

Democratic decision-making at the village level is the best process for determining the best mix of energy needed to meet local needs. Unfortunately, the current model of industrialized production of ethanol and biodiesel from plants based on monocultures fails the criteria of sustainability, justice, and democracy. It is centralized and driven by corporate greed, not community needs.

40. We need a new model, one that respects people's right to land and food, to their commons and biodiversity. A biodiversity-based, democratically evolved bioenergy program could enhance food security, energy security, and livelihood security of the poor.

Analyze

1. What materials can be used for biofuels?
2. According to the article, how can biofuels be used sustainably at the local level? Why is this a problem when biofuel usage is industrialized? In other words, what is the difference between "ecological, diverse, decentralized biofuels" and "industrial biofuels"?
3. In what ways do industrial biofuels compete with food production? How does the production of industrial biofuels affect soil quality?

Explore

1. According to this article, the production of industrial biofuels actually makes greenhouse gas emissions worse. Following her argument, trace the steps outlined by the author that contribute to this process. Break down the steps into as many parts as you can—for example, take note that before crops can be planted, some land must be cleared. Alongside each step of the process, list how that step might contribute to greenhouse gas emissions.
2. This author clearly argues against industrial biofuels as a carbon-neutral source of fuel. However, she recognizes in her argument that her position is not held by everyone. Using the information given in this article, construct an expository essay that presents both sides of this argument in a neutral way—remember that your goal is to inform, rather than to persuade.

3. Biofuel production in the United States, largely corn-based ethanol production, is a huge growth industry. Using the Internet, do some research on the state of ethanol production in the United States. How much do we produce? And how? And what are the controversies over ethanol production? Write a brief essay that uses this information to follow the title "Corn for Cars: Is This a Wise Idea?"

Thomas L. Friedman "The Age of Noah: Biodiversity"

Thomas L. Friedman writes about politics, globalization, and the environment for *The New York Times* and has won three Pulitzer Prizes. Friedman has published six books, including *The World Is Flat: A Brief History of the Twentieth Century*, *The Lexus and the Olive Tree: Understanding Globalization*, and *Hot, Flat and Crowded: Why We Need Green Revolution—and How It Can Renew America*, from which the excerpt below is taken. The "hot," "flat," and "crowded" in his book title refer to a world that climate change is making "hot," a society made socially "flat" or homogenous by the growth of the middle class, and a planet more "crowded" because of population growth. "Code Green" is Friedman's term for our emergency need for a "green" revolution.

With more and more species threatened with extinction by the flood that is today's global economy, we may be the first generation in human history that literally has to act like Noah—to save the last pairs of a wide range of species. Or as God commanded Noah in Genesis: "And of every living thing of all flesh, you shall bring two of every sort into the ark, to keep them alive with you; they shall be male and female."

"Nature is the art of God."

—Thomas Browne, *Religio Medici*, 1635

"'Development' is like Shakespeare's virtue, which grown into a pleurisy, dies of its own too-much."

—Aldo Leopold, "A Plea for Wilderness Hunting Grounds," 1925

Unlike Noah, though, we—our generation and our civilization—are responsible for the flood, and we have the responsibility to build the ark. We are causing the flood, as more and more coral reefs, forests, fisheries, rivers, and fertile soils are spoiled or overwhelmed by commercial development; and only we can build the ark that is needed to preserve them.

The beginning of wisdom is to understand that it is our challenge and our responsibility to act like Noah—to create arks, not floods. The Energy-Climate Era is about more than just addressing soaring energy demand, drastic climate change, and proliferating petrodictatorships. It is also about dealing with another effect of a world that is hot, flat, and crowded—the threat to the earth's biodiversity, as more and more plant and animal species are endangered or go extinct.

In the past decade, I have traveled throughout the world with Conservation International, which specializes in biodiversity preservation. My wife, Ann, is a member of the CI board, and I frequently call on CI scientists for insight when writing about biodiversity, as I do in this chapter. Species are constantly being discovered and others are going extinct, either due to biological circumstances or to economic development, hunting, or other human activities. But Conservation International currently estimates that one species is now going extinct every twenty minutes, which is a thousand times faster than the norm during most of the earth's history. It is understandably hard to imagine what it means that we humans are causing something in the natural realm to happen a thousand times faster than normal. That is a big number.

- 5 "Imagine what would happen to us or to our lives and livelihoods and our planet were any other natural rate to be a thousand times higher today than normal," asked Thomas Brooks, a senior director with Conservation International's Center for Applied Biodiversity Science. "What if rainfall were a thousand times more than normal? We would be flooded. What if snowfall were a thousand times more than normal? We would never dig out. What if rates of disease transmission for malaria or HIV/AIDS were a thousand times higher than they are now? Millions would perish. But that is what is happening to plant and animal biodiversity today."

This is not just a problem for zoos. We have no idea how many natural cures, how many industrial materials, how many biological insights, how much sheer natural beauty, and how many parts and pieces of a complex web of life we barely understand are being lost.

"The biodiversity of the planet is a unique and uniquely valuable library that we have been steadily burning down—one wing at a time—before

we have even cataloged all the books, let alone read them all," said John Holdren, the Harvard and Woods Hole environmental scientist.

Imagine if the trend toward rapid and widespread extinction continues and accelerates. Imagine a world with little or no biodiversity—a stainless-steel-and-cement world stripped bare of every plant and animal, every tree and hillside. Not only would such a world be barely livable, from a biological point of view—it would be a world we would barely want to live in.

From what landscapes or flowerbeds would future painters draw their inspiration? What would move poets to write their sonnets, composers to craft their symphonies, and religious leaders and philosophers to contemplate the meaning of God by examining his handiwork up close and in miniature? To go through life without being able to smell a flower, swim a river, pluck the apple off a tree, or behold a mountain valley in spring is to be less than fully alive. Yes, one supposes, we would find substitutes, but nothing that could compare with the pristine bounty, beauty, colors, and complexity of nature, without which we are literally less human. Is it any wonder that studies show that hospital patients who have a view of natural scenery from their rooms recover more quickly?

"Destroying a tropical rain forest and other species-rich ecosystems for profit is like burning all the paintings of the Louvre to cook dinner," explained the famed entomologist Edward O. Wilson when I visited him in his lab at Harvard, where the walls are lined with drawers and drawers full of the thousands of different ant species that he and his colleagues have collected from across the world: "That is what we're doing. 'We need this money from our oil palm plantations—sorry about the great forest of Borneo and the orangutans.'"

But for those not persuaded by the aesthetic, elegiac, religious, or spiritual values of biodiversity, there are some often overlooked practical benefits to keep in mind. These are known to environmentalists by the rather dry and un-descriptive term "ecosystem services." Natural ecosystems provide a wide range of benefits and "services" to people who do not have or cannot afford a local supermarket or plumbing: They supply fresh water, they filter pollutants from streams, they provide breeding grounds for fisheries, they control erosion, they buffer human communities against storms and natural disasters, they harbor insects that pollinate crops or attack crop pests, they naturally take CO₂ out of the atmosphere. These "services" are particularly crucial to poor people in the developing world who depend directly on ecosystems for their livelihoods.

"Critics of environmentalism . . . usually wave aside the small and the unfamiliar, which they tend to classify into two categories, bugs and weeds," Wilson wrote in *The Creation*.

It is easy for them to overlook the fact that these creatures make up most of the organisms and species on Earth. They forget, if they ever knew, how the voracious caterpillars of an obscure moth from the American tropics saved Australia's pastureland from the overgrowth of cactus; how a Madagascar "weed," the rosy periwinkle, provided the alkaloids that cure most cases of Hodgkin's disease and acute childhood leukemia; how another substance from an obscure Norwegian fungus made possible the organ transplant industry; how a chemical from the saliva of leeches yielded a solvent that prevents blood clots during and after surgery; and so on through the pharmacopoeia that has stretched from the herbal medicines of Stone Age shamans to the magic-bullet cures of present-day biomedical science . . . Wild species [also] enrich the soil, cleanse the water, pollinate most of the flowering plants. They create the very air we breathe. Without these amenities, the remainder of human history would be nasty and brief.

If we destabilize nature by degrading it, Wilson continued, "the organisms most affected are likely to be the largest and most complex, including human beings."

Biodiversity doesn't only help us to live—it helps us to adapt. There is nothing more practical than the role that biodiversity plays in easing adaptation to change for all living things—including us humans. Mark Erdmann, a marine biologist with Conservation International in Indonesia, gave me a mini-lecture about this in March 2008, as we sat on a beachfront overlooking the Lombok Strait, on the island of Nusa Penida in Indonesia. I had gone there to learn about CIs work to save the diversity of marine life in the Indonesian archipelago.

- 15 "Change is the one constant in life, and without diversity—of species, cultures, crops—adaptation to this change becomes much more difficult," Erdmann explained. "Talk to the farmer who grows just one crop and a disease wipes out his whole farm. Talk to the financial adviser who puts all his money into a single stock... In a nutshell, diversity bequeaths resilience—and we're gonna need all the resilience we can muster to deal with the global

changes rapidly descending upon us." Who knows what catastrophic diseases lie in wait in our future? If we have plowed up our tropical rain forests for palm oil and sugarcane ethanol, it will be like emptying our tool kit of natural medicines. "We need diversity precisely because change is constant, and diversity provides the raw material we need to adapt to change," added Erdmann.

In a world that is hot, flat, and crowded, where all kinds of things are going to be moving and shifting much faster than in ages past, the last thing we want to lose is the tools we need to adapt to change.

When we speak about preserving biodiversity, what exactly does that include? I like the definition offered by the dictionary Biologyreference.com, which defines biodiversity as "the sum total of life on Earth; the entire global complement of terrestrial, marine, and freshwater biomes and ecosystems, and the species—plants, animals, fungi, and microorganisms—that live in them, including their behaviors, interactions, and ecological processes. Biodiversity is [also] linked directly to the nonliving components of the planet—atmosphere, oceans, freshwater systems, geological formations, and soils—forming one great, interdependent system, the biosphere."

In this whole biosphere, scientists today have discovered and described between 1.7 and 1.8 million species of plants, animals, and microorganisms, says Russell A. Mittermeier, president of Conservation International, but some estimates suggest that the total number of species ranges between 5 and 30 million, and some scientists believe there may be as many as another 100 million species that we just have not identified, because they are hidden beneath the earth or seas or in remote locales. Some eighty to ninety new species of primates have been identified in just the last decade and a half, noted Mittermeier, "which means that 15 to 20 percent of all primates have been described by science in just the last fifteen years."

That's why Code Green has to involve both a strategy for the generation of clean energy—in order to mitigate climate change and its effects on weather, temperatures, rainfall, sea levels, and droughts—and a strategy for the preservation of the earth's biodiversity, so we don't also destroy the very plant and animal species that sustain life. Remember: Climate change is a critical issue, but biodiversity loss could also destabilize the systemic and vital carrying capacity of our planet—as much as climate change. In all the very welcome attention to climate change in recent years, the issue of biodiversity loss has gotten lost. That's why Code Green focuses on both generation of a new kind of energy and preservation of the natural world.

20 "Global warming and pollution are just a couple of things that happen when we overtax our natural resources," said Glenn Prickett, senior vice president of Conservation International and an expert on economics and the environment. "What also happens is that oceans get overfished, forests and coral reefs are destroyed, and this has a real impact, not only on the plants and animals who live in these ecosystems, but also on the people who live off them."

We have to consider this problem comprehensively. If the whole world just thinks about halting the emissions of CO₂ into the atmosphere and ignores what is happening within our ecosystems, "much of the world's biodiversity could be wiped out while we're looking the other way," added Prickett. "And don't think for minute that you can have a healthy climate, or a healthy civilization, on a dead planet. Our climate is directly impacted by the health of our tropical forests and other natural systems."

Over the past decade, I have traveled with Glenn to some of the world's biodiversity hot spots and other endangered regions where CI is working—from the Pantanal wetlands in southwestern Brazil to the Atlantic rain forest on Brazil's coast, from the Guyana Shield forest wilderness in southern Venezuela to the Rio Tambopata macaw research station in the heart of the Peruvian jungle, from the exotic-sounding highland of Shangri-La in Chinese-controlled Tibet to the tropical forests of Sumatra and the coral-ringed islands off Bali, in Indonesia. For me, these trips have been master classes in biodiversity, as were my own travels to the Masai Mara in Kenya and the Ngorongoro Crater in Tanzania and the vast Empty Quarter of the Saudi Arabian Desert and—before I had kids—a rappelling trip inside the salt domes of the Dead Sea.

In many ways, though, the first trip Glenn and I ever took taught me everything I needed to know about the biodiversity challenge we are facing. In 1998 we went to Brazil, and the trip began with the most unusual interview—locationwise—that I have ever conducted. It was with Nilson de Barros, then superintendent for the environment for the Brazilian state Mato Grosso do Sul, who insisted that we conduct our talk in the middle of the Rio Negro.

Mato Grosso do Sul is at the heart of the Pantanal region, along the border between Brazil, Bolivia, and Paraguay. The Pantanal is the largest freshwater wetland in the world (the size of Wisconsin), and is home to jaguar and a host of endangered species. Glenn and I flew in on a tiny prop plane, which landed in the front yard of the Fazenda Rio Negro, a ranch

and nature lodge on the Rio Negro. We then boarded motorized launches and set off for the meeting point at a shallow bend in the river.

The Pantanal nature reserve is Jurassic Park without the dinosaurs. 25 Moving downriver, we passed scores of caimans lounging on the bank, giant river otters bobbing up and down, with egrets, hyacinth macaws, toucans, ibises, marsh deer, spoonbills, jabiru storks, foxes, ocelots, and rheas (relatives of ostriches) all poking their heads through the forest curtain at different points along our route. It was, quite simply, the most stunning cornucopia of biodiversity—plants and animals—that I have ever encountered at one time. De Barros and his team were waiting for us, standing waist-deep in the middle of the Rio Negro.

"First a beer, then a bath, then we talk," he said, cracking open a can of Skol as the river flowed by.

And I thought I had the best job in the world.

The broad threat to biodiversity and ecosystems worldwide today comes from two directions, de Barros explained. The first is from regions where the poorest of the poor are trying to scrape out a living from the natural ecosystems around them. When too many people try to do that, you lose whatever forests, reefs, and species are within reach. That is a huge problem around the Amazon wetlands and rain forest, but not in the Pantanal. The Pantanal, he explained, is not threatened by poor residents who chop down trees and sell them to timber companies to escape from poverty. The culture in the Pantanal is a rare example of man and nature thriving in harmony—through a mixed economy of ranching, fishing, and, lately, ecotourism.

No, the main biodiversity challenge to the Pantanal came from the outside: from globalization. A global triple threat was converging on the Pantanal: Soy farmers on the plateau above the Pantanal basin, eager to feed a rapidly expanding world soybean market, were widening their fields, and pesticides and silt runoff from their farms were fouling the rivers and wildlife. At the same time, the governments of Brazil, Argentina, Uruguay, Paraguay, and Bolivia had formed a trading block in the hope of making their economies more globally competitive. To better get the Pantanal's soy products to market, these governments wanted to dredge and straighten the rivers in the area in ways that could greatly alter the ecosystem. Finally, a consortium of international energy companies was building a pipeline across the Pantanal, from natural-gas-rich Bolivia to the vast, energy-guzzling Brazilian city of São Paulo.

30 The Pantanal, in fact, is a laboratory of globalization's economic upsides and biodiversity downsides. The biggest upside is that globalization is bringing more people out of poverty faster than ever before in the history of the world. The biggest downside is that in raising standards of living, globalization is making possible much higher levels of production and consumption by many more people. That's flat meeting crowded. And that, in turn, is fueling urban sprawl around the world, an increase in highways and motorized traffic, and bigger homes with more energy guzzling devices for more people. To feed this ravenous global economy, more and more companies are tempted to take over vast native forests in places like Indonesia and Brazil and convert them to oil palm plantations, soybean farms, and other large-scale commercial enterprises at a speed and scope the world has also never seen before.

Over the years, Glenn Prickett explains, NGOs like Conservation International, The Nature Conservancy, and the World Wildlife Fund have developed tools and large-scale education campaigns that can help the rural poor live more sustainably and preserve the very natural systems on which they depend. "But we have not yet developed the tools and scale of operation to meet the globalization threat to biodiversity, which is becoming overwhelming," he explained.

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It starts with connecting the dots. To help cut emissions and boost energy security, the entire European Union has set the target of producing 20 percent of its energy from renewable sources by 2020, including increased use of biofuels—transportation fuels derived either from crops like corn, oil palm, soybeans, algae, or sugarcane or from plant waste, wood chips, or wild grasses, like switchgrass. The EU has declared that the "bio" ingredients of biofuels sold in Europe—palm oil and corn, for example—must not come from tropical forests, nature reserves, wetlands, or grasslands with high biodiversity. But fuels are fungible in a world market and are not always easy to monitor. It is hard to believe the EU mandate about renewable fuels will not accelerate the conversion of rain forests in Southeast Asia to oil palm plantations; some say it already has. Palm oil is the most efficient base for biodiesel fuel, although it is also used for cosmetics and in cooking. The cruel irony is that deforestation will result in more greenhouse gases being released into the atmosphere than the use of biofuels will eliminate. I have flown over an oil palm plantation in north Sumatra, in Indonesia. It looked like someone laid down twenty-five football fields in the middle of a tropical forest—just

Michael Grunwald wrote a piece for *Time* (March 27, 2008) in which he described flying over a similar plantation in Brazil with an ecoactivist.

From his Cessna a mile above the southern Amazon, John Carter looks down on the destruction of the world's greatest ecological jewel. He watches men converting rain forest into cattle pastures and soybean fields with bulldozers and chains. He sees fires wiping out such gigantic swaths of jungle that scientists now debate the "savannization" of the Amazon. Brazil just announced that deforestation is on track to double this year; Carter, a Texas cowboy with all the subtlety of a chainsaw, says it's going to get worse fast. "It gives me goose bumps," says Carter, who founded a nonprofit to promote sustainable ranching on the Amazon frontier. "It's like witnessing a rape," Carter adds, "You can't protect it. There's too much money to be made tearing it down," he says. "Out here on the frontier, you really see the market at work."

The numbers tell the story. Our planet is four billion years old and life has existed on earth for a little more than two billion years. Over those two billion years there has been a very, very slow "normal" pace of extinctions. On average, a species might live for one million years, then go extinct. That very gentle, very slow, background rate of extinctions has been punctuated over the centuries by five massive, catastrophic extinction events that have led to the loss of an extremely high proportion of our planet's life at different periods. The most recent mass extinction, said Thomas Brooks, the Conservation International biodiversity expert, was about sixty-five million years ago—the mass extinction of the dinosaurs, apparently due to an asteroid smashing into the Yucatan Peninsula, in what is now Mexico. That asteroid is believed to have expelled a thick dust cloud into the atmosphere, which apparently triggered global cooling and ended up starving a large proportion of the earth's plants and animals.

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We know that we can restore natural habitats, said Brooks. We know 35 that we can restore populations in order to bring back species whose survival is threatened, like the buffalo. We know that we can clean up pollution, even a river as polluted as the Thames. "It is even within our grasp to reverse climate change," he added. "But extinctions are irreversible. Jurassic Park is a fiction: Once a species is gone, it is lost forever—we have lost that

Mindlessly degrading the natural world the way we have been is no different than a bird degrading its own nest, a fox degrading its own den, a beaver degrading its own dam. We can't keep doing that and assume that it is just happening "over there." The scale of biodiversity loss happening today is having global impacts. As the team at Conservation International likes to say: "Lost there, felt here." And we can't keep doing that and assume that we will repair it later.

Later is over. That is the psychological biodiversity redline we have passed as we entered the Energy-Climate Era. "Later" was a luxury for previous generations, eras, civilizations, and epochs. It meant that you could paint the same landscape, see the same animals, eat the same fruit, climb the same trees, fish the same rivers, enjoy the same weather or rescue the same endangered species that you did when you were a kid—but just do it later, whenever you got around to it. Nature's bounty seemed infinite and all the threats to it either limited or reversible. In the Energy-Climate Era, given the accelerating rates of extinction and development, "later" is going to be removed from the dictionary. Later is no longer when you get to do all those things in nature you did as a kid—on your time schedule. Later is when they're gone—when you won't get to do any of them ever again. Later is too late, so whatever we are going to save, we'd better start saving now.

Analyze

1. Briefly describe, in a few well-crafted sentences, how the article views globalization as damaging to the stability of ecosystems.
2. What is biodiversity? And why is it so important?
3. Imagine, as a class, that you have been selected to lead the fight against the destruction of the tropical rainforest in the Amazon. Choose three arguments against the destruction of the rainforest that you feel are the most powerful. What types of arguments are these? Are they based in reason? Emotion? Idealism?

Explore

1. In many cases, descriptions of future energy needs frame human actions in a negative light; though this author does argue that humans have caused a "flood" and are responsible for their actions, by making a comparison to Noah, he is ultimately framing people positively, as a savior capable of great things. Along this line, in a small group come up

with as many other metaphors as you can that might appeal to human action in a positive light.

2. A massive number of animals have been placed on endangered watch lists or have become extinct over the past 50 years in the United States. Using the Internet, locate some statistics regarding which region—Northeast, Mid-Atlantic, Pacific Northwest, etc.—of the United States has seen the greatest number of endangered animals or extinctions. Can you connect these results to some generalizations about the region's economic makeup?
3. Use the information in this reading and some of the others in this chapter to persuade your friends that "later is over."

Evan I. Schwartz "How Not to Make Energy Decisions: Lessons From the Battle Over Cape Wind"

Evan I. Schwartz is an author and journalist who writes about technology and innovation. He is a former editor of *MIT Technology Review*, from which the excerpt below was taken. *MIT Technology Review* was founded in 1899 and is now an independent digital media company dedicated to analysis and review of emerging technology. This excerpt introduces the social and political controversy of Cape Wind, a large wind energy project proposed for Cape Cod Bay off the coast of Massachusetts. It is the topic of the next two selections.

America's first offshore wind farm promises to be a picture of ugliness, with 130 turbines, each as tall as a 40-story skyscraper, marring the scenic Massachusetts waters off Cape Cod, Nantucket, and Martha's Vineyard. Or it promises to be a vision of beauty, each white windmill spinning majestically as it produces an alternative to carbon-spewing fossil fuels. But one thing everyone can agree on is that Cape Wind will be big. The turbines, spread out over an area as large as Manhattan, will be visible from the coastline for miles.