby restaurant, customers can now have food delivered by scooter to their front door. This convenience requires the use of plastic bags, sauce vessels, and dish containers.

# In Defense of Animal Rights

#### By Lauren Remenick

When considering the ethics of animal treatment, two opposing views tend to dominate the conversation: the animal welfare perspective and the animal rights perspective. The animal welfare perspective takes the position that humans should use animals to their benefit while causing the least amount of harm to an animal, while the animal rights perspective says that every animal is entitled to live a life free of human use or domestication and should not be subjected to any stress, trauma or pain. In this essay, I use six arguments to defend the abolitionist or animal rights perspective of animal use rather than the animal welfare perspective.

Humans can have a balanced diet and healthy lifestyle without using animal products.



Food by geertcolp from sxc.hu

The food industry today is all about consumer efficiency. Foods are so modified, processed and made with so little cost to the producer that the end product often has little to no nutritional value. Because of this, many foods such as bread, juice, milk, eggs and dairy are fortified with extra vitamins for the consumer's benefit. What people do not know is that simply eating a non-processed, balanced, and varied diet will give you all of the nutrition you need. A variety of foods such as tofu, soy milk, legumes, nuts, and seeds have plenty of protein. Therefore, humans do not need to eat animal products in order to get enough protein and nutrients.

To extend this argument, humans do not need any non-edible animal products- feathers, fat, or leatherto live a healthy lifestyle. Feather pillows or down comforters can be replaced with foam; animal fat and butter can be replaced with oil (which is also a healthier option); and leather can be replaced by any other fabric or material. We have the technology and options to replace these goods. We use animals and their products simply because we want to, for our own pleasure, which is morally wrong (Francione G. 2005).

### Animals feel pain.

Some people say that it does not matter if we use animals for pleasure because they do not feel pain (Descartes, 1993). The law of evolution shows us just how similar humans are to animals – heck, humans derived from animals! Any animal with a nervous system can feel pain - it's a mechanism for staying alive. As Hogan has shown, even a mouse, if it has been shocked in one particular location, been moved, and then been brought back to that original area, will start crying (Hogan, 1995). It remembers being shocked.

For some, Descartes' argument is used to justify treatment in slaughterhouses. Animals in factory farms especially undergo more pain than they do pleasure, as they only live for a few months or years, mostly under horrible conditions (Francione & Garner, 2010). When the majority of one's life is stressful, painful, grueling and intolerable, perhaps it would be better to not have lived at all.

To defend slaughterhouse practices, some may argue that animals out in the wild would die anyway because of the predator-prey relationship. So they ask, "What's the difference between being killed in the wild and being killed in a slaughterhouse?" People forget that humans domesticate and slaughter animals in a mechanical fashion without any sacrifice to themselves. Animals in the wild are using every bit of skill they have, as well as excessive amounts of energy, to hunt and kill their prey. In the wild it is a life for a life. Respect and skill are necessary - not to mention that finding food for the day or week is necessary. Humans use little energy in slaughterhouses where mass death is mechanized. In the United States alone, nine billion land animals were slaughtered for human consumption in 2012 (Farm Animal Statistics: Slaughter Totals, 2013). Yet most people don't know how their food was killed, where it came from, or that it had a life. In the wild, the saying goes, "Kill or be killed." In civilization, it's just "Kill."



*Chicks in the Farmyard* by Patrizio Martorana from sxc.hu

Some people may argue that it's okay to kill animals if they undergo a relatively painless death and a relatively good life because the benefit of animal products is greater than the cost of humane slaughter (Bentham, 1789). However, even free-range animals may undergo unnecessary pain and torture (Francione & Garner, 2010). Though we may picture cage-free hens as happy hens that run around a farm living a free life, this is not always the case. Often cage-free hens are crammed into a warehouse with no windows and poor ventilation. They do not always live in cages, but they often do live in poor conditions and undergo unnecessary stress and trauma. The labeling of "cagefree hens" or "free range chickens" does not mean that their conditions were humane. Even animals that were treated well their whole lives must be killed for human consumption, and there really is no way to humanely kill an animal because the death is against the animal's own will. If we were talking about our own species, the penalty would be very high - one would go to prison for murder, even for "harmless" euthanasia. Death on someone else's terms is never an acceptable death. No being in their right mind wants to die, so why can we pass it off as morally acceptable to murder a being, just because it's the being of a species different than ours?

4 Animals do not live solely by instinct, and they exhibit complex social functions.

Some say that animals live life by instinct, without thinking about the past or future (Descartes, 1993), and therefore they need protection. However, animals are highly complex creatures with morals, social systems, emotions and planning capabilities. Before humans domesticated and used some animals, these animals were living and fending for themselves, and doing just fine. Many animals in the wild are still following this pattern. The study of animals has shown that fish live by the rule of reciprocity and therefore develop a reputation. Verbal animals have their own language and communicate with one another. Great apes have even learned to speak to humans through sign language (Linden, 1981). Not only that, but many animals, such as wolves, big cats, whales, elephants, primates, pigs, bees, and ants, have a highly complex social structure. If animals only lived in the moment and moved by instinct, we wouldn't see baby cubs play with one another, family members get in fights over social status, fish try to cheat each other, wolves and elephants mourn for their dead relatives, or other complex actions that suggest a higher-level brain function.



fish.jpg by Scott Snyder from sxc.hu

Domesticating animals renders them helpless.

Some argue that animals are being "saved" from humans by using the welfare system (Francione &

Garner, 2010). Many people have said that by putting animals in sanctuaries or zoos, they're preserving the species from almost certain death caused by deforestation. development/habitat destruction, pollution, poor water quality, and climate change. In reality, animals in captivity are being domesticated and are no longer those wild animals that they once were (Lee, 2005). Putting animals and humans together, with humans in charge, means that animals must bow down to their masters. The animals have to do anything the human says, which can be both good and bad. In this way, the animals are being taken care of, but they're being "denatured." Once animals are complacent around humans, they can no longer be considered wild, and may not even be able to function on their own ever again.

Even domestic animals, or pets, are owned by humans, forming a relationship in which animals are coerced and have little free will. The animals are taken advantage of when they're vulnerable - usually animals become pets when they are very young or are very hungry and develop Stockholm syndrome for their owners. If all animals wanted to simply be our pets, they would just run up to us and stay in our homes forever. But that's not reality. We coerce them to be our pets.

### The government allows the food production industry too much power.

The main problem with using animals for the benefit of humans is that the government gives industry the reigns to regulate its stock. They do this because the industry knows its product better, and it would be economically counter-productive to harm the product that they're trying to sell. However, economic demands put pressure on companies to produce cheap, genetically modified animals (for example, most people want white meat not because it's necessary, but because they desire it, so chickens are modified to grow larger breasts). The only realistic way for companies to meet the demands of the market is to house large quantities of their goodsusing as little space as possible, grow animals as quickly as possible, and mechanize the production to keep employee fees and supermarket prices low. Obviously these demands result cruelty towards the animal. Though companies try to keep the animal bodies from getting maimed, it is impossible to avoid any losses when using such large-scale production. I view it as finding the best way to be abusive without leaving any scars.

In summary, we've tried the welfare system, a process that intends to use the animals in a safe and mutually beneficial way, but it ends up only harming animals. Nonhuman animals and their products are unnecessary for human well-being and should not be used by humans at all. It's time for a change. Let's try something new. Let's enjoy the other species on this planet without exploiting them. Let's not coerce or subject animals to non-consensual acts, but simply be content in their presence. Let's make a change for the good.

Lauren Remenick graduated from Elon in December 2012 with a B.S. in Environmental Studies and B.A. in Psychology and is continuing her stuides and research in the Forest Ecosystems and Society Master's program at Oregon State University. Lauren is an avid advocate of healthy lifestyle choices, animal and human rights, and environmentally-conscious living. in her spare time Lauren likes to garden and run. Currently Lauren has two cats but would someday like to adopt dogs, chickens and sheep as well.

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### Community and Art



By Kathryn Jeffords

Look around at your community. In your eyes, it may seem like a group of humans living and working in (pleasant or unpleasant) close proximity with each other, sharing a favorite brunch spot; or it may be a town square where kids play tag, teens sneak a cigarette, and (if you're lucky) you can unwind with a Guinness and a taste of local folk music at a groovy coffee shop.

But what fuels your community? Sure, money keeps the sidewalks paved and the streetlights buzzing, but I'm asking what really charges the heart and soul of your community. The answers are all too often underappreciated: Art, creativity, **love**.

In a community, there are many sources of energy. One of these is money, the gasoline of humanity, which pollutes the mind and soul with greed, stains our children's futures by promoting an obsession with consumption and a hopeless quest for an ultimately empty happiness.



Student Mural by Sean Walmer

But there is a **greener**, cleaner energy source: Art. How important to reach inside the Broca's area of our brains and pull out things that aren't carcinogenic or potentially dangerous to humanity but fuel the drive towards something **real**. Not the quartz glass screen of your iPhone or the stitching on your kid's Ralph Lauren polo. Tangibility doesn't always imply authenticity.

London Art Wall by Dan Enders

What's authentic to me is that vibration you get in your stomach as the bass drops, the burn in your squinting eyes as you devour a piece of art, the swing in your mother's step as she teaches you to dance, or your grandfather's throaty chuckle at the dirty punch line of a movie.

Art doesn't pollute. It doesn't manipulate or exploit.

Art unifies and brings people together across all spectrums. Art heals. Art teaches us to understand the mind. Art creates culture, which creates community.

Art is not an accessory or an amenity; art is a necessity. It's something we form an intimate relationship with, and it is the responsibility of citizens to feed that relationship not with pesticides, but with a shower of dedication and commitment.

Art is something we use to create relationships. And what more is a community than a web of relationships? Through art we are tied together and humbled.

Kathryn Jeffords is a sophomore from Davidson, North Carolina. She is majoring in Media Arts and Entertainment with a minor in Business Administration. On campus, she is also a part of the Honors Fellows and Alpha Xi Delta sorority. She is interested in sustainability as it relates to supporting local artists, musicians and businesses and hopes to incorporate that into her aspiring career goal to produce documentaries.

### **Sleepless Nights and Songs**



#### By William Wollman

It is three a.m. and I am lying in bed trying to fall asleep. Somewhere through the muffled sound of my roommate snoring, I can hear the faint whispers of my music playing in the background. If I focus hard enough, if I strain to listen, I can hear it and I am home.

The guitar peppers the song with a melancholy overtone, and I am at my grandparents' farm staring up at the stars. The cry of cicadas is deafening. I am 21, and tomorrow I will pack up my things and move back to college for my senior year. Soon I will graduate and say goodbye to the all-nighters, the four-day binges, the comfort, the excess, the spontaneity. Soon it will be time to adapt yet again, and all of the things I was trying to be will fade away as I move on to another image of myself outside of college. I sit under the branches of a mimosa tree, an invasive species. Right now, I too am trying to survive in unfamiliar territory, caught between childhood and adulthood.



Guitar by Ryan Smart from sxc.hu

The bass line quietly thumps along the backbone of the song, and I am by the pond in my backyard with my grandfather. The Carolina sky peers down at us in between white oak leaves. I am six and my grandpa is teaching me how to fish for the first time. "Wait until the bobber is completely underwater, let the fish run with it for a bit, and then set the hook," he tells me calmly. Soon, I catch my first bass; its brown-green scales shine in the late May sunset as we pull it from our net. My grandpa shows me how to take the hook out with pliers, and how to hold the fish between its gills and its mouth. "Always throw back what you cannot eat," he says, "always leave your fishing spot in better condition than you found it." Life is a simple game of catch and release.

> The drum beat comes into focus, frantically banging through the bars as its symbols eat away the bass line, and I am wandering down a path in Umstead Park. Cardinals sing songs of spring's arrival and the rebirth of nature. I am 18, I have just graduated high school and my best friend is in the hospital after a graduation-night car accident left him in a coma. What was supposed to be the best night of our lives turned into the worst, and I can't stop imagining the image of his truck flipping on the road. Until the sun sets I will wander the paths looking for answers to questions I don't know, as lost as the sweet gum leaves that flow over the crawfish beds down the streams. "We all have such bright futures ahead of us,"

the Valedictorian said in his graduation speech. I lay down against a tree, bare feet covered in clay. I chuck anything I can get my hands on into the forest. The sun sets and the moon becomes my only hope of vision. The night wind whispers through the leaves, "Hold on, hold on."

William Wollman is an environmental studies major, minoring in geographic information systems and political science. He enjoys playing baseball, basketball, and staying outside as much as he can in his free time.



## With Pine and Air

Dedicated to the Misty Fjords in Ketchikan, Alaska

Poem and photos by Stephanie Butzer



Stephanie is a journalism major who loves exploring places off the beaten path. She also enjoys distance running, photographing the simple things, and interacting with interesting people. A whale's fin peels waves apart. A mist like bits of January mornings explodes in a small, but ragged outburst from the crater in its head. It holds for just one long moment – its dark, wet skin sliding out of restless inky waters. Under clouds like grey knuckles, air is sucked into the creature's cavity before it arches its thick spine and retreats.

Here, the sky is too great. The ocean is too deep, too cold, too black and the trees too dense. It's silent, except for the sickly gurgle of the yellowed tugboat. I pat the steering wheel with a mittened hand.

Light bounces off pine needles that hold it close and the navy waters gently massage the cold kinks out of shores' rocky shoulders. But it's perfect. Words don't exist out here – Only the feeling of exposure edging into my mind and against my eyes. I don't belong here, but I want so badly to breathe such raw, untouched air every day: the kind only trees and wolves have exchanged.

## Like Feathers

By Jacqueline Alnes

Jacqueline Alnes is a senior majoring in Literature and Creative Writing. Next year she'll attend Portland State University in order to attain her MFA in creative nonfiction. Though excited for the beautiful natural scenery in Oregon, she'll miss the farmlands of North Carolina where she spends much of her free time running, biking, or saving kittens from tractors in the fields. One of her goals in life is to meet James Galvin because she thinks he writes about land and natural elements in the most beautiful way.



Demolition by Jason Antony from sxc.hu



Tornado by Laura Griffith from sxc.hu

In February, a tornado took our home. The wind hasn't always been so hungry. Last winter, trees slept like they were supposed to; the blood of animals ran slow; frost melted and slid into the lake; the water looked like a dull mirror we could see ourselves in if we had the energy to try. We moved like sap down the hallways of our house. The foxes ran. They could hear the grouse change roost from six hundred paces away. They waited, listened; we watched, held our breath.

Dark feathers swirled through quiet air: in winter, the grouse danced across the snow; in early spring, the tornado screamed dark across the lake. In the middle of the night, when the neighbors were snowed in sleep and blankets, when the roads were empty veins, when the lake stared at the black sky, pressure and high winds married. The column of wind ran across the earth.

Our house was an empty roost when the tornado came. That night, we were scattered across the country: Montana, North Carolina, Oklahoma. That night, field mice skittered over rocky dirt. The wind howled. The tornado came across the lake and up our hill like a fox: sleek and furious and knowing. It tore our roof off and let it flail into the silent sky. In the morning, broken bones of our home settled into the dirt. Shingles were dark, downy feathers spread across our lawn.

### The Dust Bowl Down Under: Southeastern Australia's Water Crisis

#### By Lauren Remenick

Australia is the driest inhabited continent on earth. The brown and red scorched landscape of the legendary Outback is the most common stereotypical image of Australia, but large portions of southeastern Australia were historically rich with Eucalyptus forests, reasonably fertile soil, and enough rainfall to develop a major agriculture industry that exports huge volume of wool, wine, and wheat. However, this region has recently suffered a record-setting drought that lasted from 1995 to 2012 and coincided with large-scale environmental degradation. Much like the Dust Bowl of the 1930s in the U.S., a complex mix of climate change and region-wide land use patterns are being blamed. In Southeastern Australia, tracking the evolving hydrology provides not only insights into this crisis, but also lessons on water management that other areas of the world should take note of as climate variability increases.

Before European settlement in the region, deeprooted vegetation such as eucalyptus, the dominant indigenous tree of Australia, originally allowed for precipitation to enter deep groundwater aquifers. There was little to no runoff, and any rainwater that did not percolate into the ground ran into streams or rivers that made their way out to sea. Because of the naturally dry conditions, plants became tolerant of the relatively little water they received. This deeprooted vegetation returned much of the water back to the atmosphere via evapotranspiration, which in turn created high atmospheric water vapor in the country (Gordon, Dunlop and Foran). However, since the start of colonialism, 70% of the deep-rooted vegetation has been replaced with shallow-rooted vegetation for crop production and grasslands, as crop production is one of the largest exports in the country. Twenty-five percent of Australia's exports come from irrigated dairy, horticulture and food processing. Such high crop production increases the demand for fresh water (Anderies, Ryan and Walker).

The annual water use of Australia is 22,000 gigaliters. Of that, 30% is used for domestic food production, 30% goes towards growing export crops, and 7% is rationed for household consumption. Because of an increase in population, crop growth, and production of water-demanding crops such as rice, the net water demand in Australia jumped by 17% in only three years, from 1994-1997 (Lenzen and Foran). Additionally, no agricultural water-use policies have been implemented (Peeples).

Australia naturally has periodic droughts, which makes for an unpredictable water supply. One way to sustainably manage water in the wake of unpredictable weather and climate conditions would be to plant naturally deep-rooted vegetation, which allows the natural ecosystem to provide water catchment and water cleaning services. Instead of using natural resources, water managers have created a complex water control infrastructure. Rather than using water as a resource that needs to be conserved sustainably, the government has chosen to look at water primarily in relation to economic needs, with a primary result



Thirsty Land by abcdz2000 from sxc.hu

being incremental changes in water policy rather than transformational changes to conserve water (Anderies, Ryan and Walker).

A large freshwater supply for Australia in the southeast, the Murray-Darling Basin, provides substantial amounts of water. The Murray-Darling Basin covers a seventh of Australia, provides drinking water to 3 million people, and is used for 50% of the country's water needs, 40% of which go toward agricultural uses and provide \$17.8 billion worth of export crops. However, because of the recent multidecade drought (the worst in 117 years of recorded data) and high water demand, 90% of the wetlands around the basin have dried and the rivers in the basin no longer reach the ocean (Peeples).

The natural conditions of Australia make it susceptible to water shortages. Australia has no mountains with which to catch rainclouds and force orographic precipitation (Peeples). Therefore, with very little water precipitation input to recharge the basin's water supplies, the region has had little chance to recover from the dual stresses of high demand and drought. Diverting the water from its original cycling is inefficient, creates water losses and degrades the land (Lenzen and Foran). Furthermore, the shallow-root crops, pastures and intensive irrigation have caused water tables to rise. A result of these agricultural practices and changing hydrology is large-scale dryland salinization combined with shallow groundwater saturation, which together can damage or kill plants adapted to low-water conditions. Killing off the dry-tolerant vegetation means a decrease in evapotranspiration, which has caused a 10% reduction in atmospheric water vapor flows. The change in water vapor alters the cycle and produces a negative impact on the available freshwater, but as it was not addressed in previous

Lauren Remenick graduated from Elon in December 2012 with a B.S. in Environmental Studies and B.A. in Psychology and is continuing her stuides and research in the Forest Ecosystems and Society Master's program at Oregon State University. Lauren is an avid advocate of healthy lifestyle choices, animal and human rights, and environmentally-conscious living. in her spare time Lauren likes to garden and run. Currently Lauren has two cats but would someday like to adopt dogs, chickens and sheep as well. water management plans, the problem has grown (Gordon, Dunlop and Foran).

In addition to the effects on hydrologic cycling, these changing land use practices have large ecological and social costs. There is growing evidence that such alterations to natural cycling cause a loss of biodiversity and ecosystem services in both land and aquatic environments (Gordon, Dunlop and Foran). Likewise, communities are being impacted by deterioration of agricultural land, increased health risks, and uncertainty over water availability.

Beyond human land use, climate change further stresses the Australian water system. Mounting evidence indicates increases in extreme weather, temperature, precipitation and runoff (Soh, Roddick and von Leeuwen). The average Australian temperature has risen 0.7°C from 1910 to 2004 (Soh, Roddick and von Leeuwen). That may not seem like much, but for every increase in 1°C, 15% of the river flow will dry up (Taylor). Furthermore, surface water from rain is more likely to collect pollution both by redistributing atmospheric particles like acid rain into the terrestrial system and by capturing and carrying pollutants on the surface (Peeples). Since 10-15% less rain means 50% less runoff, rainwater that would run into rivers and streams are no longer viable sources of water (Peeples).

Climate change not only increases air temperature, but also increases the temperature of water bodies. Increases in temperature stratifies water bodies, causes algal blooms, creates anoxic water and excessive dissolved metals, has a soiled taste and smell, and allows cyanobacteria to have an advantage over other types of bacteria. The problem with cyanobacteria is that it has algal toxins that, when in large enough numbers, can harm humans (Soh, Roddick and von Leeuwen).

Less water, either in the air, on the surface or in the ground, means that non dry-tolerant vegetation (like grasslands and agricultural crops) have a higher rate of catching fire and creating brushfires (Peeples). When a country is stressed from having decreasing water supplies, using the precious ground water that it does have on putting out preventable fires seems a notable waste.

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Drought by Kwest from fotolia.com

In all, the combined effects of large droughts, land use stresses, and altered hydrologic cycling have left Australia's population and industry in a precarious and dire situation. So what are some strategies that Australia can use to conserve water? Many water managers have suggested simple, efficient techniques to reduce the amount of water used and wasted in the country. A first task is to learn who exactly is using water, and how much water they use. This measurement of water use is called a water footprint. Before any policy can be made regarding water use, a water footprint is necessary (Peeples). Another important step is recycling both wastewater and stormwater. With new technology or old practices, households, farmers and companies can be more efficient in their water use (Peeples). In the Murray-Darling Basin, the water managers have come to rely on technology for increased efficiency and reduced waste. Desalination is used to purify salt water, wastewater and stormwater is recycled, and natural filtration systems like wetlands and lagoons have been constructed (Peeples).

Often, water is used on water-intense crops that bring in a lot of money for the country, but these could be replaced with more natural crops that can tolerate the heat and more efficiently use the water. Rice is one such crop that has dried up as Australia's water supply has become less reliable. Rice production dropped from 1.6 million tons in 2000 to 18,000 tons in 2008 (Heimbuch).

Climate change, intensive agriculture systems, inefficient water use and changing land use have set

the stage for Australia's water crisis. The world waits to see what action Australia will take, and if other countries can model their strategy. For now though, water managers worldwide are advocating for more efficient water use, recreating natural systems with deep-rooted dry-tolerant plants and instituting policies that limit unnecessary agricultural water use.

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Colorful Corals on a Red Sea Reef by Richard Carey from fotolia.com

### Coral Reefs: A Deeper Look

#### By Kara Durante

Coral Reefs have typically been characterized as highly productive, biologically diverse, and extremely complex ecosystems. They occupy 0.1 percent of the earth's surface yet they are of high economic value to humans who live near them, providing food, resources, and income. For outsiders, they are prime tourist destinations, attracting people from around the world. For the planet they are one of its most important life-support systems (Murphy, 2002). It is imperative to understand the significance of coral reefs; from where they are located around the world, to what their function is, why they are important, the biodiversity of life surrounding them, and their current conditions.

The largest structures on our planet created by living things are coral reefs-more massive and taller than the pyramids. At their tops, "coral buildings" remain alive-growing, adapting, and reproducing themselves over eons. Not too bad for simple animals that have a nervous system, but lack a brain. The first reefs existed more than a billion years ago and were constructed by blue-green algae that formed 'stromatolites.' The Great Barrier Reef in Australia began to grow 18 billion years ago, and most reefs elsewhere are only thousands of to a few million years old. Although modern corals are not the first reef builders, they are among the most impressive.

Scientific investigations of coral reefs have increased dramatically in recent years. Different types of reefs have been defined, including fringing reefs close to coasts; barrier reefs, a bit further offshore and often with a lagoon; and coral atolls encircling a sunken volcanic island. And, of course, general groups of organisms were presented, particularly those involved in reef construction and food webs. Although a catalogue of locations, environmental conditions, forms and components provided an appreciation of certain aspects of coral reefs, they hardly conveyed the magic and mystery of the living community. Doors to such wonders opened the last thirty years thanks to sophisticated scientific techniques (Murphy, 2002). Scientists are coming





*Tropical Fish* by Thad Zajdowicz from sxc.hu



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Thad Zajdowicz



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to appreciate not only the biodiversity of reefs, but also how the reef residents interact and depend on one another. I believe the most fascinating aspects of coral reefs relate to how corals and reef residents meet the challenges of survival and live together. Sick reefs may indicate a sick planet, and we cannot afford to undermine the habitability of the only place we have to live.

Coral reefs are one of the Earth's most critically important life support systems. Reefs are one of few ecosystems that make their own substrate; they are made of limestone derived from several different but interconnected sources. A reef makes its own substrate in a way that, in a healthy reef, is constantly balanced but which overall is growing and accreting more than it is eroding. But limestone is a soft rock, and if it were not for its continual growth and replacement, it otherwise would not last in the shallow seas (Sheppard, 2009).

The coral city runs exclusively on solar energy. This is possible because almost all the surfaces of the coral reef are covered with solar collectors-various species of algae. Some take the form of underwater farms and gardens; some are thin encrustations growing over the reef foundation; and others are the algae living inside of corals. The form of many coral colonies is especially designed to promote efficient energy collection by algae; without these solar collectors, the coral reef could not exist (Murphy, 2002). Algae, which scientists call zooxanthella, reside inside the coral and use sunlight to drive photosynthesis. This coral-algae relationship benefits each partner. The coral grows in forms that help algae receive more sunlight and provides shelter and essential raw materials for its internal garden of algae. As animals, corals produce metabolic wastes, the byproducts of their using food, some of which comes from the algae. These wastes are the very nutrients algae need for growth. Thus, byproduct substances such as carbon dioxide, nitrogen, and phosphorus are efficiently recycled. The coral has its own wastes removed and the alga uses it as fertilizer, helping the algae to convert more sunlight into food. In the coral city there is no waste. The byproduct of every organism is a resource for another (Murphy, 2002). This unique process of the coral reefs shows how significant it is to understand the biological processes and selfsustainability of the reefs.

There are many organisms that live on the reef that help contribute to make the reef a constant flowing operation. Sponges, clams, and sea squirts filter seawater through their bodies, extract food, and return to the reef ecosystem water that is cleaner than when it arrived. By filtering the water for their own benefit, they also contribute to the reef's health and vitality. The amount of work done by these purifiers is incredible. Some sponges can remove as much as 99 percent of the bacteria from the water they filter, and some can even filter their own volume of water in less than 30 seconds. Not bad for a solar-powered air and water conditioning system that repairs and replaces itself for free.

One of the main attractions to diving on the coral reefs is the clarity of water. The water is so clear because there is so little phytoplankton, which is in turn the specific result of low concentrations of nutrients in the water. The oceanic waters that bathe many coral reefs are called "biological deserts" because of their lack of abundant nutrients.

*Corallos rosso e gorgonie* by marcodeepsubo from fotolia.com



However, this works because of the extensive amount of recycling that the reef goes through constantly (Murphy, 2002).

Estimates of the number of species of animals and plants on coral reefs range widely from 600,000 to over 9 million worldwide. The true diversity of reefs remains unknown and perhaps only 10 percent of species have been discovered. In the case of reef corals, species diversity drops off towards the latitudinal margins of coral reef development as a result of several abiotic factors, not only reduced temperature. Coral species present must be able to tolerate not only the prevailing abiotic conditions but also must grow fast enough to withstand competition, in particular overgrowth by macroalgae (Sheppard, 2009).

The total area of coral reefs and their substantial contribution to global biodiversity and productivity make them important to the world and to humans. Longitudinally, reef distribution in all three tropical oceans is concentrated along the western sides. In part, this is because of the distribution of islands, but it is also controlled by dissolved nutrients and temperature. For example, in the Indian Ocean, a very strong seasonal upwelling occurs off the coasts of Arabia and North Africa, which inhibits reef development along these shores. On the other hand, the western coast of Australia differs somewhat from this pattern because of warm currents, which flow southwards along that coast from Indonesia. Indonesia, Australia, the Philippines, Papua New Guinea, and Fiji include the areas in which coral reefs reside with the most amount of area covered (Sheppard, 2009).

Deep-sea corals are long-lived animals that often provide habitat for a diverse array of marine life, including commercially valuable finfish and shellfish. They also have untapped potential to produce novel medical compounds and have been valued as jewelry for millennia. Scientists are studying extracts of deep-sea corals, sponges, and other organisms to develop new pharmaceutical products to fight cancer, Alzheimer's disease, asthma, and viral infections. For example, one compound that has been found in deepsea corals is called discodermolide. This promising drug recently completed the early stages of clinical trials and is one of the most exciting anticancer compounds to date, as it may treat cancers that are

VISIONS



http://www.nasa.gov/images/content/153208main\_coralreef\_map\_lg.jpg

resistant to other drugs. It is isolated from the sponge Discodermia dissoluta, found off the coast of the Bahamas in water over 460 feet deep.

The tremendous longevity of deep-sea corals also makes them valuable archives of past conditions on Earth (Morgan, 2006). Deep-sea exploration is revealing spectacularly diverse seafloor communities. The deep-sea corals that structure these communities provide shelter, feeding habitats, and breeding and nursery grounds to many species, including commercially important fishes. Conserving these long-lived animals is also important because of their potential use in climate research and medicine.

Despite their diversity, all deep-sea corals share an important characteristic, their vulnerability to human activities that damage the seafloor or alter the deep ocean environment. The following activities threaten the life and health of corals worldwide: fishing, oil and gas exploration and extraction, coral exploration and trade, introduction of invasive species, increasing atmospheric CO2, cable laying, waste disposal, mineral extraction, and bioprospecting. Oil and gas exploration and extraction results in permanent alteration to seafloor habitat and causes short-term re-suspension of sediment, which is detrimental to deep -sea corals. Drilling, anchoring, placing of pipelines, the dumping of chemicals and their spills, can all smother, contaminate, and remove corals and alter the ecosystem. For example, the Gulf of Mexico oil spill that occurred in 2010 was a detrimental accident that caused drastic harm to the ocean and coral reefs for thousands of miles.

Coral exploitation is often a problem globally. Divers engage in illegal practices by using machines to collect corals and sell them in aquarium trades. Non-native species can invade the habitat of native deep-sea corals, greatly reducing populations. The non-native snowflake coral has invaded many black coral, mostly found in the Hawaiian Islands. In 2005, nearly 90 percent of black coral had been killed from this invasive specie, also causing harm and alterations within the greater ecosystem.

The oceans are changing both chemically and physically as a result of carbon dioxide released from fossil fuels. Shallow water and deep-sea corals and other marine species that need to build calcium carbonate skeletons will be harmed as oceans become more acidic. Global temperatures are rising in the deep sea and these rising temperatures will influence deep-sea corals by altering surface productivity and the delivery of food to the seafloor.

There are, of course, other threats to the coral reef environment. For instance, laying cable in the seafloor requires a large ditch for the cable to be buried. This procedure will inevitably overturn organisms in the cables path and disturb the seafloor environment. Waste disposal and pollution is also a large factor in the disturbance of the coral reefs. These practices may cause oxygen depletion, as well as toxins leaking into the ocean, potentially affecting the health and changing the behavior of deep-sea species. Even though as stated earlier that research and development can help find medicines, bioprospecting removes coral colonies from the deep sea (Morgan, 2002). There are regulations and laws for doing this to protect the reefs as much as possible, but this does harm the reefs to some degree as well. With all of these factors continuously being a threat to the coral reefs globally, much improvement needs to be done.

The uncharacteristic temperatures and movement brought on periodically by El Nino is known to have caused reef-building corals to expel their algae, which is their source of nourishment, causing a phenomenon known as 'coral bleaching.' Coral bleaching was first discovered off the south coast of Jamaica and slowly became a problem in the eastern Pacific and Caribbean (Sapp, 1999). Bleaching is a process by which algae are lost from the corals, leaving them white and subject to damage from sunlight. Between one and two million algae cells per square centimeter of coral tissue give corals their splendid colors and help to nourish them with their photosynthetically produced carbon compounds. Some species are known to receive 60 percent of their food in this way. When corals bleach, the delicate balance between algae and coral polyp is destroyed. Corals loose algae, leaving their tissues transparent so that only white calcium carbonate skeleton is apparent. Thermal tolerance seems to vary by coral species as well as geographic location. If the thermal stress is prolonged, the coral can be damaged beyond repair and may eventually die. Some global examples of coral bleaching have happened relatively recently. Mass bleaching affected all the reefs in the southern islands off Singapore in mid-1998. Bleaching of between 50 percent and 90 percent was observed along reef flats and reef crests of entire reefs, down to a depth of 6 meters. In the



Florida Keys, up to 60 percent of the corals have died in some locations. Latest research by the University of East Anglia states that the Caribbean has suffered an 80 percent reduction in coral reef area over the past 30 years (Deas, 2005).

It is likely that reefs will be the first major ecosystem in the modern era to become ecologically extinct. One third of the 845 main reef building species are likely to be at risk of extinction. This is not only a prediction for the distant future; many reefs are already well along this path, with one third already irrecoverably damaged. Fishes are being affected correspondingly; this ecosystem is under severe stress. Problems with isolated coral reefs have been reported for 130 years, but only in the past two decades have widespread and massive declines threatened the system as a whole. Based on present evidence and trends, few will survive unchanged, most will survive as grossly distorted and stressed relics, and a good proportion will no longer be anything like a recognizable reef (Sheppard, 2009). Conservation of coral reefs is primarily concerned



Fish...I guess by Piotr Ciuchta from sxc.hu

Coral by Claudia Meyer from sxc.hu

Orange Plate Coral by

VISIONS



with the controlling or reducing the levels of fishing or resource extraction and marine pollution. These two factors are considered by coral reef scinetist to be the main human influences on coral reefs. There are also uncontrollable elements at a global level and therefore less amenable to management. For instance, warming the Earth by the burning of fossil fuels causes the temperatures of the ocean to rise beyond a maximum threshold tolerable to corals, and is arguably one of the major threats to the survival of coral reefs (McClanahan, 2000). However, throughout the world, many nations have recognized the value of coral reefs and taken some steps to provide them with greater protection. The European Union, Norway, Canada, New Zealand, and Australia have all taken steps to prohibit bottom trawling in certain coral areas. Federal agencies in the USA with the authority to manage deep sea corals include the National Marine Fisheries Service, in consulation with 8 regional management councils (Morgan, 2006). Managing various fisheries is currently being attempted on a larger scale, as well as controlling the harmful factors listed earlier.

Drastic change and greater conservation efforts are needed for the coral reefs around the world to stand a chance in the long run. The beauty and mystery of the corals is something that should not become extinct because of negative human impact. More laws, patrolling coastal areas, and regulations should be put into place to save the reefs on a global scale for the future of this remarkable, self-sustaining ecosystem.

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Kara Durante is a marketing major with a concentration in sales. She enjoys playing sports, going camping, and attending live musical performances. After graduation, she will be returning to the Washington D.C. area to persue a career in sales. One of her goals in life is to return to Spain, where she studied abroad in 2011, to live there for some time. Though excited for the next chapter of her life, she will miss Elon dearly and is grateful for an unforgettable 4 years.



Levi Wilcox from sxc.hu Coral by Massimo Zunino from sxc.hu

Sea Life by Tony Hathcock from sxc.hu

# *Eaarth: Making a Life on a Tough New Planet* by Bill McKibben

Reviewed by Avery McGaha



Climate change is hard to write about. From the slow warming of the atmosphere and the quirks of its infrared-absorbing protagonist, carbon dioxide, to the volatile and probabilistic swirls of hurricanes, to the long Ariadne's thread connecting droughts. resource conflicts, and poverty, the sheer expanse of climate issues provides a particular kind of challenge to authors attempting to communicate its implications to a broad audience. As we have learned from the great science communicators—here one can't help but bow to the late Stephen Jay Gould for his artful recreation of non-adaptive evolutionary traits as the spandrels inadvertently birthed from a cathedral arch, or his conception of natural history as a tape to be replayed in our minds—metaphor is often an effective way to speak of complicated and foreign concepts in terms of the familiar.

In the field of climate science, as in evolution, many writers deploy certain metaphors with much success, as does geophysicist Henry Pollack. In his book *A World Without Ice*, Pollack describes pieces of the warming world with the familiar language The presciently named Avery Franklin Thoreau McGaha is a junior environmental studies major and Elon College Fellow, who comes from the woods just south of Asheville, NC.

of money: Tipping points, those soon-approaching levels of warming from which we may not return, are described as mortgages. Self-reinforcing feedback loops are disorderly markets; sea level rise and glacial ice melt are budgets we must not unbalance. In an attempt to explain the physiology and slow movement of glaciers across time, he even brings us into the kitchen, transposing the hard measurements of ice to the naissance of a flapjack:

When enough ice accumulates and reaches a critical thickness, it will begin to squeeze the deeper ice outward, much like what happens when pancake batter is poured onto a griddle. Even though the batter is poured in the center of the griddle, it doesn't stay there—it spreads radially outward into a sheet, eventually to cook into a pancake. (41)

Translations like this can effectively distill foreign concepts, like glacial melt behavior, through discussion in the language of familiar, everyday stuff. The possibilities for communication can ultimately be rather ambitious: as Harvard scientist Steve Pinker writes in one of his great tomes on language and human nature, The Stuff of Thought, "Metaphor allows a finite set of simple ideas to give rise to an infinite set of complex ones" (243). But while Pollack wields metaphor to his strength in these cases, the scope of this thinking is almost necessarily confined. In a way, its simplicity—while favorable for easy understanding—conceals the immense complexity of the larger issue. Are climate interactions as obtuse as pouring a pancake, or the solutions to the current crisis as intellectually rigid as balancing a budget?

It is, of course, much easier to critique Pollack's targeted rhetorical tools than to craft ones that have

the power to convey everything we want. Overall, however, I think it can be said that the broader concept of anthropogenic climate change doesn't exactly lend itself to precise metaphor. Or at least to metaphors that aren't so melodramatic, quite so empty as the Faustian Bargain, the hackneyed devil's blood pact in this case most memorably invoked in George Monbiot's sharp and fiery book, *Heat: How to Stop the Planet from Burning.* He borrows this grand and histrionic metaphor from the sixteenth century story of Doctor Faustus, a man who sells his soul to the devil in exchange for power. As Monbiot wryly summarizes:

So the bargain is struck and signed in blood, and Faustus acquires his magical powers. With the help of a flying 'chariot burning bright', he takes a sightseeing tour around Europe. He performs miracles. He summons fresh grapes from the southern hemisphere in the dead of winter. After twenty-four years, the devils come for him. He begs for mercy, but it is too late. They drag him down to hell...If you did not know any better, you could mistake this story for a metaphor of climate change. (2)

This condemning drama, guiding us throughout the entire book, is as dark as it is engaging. It draws us in, it gives his work structure and endows his arguments with a sort of divine weight. And although Monbiot delivers his chosen metaphor with a vivid and witty tongue, the Faustian bargain itself explains a much smaller piece than it advertises. We may have "sold our souls" for cheap fossil fuel energy in exchange for the safety of our precious children or Earth's marvelous biological diversity, as this metaphor implies, but what of the solutions? What of the billions of people on earth who have not sold their souls, have not contributed to climate change at all? What of the future? If we can't un-sell our souls. are we doomed to an eternity of fire and brimstone? These are not trivial questions. Like the Faustian Bargain, similar large-scale metaphors fail to logically or emotionally impart us readers with the emotional pull and the grand perspective required to perceive

climate change as a serious issue. They fail to leave us readers memorably changed—only scolded and shaken. Critically, these descriptions also miss an opportunity to convey a deep sense of what climate change means for life on Earth, and beyond.

Although the guiding metaphors of George Monbiot, Henry Pollack, and of many other talented writers may achieve the best descriptions one can reasonably concoct about a horrendously-and beautifully-complex, interconnected issue, they regrettably do not address—and more importantly do not *distill* in a reader's mind—some other important parts of the climate change discussion: Why must we force climate action *right now*? What do we want the future to *actually* look like? What does the issue itself imply about us as humans, about possibilities and opportunities? These fundamental questions should be unavoidable. And with global temperatures and carbon dioxide emissions climbing, and with governments around the world patting themselves on the back for their pitiful climate initiatives; while the Keystone XL pipeline invades more and more territory, and while droughts, floods, and storms shake themselves from prediction to reality-it is easy to be overwhelmed by forces entirely

foreign and indifferent, and to lose sight of our goals and of our friends in this fight. What could a metaphor say about this?

The doubt and despair implied by these events may find you at times, as they have me. Fortunately on, these feelings have most often deported me to my bookshelf—where I am increasingly likely to pick up and absorb, in the course of a productive morning or an extended afternoon, climate activist Bill McKibben's Eaarth: Making a Life on a Tough New Planet. It does take a bit more effort with each reading, due to the ever-ratcheting load of sticky

notes and scratchy pen marks, but I find something different, something essential, each time. And after I hoist

Planet Earth 3 by Barun Patro from sxc.hu myself up off the floor, the tingling in my spine relaxes, and my cries of pleasure suppress to dull coos of awe and appreciation, I feel rejuvenated and refocused; I feel less like I'm going to be poisoned, droughted, flooded, and forest-fired to death, and more like I may at any minute shout my love for Bill McKibben, for nature and for slow-food from a mountain top.

There is something different about this book. There is an uneasiness about it, an unconscious tilt, a call from a frequency too low to hear, a ringing and a need for action that does not emerge from *A World Without Ice* or from *Heat*, or just about any other book on climate change that exists today. And I think much of *Eaarth*'s power comes from McKibben's groundbreaking central metaphor.

#### A New World

When you read the first chapter of *Eaarth*, remember that pancake. It somewhat explains a large-scale interaction, yes. It relates an everyday experience to an abstract scientific concept, sure. In many ways, that little pancake represents how many writers attempt to convey climate science—as a heavy and bland lump of grease, drowned in syrupy language so it goes down easier. But think about it when McKibben asks you:

Imagine we live on a planet. Not our cozy, taken-forgranted earth, but a planet, a real one, with melting poles and dying forests and a heaving, corrosive sea, raked by winds, strafed by storms, and scorched by heat. An inhospitable place. (1)

"It's hard," he agrees. For the entirety of human existence, temperatures have been relatively modest and stable; civilizations have cultivated crops and sophisticated societies next to relatively calm and static seas. We—and it's always the first person plural, the cooperative human species "we"— have lived our evolutionarily short life thus far on the friendly planet that humanity first really glimpsed as *Apollo* 8 orbited the moon in 1968. But here's the catch, the sudden presentation of his device that binds the whole book together—that blends the line between metaphor, thesis, and reality:

*But we no longer live on that planet.* In the four decades since, the earth has changed in profound ways, ways that have already taken us out of the sweet spot where humans so long thrived. We're every day

less the oasis and more the desert. The world hasn't ended, but the world as we know it has—even if we don't quite know it yet...It needs a new name. Eaarth. Or Monnde, or Tierrre...(2)

Next to this mind-blowing thought, pancakes and budget metaphors are almost comical in their intellectual poverty. See, climate change is all about scale. When we try to contemplate its implications, billions upon billions of people and cars and tons of coal and nations of oil and cubic miles of gas must fill our heads. Can we ramp up solar and wind enough and in time to keep carbon dioxide below 500 ppm and average warming under 2°C? The fossil fuel companies, to use McKibben's terms, the richest "in the history of money," spend piles of cash to suppress science and confuse the public, and continue to seek and dig up more fossil fuels than can be safely burned. Given this massive moneved and entrenched impediment, can we push legislation through a polarized political system to up our energy efficiency standards for enough cars and coal-fired power plants to cut carbon emissions 80% by 2030? It's a colossal headache.

Or consider the tiny shell-building plankton, often the unappreciated foundations of marine ecosystems, who are melting away as the acidifying ocean absorbs carbon dioxide. Can we coordinate any meaningful climate action with a thousand million aspiring, coal-happy smog-blinded Chinese? (Not to mention Indians, etc.) What if for the first time in hundreds of thousands of years, no ice exists on Earth—in places no glacial melt water, no crop irrigation, no regulating ocean currents? Quite quickly, a colossal headache turns into what one might understatedly dub an almighty spider's nest of thundering migraines.

So here's McKibben's deal. We are staring these problems in the face, right now; but conventional wisdom and conventional approaches, he argues, are not equipped to deal with something this huge, this fundamentally enormous. With the Eaarth metaphor he shows that the most important problem is the *scale* of our thinking: "The trouble...is that it misses the essential flavor of the new world we're constructing." After all climate change is, he says, "the biggest thing that's ever happened" (46). The Eaarth metaphor, that we live on an entirely different, unstable, unfriendly, chaotic planet is such a powerful and immense idea that it seems to closely fit the discourse required of "the biggest thing that's ever happened"—more than a budget, more than a pancake, and much more than a doomed, oversimplified, Cartesian black-and-white pact with a devil.

#### High Tide

But we have yet to witness the full power of the Eaarth metaphor. The first chapter, called "A New World," introduces the pivotal device-intended to in one fell proverbial swoop undermine the roots of conventional wisdom and to shock us into viewing the world from a more expansive vantage point. The second chapter explores the implications of this idea further. Here McKibben silently layers another metaphor into just the title, "High Tide," which from the outset creates a sense of urgency and ubiquity, conspicuously unpresent from A World Without Ice or Owen's The Conundrum. The more explicit function of "High Tide," however, is a careful situating of the grand metaphor within the context of mainstream arguments and proposals. For the first half, he steadily builds a case showing how risky our collective habits have been, and why the myriad solutions posited (like nuclear power) are unsatisfactory.

If you walk out the airlock on your Martian base and start breathing, you'll be sorry. If you find yourself on Pluto, a strong leap will take you 116 feet into the air. We simply can't live on the new earth as if it were the old earth; we've foreclosed that option. (47)

At the peak of this part, he then overturns the standard political argument for clean energy as the solution to climate change, as represented by green energy advocate and *New York Times* columnist Thomas Friedman in his book *Hot, Flat, and Crowded*. Simply applying green technologies to the current model of infinite economic growth will not save us, McKibben writes, because:

We do not live any longer on the flat earth that Tom Friedman postulated. Eaarth is an uphill planet now, where gravity exerts a stronger pull than we're used to. There's more friction than we're used to...I think we know that in our bones. (86) This is important: He gets you with logic, he presents a sound and evidence-based argument, but his metaphor, like the building surge of a great wave, allows him to reach a critical emotional peak. He makes you *feel* like something dirty has been going on and you knew it all along. Something unethical and massive and it's got to change. *We know it in our bones.* The new planet metaphor effortlessly makes Friedman's claims obsolete in our minds, and makes us crave a different solution. And, to extend McKibben's titular metaphor where he does not, as the wave of suspicion breaks, the magnetic, churning undertow thus created sucks us out to sea—where Bill McKibben, we trust, has a life boat. (And, who knows, maybe some pancakes.)

#### Backing Off

Though chapter three takes place on a somewhat different beach, or rather many such "beaches" around the world, here McKibben dispatches his soldiers of metaphor with similar instruction. In this chapter, he needs to convince readers that his solutions, like his metaphor, match the scale of the problem. To do this, he begins with a personal anecdote about the speeches on the American Revolution he had to give as a tour guide, which (classic McKibben) seem pretty irrelevant until it somehow becomes another monster entirely; before you know it, he's arguing that America's military is huge and wasteful. He's relating all America's national projects, how they necessitated a strong central government, how some things today still need that. He's funny. "Whatever, dude—the National Project was not going to stop for Walter Kohler." He mocks some of our nation's more embarrassing features (the world's largest fiberglass cow: "Look on my works, ye mighty, and despair" 119). He essentially argues this main point from our history: "the size of your institutions and your government should be determined by the size of your project." Big things, big government, big business, big projects, all worked in the past. Then the metaphor strikes again, in his common rhetorical build-up to what we might as well call the "McKibben flip":



The second point is more subtle: *The project we're* now undertaking—maintenance, graceful decline, hunkering down, holding on against the storm requires a different scale. Instead of continents and vast nations, we need to think about states, about towns, about neighborhoods, about blocks. (124)

Again and again, we see how he builds a case for the otherside, gives it full life and color, and then obliterates it in the context of the new planet metaphor. Earth thinking, Earth discourse, Earth strategies will not work on our new planet—which requires a different type of project to carry us forward. The wave rises and peaks—crashes, and carries us out, out from the shores of our ignorance.

The last pages deal with the implications such an idea suggests, which match the disconcerting pressures explored in the beginning chapters. Hunkering down, weathering the storm, in essence making a life on this tough new planet requires focusing on the essentials, shrinking, diversifying our agriculture, politics, and economies to fit. As he seems to be doing throughout, here McKibben effortlessly arrives at a conclusion with unanswered details and dimly sketched connections awaiting exploration in the next chapter.



Pancakes by Alicia Solario from sxc.hu

#### Lightly, Carefully, Gracefully

In the last section McKibben focuses in on about ten varying places, situations, and locales. Each place ranging from an industrial farm, to a cow composting site, farms in Beijing to Kenya, coal plants in Georgia to a wood-fired boiler in Vermont—has a distinct flavor, a couple characters, and a short investigation into what strategies work and what don't. Since we're on about metaphors, you could think of it as a popup book; each setting brings a new picture, a new perspective.

Each begins to build upon the last, as he sneakily compares and contrasts each place, each model of life-small vs. large, monoculture vs. diversity. Isolated suburbia, tightknit community. Old Earth, *new Eaarth*. He uses this engine to steer us through three important parts of surviving on this new planet: Food, energy, and the internet (connectivity without wasteful travel, all that). He confronts the problems in these areas with the mantra of diversify and decentralize: produce power locally, produce some food in your back yard or on your roof, and connect to global values larger than yourself. It's better for our health and it's better for our future. The organization he founded—350.org, so named for the widely accepted "safe" concentration of carbon dioxide in the atmosphere, 350 parts per million—is already doing what it can to make this transition; success is on the horizon because there is no other choice.

The emotional undertow here is subtle, and it is powerful. Not only is his evidence viscerally persuasive, but the solution itself seems to bloom with a kind of proletarian inspiration: take the power away from the Big Business, the Big Industrials, the Big Government who got us into this mess, and give us back our autonomy. Produce your own energy, build community, grow your own food—peak oil and climate change be damned. Clearly defined enemies here, solutions over there. McKibben gets it. He gets those of us who are tired of politics bowing to industry, who are tired of tobacco companies and of oil and coal, of wars and of arrogance and have long lost the patience for dispassionate analysis. This solution, we think after the spine tingling has faded, feels right. To borrow one of 350.org's protest slogans, McKibben has finally connected the dots: audience and purpose, metaphor and solution.

In the last line of the afterward, his tone even borders on revolutionary—an inconvenient and thorny word, given its connotation—a word which he thus dulls to "movement." But on the scale of the "biggest thing that's ever happened," you can bet he means to raise a revolution against fossil fuels:





*Graved Melon Still Life* by Michael and Christa Richert from sxc.hu

*Old Electric Pole* by jarpur from sxc.hu



Internet by Nada Smolskaya from sxc.hu

They'll fight to the end to defend that business model, for it produces greater profits than any industry has ever known. We won't match them dollar for dollar: To fight back, we need a different currency, our bodies and our spirit and our creativity. That's what a movement looks like; let's hope we can rally one in time to make a difference. (219)

This sentiment reflects the last and most important piece of the new planet metaphor. Since Bill McKibben's first book, and the first book on climate change at that. The End of Nature published 1989, the coy and erudite writer has transformed along with Earth: from quiet writer and college professor, to reluctant, outspoken climate activist. Indeed The End of Nature might be one of the most misanthropic accounts of the global condition available, but here McKibben seems to supply his own antidote—one that provides the impetus and conceptual scaffolding for a climate revolution. His most recent forays into activism include being arrested this year (again) outside the White House in protest of the Keystone XL pipeline, along with one of the top climate scientists in the world, James Hansen (again), and a weeks-long tour of American colleges and universities, where he and a host of leading activists have taught students, faculty, and community members of "Global Warming's Terrifying New Math," as his feature in Rolling Stone last summer contended. This campaign, called the "Do The Math" tour, has called for grassroots action to force institutions of higher education to *divest*, or sell their stock in fossil fuel companies—a tactic born from the movement against the South African Apartheid regime.

I was fortunate to attend his stop at Duke University mid-November, on a Monday night much colder than any seen in the sweaty 75 degree weeks beginning December. In the lavish Page Auditorium next to the Duke University Chapel, there was something contradictory about McKibben's newfound persona: measured but excited, shy and sharp, angered and hopeful. As he nervously paced across the stage in his bright white sneakers, his khaki pants harboring one hand as the other shakily articulated figure after figure, he drew battle lines between the people and the fossil fuel industry—calling for a coalition against a clearly defined public enemy, whose business practices are unacceptable on this new planet. Near the end of the talk, McKibben stepped into the crowd and asked us all to stand with him, to raise our fists in opposition to an industry that puts its profits over our safety, and to call for our schools and churches and pension funds to do the same. We did, of course, and a photographer snapped a picture of a sold-out auditorium, together joining in to act as he says we must. The whole planet is new-so who knows what we might be able to achieve?

I left that chilly evening through the front doors to catch up with a longtime friend I'd lost on the way in. And as I walked out past the great stone arches of the chapel doors, I couldn't ignore the spandrels living uselessly on either top corner of the arches. I thought of Stephen Jay Gould, but I also thought of Richard Dawkins's selfish genes, of Mary Lasker's War on Cancer, of the spiral staircase that had not escaped the notice of Watson and Crick. Had McKibben finally settled on a metaphor that could push our thinking to the right scope, the right perspective to raise a climate movement—or even a revolution?

As 350.org's accelerating progress and momentum suggest, perhaps. Non-violent demonstrations are popping up all over: folks are chaining themselves to construction equipment to stall Keystone XL. Students at over three hundred campuses in the United States are rallying to push divestment from fossil fuels. Local groups of 350.org are organizing against coal and oil in India, Senegal, Burundi and Bangladesh, in Burma and in Brazil. And this past President's Day, over 40,000 protesters took to the streets of Washington DC to push for bolder climate action, in what was billed as the largest climate change rally in history.

But in any case, the Eaarth metaphor at least tips our minds in a productive direction. The scale of climate change has in a sense changed everything, and so we may need to think, discuss, and act as if the world is fundamentally different. Our home is not destroyed or collapsed, but transmogrified. We cannot live on this new Eaarth, this place we created out of our own ignorance and good intentions, in the same way we inhabited the single-a Earth. This metaphor implies that the rules of the game have changed, that the possibilities are as vast as the problems. We can manage our descent from the dogma of endless growth and land in a more resilient lifefull of vibrancy, community, deeper roots. His is not the final word, of course, but it's a damn good start. If this level of thinking reaches critical discourse, if our metaphors begin to match the scale and depth of reality, we might all make a life on this new planet or at least start on the tough and uncertain journey to get us there. And as McKibben put it in his last words to us on that unusually chilly night: "I gotta say, I kinda like our odds." 💏

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Smoke & Sunrise by Tom Lietz from sxc.hu

*Full Body Burden: Growing Up in the Nuclear Shadow of Rocky Flats* by Kristen Iversen

Reviewed by Ali Broadstone

Ali Broadstone is a sophomore studying English and psychology at Elon University.

A common theme we see in cautionary tales is one of silence and its consequences. In Kristen Iversen's *Full Body Burden: Growing Up in the Nuclear Shadow of Rocky Flats,* published by Crown Publishers in 2012, Iversen presents two stories that intertwine. "I want to write about the two things that have frightened me most in life," Iversen writes, "Rocky Flats, and Dad's alcoholism." Growing up in Arvada, Colorado, Iversen was aware that her parents and siblings never spoke of taboo topics such as her father's drinking; conversely, she was not aware of the incidents occurring at Rocky Flats, but she constantly alludes to its presence in the neighborhood where she grew up.

Iversen presents this second narrative through testimonies from individuals affiliated with Rocky Flats. The plant was built in 1951 to produce plutonium triggers--cores of nuclear bombs--and it operated until 1999, long after the Cold War ended. Construction of the plant was not originally considered controversial, despite the fact that Denver was within close range. These testimonies from plant workers, townspeople, and affiliates of the plant provide the reader with a laundry list of environmental violations and documented tumor growth in the citizens of nearby towns. Most likely Rocky Flats caused them all.

At times, *Full Body Burden* reads like a mystery novel. Iversen's storytelling is suspenseful and scary; little by little readers learn clues about the stories they're reading.

Without Iverson's personal narrative, the reader could compare *Full Body Burden* to Rachel Carson's *Silent Spring*, though *Full Body Burden* is more specific and not a general criticism of environmental abuse in the United States. While *Full Body Burden* focuses on Rocky Flats and the result of negligence on behalf of the plant's owners, readers who enjoyed *Silent Spring* might enjoy the similarities between the two books while still appreciating the unique autobiographical elements that Iversen's writing offers.

*Full Body Burden* is not only a commentary on the manufacturing of nuclear bombs and their potential dangers, but it is also a story that emphasizes the importance of speaking up or facing the potentially negative, long-term consequences of not doing so. As Iversen writes, "To speak out or to remain silent is the first and most crucial decision we can make."



# Another Turn of the Crank by Wendell Berry

Reviewed by Brittany Siciliano

Sustainability is a hot button topic in today's society. Many of the issues that we discuss today are issues that Wendell Berry discusses in his 1995 book, Another Turn of the Crank. Berry gives great insight into what we still need to be looking into as far as sustainable initiatives and how we can become a sustainable society. This paper will highlight Berry's thoughts on forestry, local communities, local food, waste, and the idea of boomers versus stickers or nesters. After looking into these environmental topics, this paper will consider how Berry's ideas can help with these issues in our current daily lives. Having been stuck in an unsustainable world for so long, enacting Berry's ideas will not be easy, but some of them will be necessary in order to provide a healthy future for generations to come.

### Sustainable Forestry and Corporate Accountability

In the essay, "Conserving Forest Communities," Berry discusses forestry and what it means to be sustainable. Today, there are many different interpretations of what a sustainable forestry management system would do. Clear-cutting has been looked down upon for many years. Not only does it seem unsustainable, but it is also aesthetically displeasing. Nobody would like to look at a field of stumps. However, some places, such as New Hampshire, are missing their new growth forests due to the building up of communities. In places such as this, clear cutting sections of forests may act to keep viable habitats for some species. Many would say that selective harvests are the best option; however, when this occurs, the best and biggest trees are taken first. Therefore, it is not actually a sustainable management system.

To deal with the problem of sustainable forestry, Berry describes the Menominee, a Native American tribe located around the Great Lakes region of the United States. The Menominee system shows how to cut down trees, make a profit, and still have a sustainable management system. Berry describes their practices over a 150-year span. In 1854 it was estimated that there were about a billion and a half board feet of standing timber in their forested land in the Great Lakes region. Between 1865 and 1988 they took out approximately 2 billion board feet from their land. Today, there is still a billion and a half board feet standing (Berry 1995; 42). When the Menominee go into their stands, they do not clear-cut the trees within the different sections of their forest. Instead, they have 109 compartments within their acreage that they rotate among every 15 years. When they go out, they "cut the worst and leave the best" (Berry 1995; 42). Essentially, if they are cutting every 15 years, they are going to cut down trees that they do not believe will make it to the next cutting. Since they are taking older, weaker, or dying trees most of the time, they have relatively healthy, strong, and old trees left. As Berry says, "good foresters must always look towards harvest they will not live to reap" (Berry 1995.44).



Crowning Glory by Brad Harrison from sxc.hu

When reading this section, it made me happy to know that at least one group of people has not only profit, but also the planet's wellbeing, in mind. I feel as though most of the time we only hear about horror stories of forestry. Within the past few years during my studies at Elon, I have been fortunate to hear about more and more success stories. One of the things that I wish others would learn is not only the idea of sustainable forestry but also that logging has had corruption issues and the loggers are not going to or be able to change overnight. The Menominee work with the loggers throughout the whole process by training them on how to maintain the forests, as well as supervise them when they are cutting. It is important to not only reward people and companies for their production but also for their stewardship. If we do not, then we are worsening the problem

prolonging the pattern of unsustainable practices. In my opinion, this is one of the reasons we are heading towards a sustainability catastrophe. We need to start holding big companies more accountable and to do that, it seems as though we are going to have to hold their hand along the way until they can be trusted. We inherently put a large amount of trust into large companies and at the end of the day they seem to be turning against us most of the time.

For example, we trust coal companies because they have "clean coal." However, there is no such thing. Even though it is called "clean" it does not mean that the extraction process is any cleaner than any other type of coal extraction. When driving through West Virginia, you can see hundreds of billboards that tell us how the coal companies keep the lights on and that without them, we would not have any power, ever. This is just not true. We can have cleaner options, but we have to let companies know that we want them. We have to tell the large companies that we are tired of having our waters poisoned so that they can turn a profit. It does seem slightly odd that we must tell companies how we want things done in our communities and we can't just do them ourselves. This discussion ties to another topic that Wendell talks about in his second essay on "Conserving Communities."

#### Building Community Through Local Food Innitiatives

While reading "Conserving Communities," it becomes very apparent that it is imperative that we ensure the success of our local communities if we want to ensure our own futures. To do this, we must deter further destruction of local communities. When large companies come in, they run small business owners out of business. Then, when they are gone, the companies can charge whatever they would like, because there is no competition. Competition, in this sense, keeps costs low and the product standards high. When big box stores come in, small businesses should not, as Berry puts it, "expect favors from their enemies" (Berry 1995; 12). It is tiring to hear people preach about supporting their local communities and then not taking their own advice. You can say that without the local farmers, we have no food security and without food security our community is at risk. However, saying this is not the same as acting upon it."It is foolish to complain about big government if we do not do everything we can to support strong local communities and strong community economies" (Berry 1995; 15).

One of the most basic ways to start building up your local economy is to support local food. It was discouraging to hear that farmers are statistically insignificant in the beginning of Berry's essay "Conserving Community." After watching Promise of the Land, a documentary about farming, there were many eye-opening facts that made me start thinking about farming in our country. One of the first things that had a great impact on my thinking is the fact that approximately 1.5% of our nation are farmers, while in 1790, we were approximately 90% farmers. Today, 90% would not be a good balance of farmers and nonfarmers. However, if we reach for a goal between 15 and 17% farmers, we will reach a better balance. Our country's farmers are who will ensure our survival. How can their opinions not count for anything? How can the people who ensure our survival in the most basic sense be statistically insignificant? Once we run out of oil and our food cannot travel for hundreds of miles, how are we going to feed our families? The local farmers are vital to our local movement as a country. When you have large corporations take over, our voices no longer count and neither does our history.

An example of this would be the Monsanto Seed Company, as demonstrated in the documentary Food, Inc. They created a Round-Up resistant seed that blew from a truck onto a farmer's farm. The farmers did not want the seed on their property; it was blown from one of Monsanto's trucks passing by the farmers' property. When the company found out that the seed had been pollinating with non-Monsanto seeds, they sued the local farmers because they had "stolen" their patented product. Since they had millions of dollars and the farmers did not, many of the farmers were forced to get rid of all of their seeds. Some farmers had been saving their seeds for decades. Their lives were on those farms and so was their history. Due to the lawsuits, many farmers are being forced to consider selling their land. This was all because a few seeds blew off a truck one day and landed on the poor farmer's property next to the road. We cannot



Farmland Sunset by Andreas Krappweis from sxc.hu

## 1.5% of our nation are farmers, while in 1790, we were approximately 90% farmers.

allow for companies to have this kind of control on our land. We need to take back our pride and take back our land from the hands of greedy companies. In order to sustain our pride, it is important to develop a sense of place. By doing so, we ensure our wants and needs are something that we will fight for. Our communities become something that we want to ensure the security of.

#### Boomers vs. Stickers/Nesters

In Another Turn of the Crank, Berry describes two types of people, boomers and stickers or nesters. Boomers are those "that motivated both the westward movement of the frontier and the industrialization that followed" (Berry 1995; 67). It seems as though Berry believes boomers are the ones who have led to the destruction of our environment, whether cutting down trees or plowing over prairies. Once the environment does not meet its full potential, they move on. Sustainability is not a priority. They want the world to conform to them and only them. In contrast to the boomers, the nesters/stickers are not necessarily looking for a way to use and profit from the land, they are looking to settle and live a "frugal life on a small freehold" (Berry 1995; 69). Being a sticker is imperative to working towards a more sustainable life.

Boomers seek profit no matter how it may degrade the environment. Stickers and nesters have more respect for the land because they view it as their home. I believe that they view the natural world around us as something we are a part of, not something that is there to be used and abused, however and whenever we feel.

I believe that throughout our lives many people move through both stages, being boomers and nesters/stickers. When they are younger, it seems as though most adults are working towards a profit and making money. It seems as though it is more important to make money rather than save the environment and be sustainable. I believe that most of us, especially those of us who have seen the devastation that unsustainable practices can cause, have come to become stickers/nesters because we hold more respect for the land.

#### **Dealing with Waste**

One of the largest problems I have with people not caring about the environment and becoming a more sustainable nation is the fact that we are a part of nature and the natural world. When we pollute the water and air, we are polluting ourselves. Today, there are more synthetic substances in our environment than ever before and cancer rates are at some of their highest rates in history. Due to the amount of waste seeping into our environment, we are putting ourselves, our neighbors, and future generations at risk.

Waste is a problem that needs addressing. Not even just material waste, but also waste of resources, water, and energy. It seems as though today not many people actually know the externalities of our everyday activities. Berry discusses how a large portion of the



Deforestation After the Squall by Birute Vijeikiene

best looking parts of the tree but waste the rest of it. Most of the time, it is left in the woods. As a society, we need to not consume as much. Along with not consuming and wasting as much, we must also look at how our products are made and how they will break down. Even if we consume less, but our trash still is made up mostly of chemicals, we are not really working towards a sustainable future. It will be important to try to live in a world with no lasting footprints.

While attending Coastal Carolina University my freshman year, I was in the Eco-Reps program which is a peer education group on campus promoting sustainability. We had to work towards getting recycling on our campus (This was in 2008). One weekend, we took a trip to the landfill in Horry County, which was the highest point in the county. It was one of the saddest places I had ever been to. It was incredible to see the amount of trash, recyclables, and just the stuff that was being plowed over in front of me. Through our research, we discovered another landfill that had been opened to test how quickly trash was breaking down; they found a newspaper that was over fifty years old that you could pick up and read, just as if it had just come off the shelf.

Once we send our trash to the landfill, it is expected that it breaks down. However, people do not see where their trash goes and how it is (or isn't) broken down. It is out of sight and out of mind. Many people seem to have NIMBY (Not in My Back Yard) syndrome and they think it gives them the right to not care about where their trash ends up and who it is affecting. Most of the time, it is affecting them; they just don't see it. If everyone could see how their trash is affecting others, then maybe they would have a different approach to trash and what they repair and try to reuse.

Berry discusses how a large portion of the trees that we cut down are wasted. We take the best looking parts of the tree but waste the rest of it. Most of the time, it is left in the woods.

#### VISIONS

#### Towards a Sustainable Future

I think of sustainability as meeting the needs of the present without compromising the ability of future generations to meet their own needs. Our actions today will inevitably affect our children. If everybody on Earth lived as we do as a society, we would need approximately 5 Earths to sustain just our resource needs. Do we really want to leave our children in a world worse off than the one we are trying to fix now? I do not believe so. At least for me, I know that I want to leave my children with a world filled with possibility and hope instead of pollution and despair. We need to educate our children about the planet and how we have a mutual relationship with the environment around us. We are part of the world and if we want to live in it, we need to respect and protect the Earth.

There have been discussions regarding how we are missing the ideas of goals in our world today. One of the biggest problems is that although we may envision how a sustainable world might look, we are, more often than not, deterred by the steps it would take us to get to that sustainable point. We must back-cast; look ahead to our visionary goal and work backwards. In order to truly become sustainable, we will have to give some conveniences up and have to put more effort into our actions. Many do not want to do that and do not see the point, because to them, the system is working. However, I think they think it is working because they cannot see the devastation and the impacts our actions have.

Environmental education will be imperative to our success as a country. While at the Bronx Zoo, I saw a plaque with a quote from Baba Dioum on one of the exhibits that I think about constantly: "In the end, we will conserve only what we love. We will love only what we understand. We will understand only what we are taught". We learn to care about past historical events because they are taught to us in school. Should we not teach our children about our past mistakes and ways to fix them in order to ensure their futures? I believe that children need to understand and value the natural environment around us. Without the earth, we would not be able to survive. I do not think that many people draw the connection from our environment to our survival, and that in and of itself is a flawed system. Reduce, repair, reuse, and recycle are not just words anymore; they are becoming a necessity to our nation's security. We can no longer depend on foreign entities for our food or energy security. We are a great nation that needs to remember how to depend on itself. Looking back on Wendell Berry's work, there are many messages to keep in mind while going through our daily lives. But the most important is that everything is connected. Our actions today affect the world that our children will live in tomorrow. If we are to create a better planet for future generations, we must change the way we live our everyday lives today. 📷

After graduating from Elon in 2011 with a B.S. in Environmental Studies, Brittany Siciliano attended graduate school at the University of New Hampshire for an M.A. in Environmental Education. Since graduating from graduate school, she has been working as a Naturalist, Camp Counselor, and in the Education Outreach programs at the Seacoast Science Center in New Hampshire. In the near future, she hopes to work in the sustainability sector promoting sustainability in a corporate or university setting.

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# The World We Live In



# And The World We Want to Live In

Irish Meadow by Dan Enders