Chapter 10. The Environment and Technology

This chapter contains selections that explore the relationship between the environment and technology or—to be more precise—technologies. Opening with an opinion piece by environmentalist Wendell Berry that accuses Americans of being too lax about the country's conservation efforts, this chapter includes a range of perspectives on the issue of environmentalism, all of which address—to varying degrees—the role that technology might play when it comes to both understanding environmental issues and addressing them. Like Berry's piece, Derrick Jensen's more contemporary "Forget Shorter Showers" makes similar claims about the need for Americans to be more aggressive in the fight to save the environment. Moreover, Jensen also addresses (what Jensen sees as) the misnomer of "green technology." Finally, Amelia Urry and James W. Cortada's selections address the relationship between technology and the environment most directly as they consider the role of technology in national parks and on farms, respectively.

Prior to Reading Each Selection in This Chapter

Look at the questions after each reading. What are you expected to do after reading this selection? In other words, what are your purposes for reading? Although you will be asked to apply particular reading strategies in order to complete some of the tasks, others will leave the choice of strategy up to you. Refer to the descriptions of the reading strategies in Chapter 2 and decide which will be most useful in helping you accomplish those tasks. Remember that you will be reading each selection multiple times and, therefore, will have additional opportunities to apply different reading strategies.

Readings

Environmentalists Have Given Up Too Much by Not Being Radical Enough

By Wendell Berry

This article explores conservation efforts in the United States. Berry outlines the problems with the current way in which conservation is addressed and offers recommendations for what he sees as more productive approaches.

Published October 21, 2004, at Grist.org.

Visit http://grist.org/article/berry/

We are destroying our country—I mean our country itself, our land. This is a terrible thing to know, but it is not a reason for despair unless we decide to continue the destruction. If we decide to continue the destruction, that will not be because we have no other choice. This destruction is not necessary. It is not inevitable, except that by our submissiveness we make it so.

We Americans are not usually thought to be a submissive people, but of course we are. Why else would we allow our country to be destroyed? Why else would we be rewarding its destroyers? Why else would we all—by proxies we have given to greedy corporations and corrupt politicians—be participating in its destruction? Most of us are still too sane to piss in our own cistern, but we allow others to do so and we reward them for it. We reward them so well, in fact, that those who piss in our cistern are wealthier than the rest of us.

How do we submit? By not being radical enough. Or by not being thorough enough, which is the same thing.

Protection to the People

Since the beginning of the conservation effort in our country, conservationists have too often believed that we could protect the land without protecting the people. This has begun to change, but for a while yet we will have to reckon with the old assumption that we can preserve the natural world

by protecting wilderness areas while we neglect or destroy the economic landscapes—the farms and ranches and working forests—and the people who use them. That assumption is understandable in view of the worsening threats to wilderness areas, but it is wrong. If conservationists hope to save even the wild lands and wild creatures, they are going to have to address issues of economy, which is to say issues of the health of the landscapes and the towns and cities where we do our work, and the quality of that work, and the well-being of the people who do the work.

Governments seem to be making the opposite error, believing that the people can be adequately protected without protecting the land. And here I am not talking about parties or party doctrines, but about the dominant political assumption. Sooner or later, governments will have to recognize that if the land does not prosper, nothing else can prosper for very long. We can have no industry or trade or wealth or security if we don't uphold the health of the land and the people and the people's work.

It is merely a fact that the land, here and everywhere, is suffering. We have the "dead zone" in the Gulf of Mexico and undrinkable water to attest to the toxicity of our agriculture. We know that we are carelessly and wastefully logging our forests. We know that soil erosion, air and water pollution, urban sprawl, the proliferation of highways and garbage are making our lives always less pleasant, less healthful, less sustainable, and our dwelling places more ugly.

Nearly 40 years ago, my state of Kentucky, like other coal-producing states, began an effort to regulate strip mining. While that effort has continued, and has imposed certain requirements of "reclamation," strip mining has become steadily more destructive of the land and the land's future. We are now permitting the destruction of entire mountains and entire watersheds. No war, so far, has done such extensive or such permanent damage. If we know that coal is an exhaustible resource, whereas the forests over it are with proper use inexhaustible, and that strip mining destroys the forest virtually forever, how can we permit this destruction? If we honor at all that fragile creature the topsoil, so long in the making, so miraculously made, so indispensable to all life, how can we destroy it? If we believe, as so many of us profess to do, that the earth is God's property and is full of His glory, how can we do harm to any part of it?

In Kentucky, as in other unfortunate states, and again at great public cost, we have allowed—in fact we have officially encouraged—the establishment of the confined animal-feeding industry, which exploits and abuses everything involved: the land, the people, the animals, and the consumers. If we love our country, as so many of us profess to do, how can we so desecrate it?

But the economic damage is not confined just to our farms and forests. For the sake of "job cre-

ation," in Kentucky, and in other backward states, we have lavished public money on corporations that come in and stay only so long as they can exploit people here more cheaply than elsewhere. The general purpose of the present economy is to exploit, not to foster or conserve.

Look carefully, if you doubt me, at the centers of the larger towns in virtually every part of our country. You will find that they are economically dead or dying. Good buildings that used to house needful, useful, locally owned small businesses of all kinds are now empty or have evolved into junk stores or antique shops. But look at the houses, the churches, the commercial buildings, the courthouse, and you will see that more often than not they are comely and well made. And then go look at the corporate outskirts: the chain stores, the fast-food joints, the food-and-fuel stores that no longer can be called service stations, the motels. Try to find something comely or well made there.

What is the difference? The difference is that the old town centers were built by people who were proud of their place and who realized a particular value in living there. The old buildings look good because they were built by people who respected themselves and wanted the respect of their neighbors. The corporate outskirts, on the contrary, were built by people who manifestly take no pride in the place, see no value in lives lived there, and recognize no neighbors. The only value they see in the place is the money that can be siphoned out of it to more fortunate places—that is, to the wealthier suburbs of the larger cities.

Can we actually suppose that we are wasting, polluting, and making ugly this beautiful land for the sake of patriotism and the love of God? Perhaps some of us would like to think so, but in fact this destruction is taking place because we have allowed ourselves to believe, and to live, a mated pair of economic lies: that nothing has a value that is not assigned to it by the market; and that the economic life of our communities can safely be handed over to the great corporations.

We citizens have a large responsibility for our delusion and our destructiveness, and I don't want to minimize that. But I don't want to minimize, either, the large responsibility that is borne by government.

The Dissent of the Governed

It is commonly understood that governments are instituted to provide certain protections that citizens individually cannot provide for themselves. But governments have tended to assume that this responsibility can be fulfilled mainly by the police and the military. They have used their regu-

latory powers reluctantly and often poorly. Our governments have only occasionally recognized the need of land and people to be protected against economic violence. It is true that economic violence is not always as swift, and is rarely as bloody, as the violence of war, but it can be devastating nonetheless. Acts of economic aggression can destroy a landscape or a community or the center of a town or city, and they routinely do so.

Such damage is justified by its corporate perpetrators and their political abettors in the name of the "free market" and "free enterprise," but this is a freedom that makes greed the dominant economic virtue, and it destroys the freedom of other people along with their communities and livelihoods. There are such things as economic weapons of massive destruction. We have allowed them to be used against us, not just by public submission and regulatory malfeasance, but also by public subsidies, incentives, and sufferances impossible to justify.

We have failed to acknowledge this threat and to act in our own defense. As a result, our once-beautiful and bountiful countryside has long been a colony of the coal, timber, and agribusiness corporations, yielding an immense wealth of energy and raw materials at an immense cost to our land and our land's people. Because of that failure also, our towns and cities have been gutted by the likes of Wal-Mart, which have had the permitted luxury of destroying locally owned small businesses by means of volume discounts.

Because as individuals or even as communities we cannot protect ourselves against these aggressions, we need our state and national governments to protect us. As the poor deserve as much justice from our courts as the rich, so the small farmer and the small merchant deserve the same economic justice, the same freedom in the market, as big farmers and chain stores. They should not suffer ruin merely because their rich competitors can afford (for a while) to undersell them.

Furthermore, to permit the smaller enterprises always to be ruined by false advantages, either at home or in the global economy, is ultimately to destroy local, regional, and even national capabilities of producing vital supplies such as food and textiles. It is impossible to understand, let alone justify, a government's willingness to allow the human sources of necessary goods to be destroyed by the "freedom" of this corporate anarchy. It is equally impossible to understand how a government can permit, and even subsidize, the destruction of the land and the land's productivity. Somehow we have lost or discarded any controlling sense of the interdependence of the earth and the human capacity to use it well. The governmental obligation to protect these economic resources, inseparably

human and natural, is the same as the obligation to protect us from hunger or from foreign invaders. In result, there is no difference between a domestic threat to the sources of our life and a foreign one.

It appears that we have fallen into the habit of compromising on issues that should not, and in fact cannot, be compromised. I have an idea that a large number of us, including even a large number of politicians, believe that it is wrong to destroy the earth. But we have powerful political opponents who insist that an earth-destroying economy is justified by freedom and profit. And so we compromise by agreeing to permit the destruction only of parts of the earth, or to permit the earth to be destroyed a little at a time—like the famous three-legged pig that was too well-loved to be slaughtered all at once.

The logic of this sort of compromising is clear, and it is clearly fatal. If we continue to be economically dependent on destroying parts of the earth, then eventually we will destroy it all.

Hope Notes

So long a complaint accumulates a debt to hope, and I would like to end with hope. To do so I need only repeat something I said at the beginning: Our destructiveness has not been, and it is not, inevitable. People who use that excuse are morally incompetent, they are cowardly, and they are lazy. Humans don't have to live by destroying the sources of their life. People can change; they can learn to do better. All of us, regardless of party, can be moved by love of our land to rise above the greed and contempt of our land's exploiters. This of course leads to practical problems, and I will offer a short list of practical suggestions.

We have got to learn better to respect ourselves and our dwelling places. We need to quit thinking of rural America as a colony. Too much of the economic history of our land has been that of the export of fuel, food, and raw materials that have been destructively and too cheaply produced. We must reaffirm the economic value of good stewardship and good work. For that we will need better accounting than we have had so far.

We need to reconsider the idea of solving our economic problems by "bringing in industry." Every state government appears to be scheming to lure in a large corporation from somewhere else by "tax incentives" and other squanderings of the people's money. We ought to suspend that practice until we are sure that in every state we have made the most and the best of what is already there. We need to build the local economies of our communities and regions by adding value to local products and marketing them locally before we seek markets elsewhere.

We need to confront honestly the issue of scale. Bigness has a charm and a drama that are seductive, especially to politicians and financiers; but bigness promotes greed, indifference, and damage, and often bigness is not necessary. You may need a large corporation to run an airline or to manufacture cars, but you don't need a large corporation to raise a chicken or a hog. You don't need

a large corporation to process local food or local timber and market it locally.

And, finally, we need to give an absolute priority to caring well for our land—for every bit of it. There should be no compromise with the destruction of the land or of anything else that we cannot replace. We have been too tolerant of politicians who, entrusted with our country's defense, become the agents of our country's destroyers, compromising on its ruin.

And so I will end this by quoting my fellow Kentuckian, a great patriot and an indomitable foe of strip-mining, Joe Begley of Blackey: "Compromise, hell!"

Questions about "Environmentalists Have Given Up Too Much by Not Being Radical Enough"

Reading and Writing to Comprehend

1. **Analyze** the quote. What does Berry mean when he writes, "This destruction is not necessary. It is not inevitable, except that by our submissiveness we make it so?"
2. **Understand** the rhetorical appeals. What kind of rhetorical appeal(s) does Berry use. How do they affect you as a reader? (For help with rhetorical appeals see Chapter 2.)
3. **Analyze** the conclusion. What do you make of the quote Berry uses to conclude his piece? How does this work as a conclusion to his argument?

Reading and Writing to Respond

4. **Write** an intellectual response. Berry's piece is an op-ed, which is short for "opinion editorial." Annotate the piece using the RLW strategy to help you notice Berry's techniques. Based on your annotations, write an intellectual response that details what you believe to be the characteristics of an op-ed and how these separate it from other genres. What seem to be the defining features? What does this genre allow and what might it prohibit?

Reading and Writing to Apply and Reflect

5. **Compose** a reflection. Use your RLW annotations about Berry's techniques as well as your answers to the previous questions to write your own an op-ed

on any subject. Then, write a reflection describing your choices. Which techniques, including the kind of rhetorical appeals Berry uses, did you choose to imitate? Why? Which did you decide against imitating? Why?

Forget Shorter Showers

By Derrick Jensen

This essay contends that current efforts to address large environmental issues are misguided. In place of these insufficient responses, Jensen recommends what he imagines are more far-reaching and sustainable solutions.

In *The Best of Technology Writing* 2007, edited by Steven Levy, University of Michigan Press, 2007.

Visit https://orionmagazine.org/article/forget-shorter-showers/


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Forget Shorter Showers

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by DERRICK JENSEN

WOULD ANY SANE PERSON think dumpster diving would have stopped Hitler, or that composting would have ended slavery or brought about the eight-hour workday, or that chopping wood and carrying water would have gotten people out of Tsarist prisons, or that dancing naked around a fire would have helped put in place the Voting Rights Act of 1957 or the Civil Rights Act of 1964? Then why now, with all the world at stake, do so many people retreat into these entirely personal "solutions"?

Part of the problem is that we've been victims of a campaign of systematic misdirection. Consumer culture and the capitalist mindset have taught us to substitute acts of personal consumption (or enlightenment) for organized political resistance. *An Inconvenient Truth* helped raise consciousness about global warming. But did you notice that all of the solutions presented had to do with personal consumption—changing light bulbs, inflating tires, driving half as much—and had nothing to do with shifting power away from corporations, or stopping the growth economy that is destroying the planet? Even if every person in the United States did everything the movie suggested, U.S. carbon emissions would fall by only 22 percent. Scientific consensus is that emissions must be reduced

by at least 75 percent worldwide.

Or let's talk water. We so often hear that the world is running out of water. People are dying from lack of water. Rivers are dewatered from lack of water. Because of this we need to take shorter showers. See the disconnect? *Because I take showers, I'm responsible for drawing down aquifers?* Well, no. More than 90 percent of the water used by humans is used by agriculture and industry. The remaining 10 percent is split between municipalities and actual living breathing individual humans. Collectively, municipal golf courses use as much water as municipal human beings. People (both human people and fish people) aren't dying because the world is running out of water. They're dying because the water is being stolen.

Or let's talk energy. Kirkpatrick Sale summarized it well: "For the past 15 years the story has been the same every year: individual consumption—residential, by private car, and so on—is never more than about a quarter of all consumption; the vast majority is commercial, industrial, corporate, by agribusiness and government [he forgot military]. So, even if we all took up cycling and wood stoves it would have a negligible impact on energy use, global warming and atmospheric pollution."

Or let's talk waste. In 2005, per-capita municipal waste production (basically everything that's put out at the curb) in the U.S. was about 1,660 pounds. Let's say you're a die-hard simple-living activist, and you reduce this to zero. You recycle everything. You bring cloth bags shopping. You fix your toaster. Your toes poke out of old tennis shoes. You're not done yet, though. Since municipal waste includes not just residential waste, but also waste from government offices and businesses, you march to those offices, waste reduction pamphlets in hand, and convince them to cut down on their waste enough to eliminate your share of it. Uh, I've got some bad news. Municipal waste accounts for only 3 percent of total waste production in the United States.

I want to be clear. I'm not saying we shouldn't live simply. I live reasonably simply myself, but I don't pretend that not buying much (or not driving much, or not having kids) is a powerful political act, or that it's deeply revolutionary. It's not. Personal change doesn't equal social change.

So how, then, and especially with all the world at stake, have we come to accept these utterly insufficient responses? I think part of it is that we're in a double bind. A double bind is where you're given multiple options, but no matter what option you choose, you lose, and withdrawal is not an option. At this point, it should be pretty easy to recognize that every action involving the industrial economy is destructive (and we shouldn't pretend that solar photovoltaics, for example, exempt us from this: they still require mining and transportation infrastructures at every point in the production processes; the same can be said for every other so-called green technology). So if we choose option one—if we avidly participate in the industrial economy—we may in the short term think we win because we may accumulate wealth, the marker of "success" in this culture. But we lose, because in doing so we give up our empathy, our animal humanity. And we really lose because industrial civilization is killing the planet, which means everyone loses. If we choose the "alternative" option

of living more simply, thus causing less harm, but still not stopping the industrial economy from killing the planet, we may in the short term think we win because we get to feel pure, and we didn't even have to give up all of our empathy (just enough to justify not stopping the horrors), but once again we really lose because industrial civilization is still killing the planet, which means everyone still loses. The third option, acting decisively to stop the industrial economy, is very scary for a number of reasons, including but not restricted to the fact that we'd lose some of the luxuries (like electricity) to which we've grown accustomed, and the fact that those in power might try to kill us if we seriously impede their ability to exploit the world—none of which alters the fact that it's a better option than a dead planet. Any option is a better option than a dead planet.

Besides being ineffective at causing the sorts of changes necessary to stop this culture from killing the planet, there are at least four other problems with perceiving simple living as a political act (as opposed to living simply because that's what you want to do). The first is that it's predicated on the flawed notion that humans inevitably harm their landbase. Simple living as a political act consists solely of harm reduction, ignoring the fact that humans can help the Earth as well as harm it. We can rehabilitate streams, we can get rid of noxious invasives, we can remove dams, we can disrupt a political system tilted toward the rich as well as an extractive economic system, we can destroy the industrial economy that is destroying the real, physical world.

The second problem—and this is another big one—is that it incorrectly assigns blame to the individual (and most especially to individuals who are particularly powerless) instead of to those who actually wield power in this system and to the system itself. Kirkpatrick Sale again: "The whole individualist what-you-can-do-to-save-the-earth guilt trip is a myth. We, as individuals, are not creating the crises, and we can't solve them."

The third problem is that it accepts capitalism's redefinition of us from citizens to consumers. By accepting this redefinition, we reduce our potential forms of resistance to consuming and not consuming. Citizens have a much wider range of available resistance tactics, including voting, not voting, running for office, pamphleting, boycotting, organizing, lobbying, protesting, and, when a government becomes destructive of life, liberty, and the pursuit of happiness, we have the right to alter or abolish it.

The fourth problem is that the endpoint of the logic behind simple living as a political act is suicide. If every act within an industrial economy is destructive, and if we want to stop this destruction, and if we are unwilling (or unable) to question (much less destroy) the intellectual, moral, economic, and physical infrastructures that cause every act within an industrial economy to be destructive, then we can easily come to believe that we will cause the least destruction possible if we are dead.

The good news is that there are other options. We can follow the examples of brave activists who lived through the difficult times I mentioned—Nazi Germany, Tsarist Russia, antebellum United States—who did far more than manifest a form of moral purity; they actively opposed the injustices that surrounded them. We can follow the example of those who remembered that the role of an

activist is not to navigate systems of oppressive power with as much integrity as possible, but rather to confront and take down those systems.

Derrick Jensen is the author of *Thought to Exist in the Wild, Songs of the Dead, Endgame, Dreams*, and other books. In 2008, he was named one of Utne Reader's "50 Visionaries Who Are Changing Your World." His *Orion* column is called "Upping the Stakes."

Questions about "Forget Shorter Showers"

Reading and Writing to Comprehend

1. **Analyze the quote**. In "Forget Shorter Showers," Jensen writes that people retreat into entirely personal "solutions" in part because "we've been victims of a campaign of systematic misdirection." What does he mean?
2. **Rhetorically read** Jensen's piece with specific attention to his argument. What is he arguing?
3. **Connect**. What does Jensen mean when he writes that "personal change doesn't equal social change?" How does this statement connect to his argument?

Reading and Writing to Respond

4. **Write** an intellectual response. Using your annotations and your answers to the previous questions, write an intellectual response to Jensen's argument (see Chapter 3 for help with intellectual responses).

Reading and Writing to Apply and Reflect

5. **Reread** Jensen's text twice in order to apply the Believing/Doubting Game reading strategy. Referring to your annotations from these readings, **write** a letter to a specific audience of your choice that supports (i.e. "believes") Jensen's argument. You may choose to write to a friend, a parent, or a professor, for example. (see Chapter 2 for help with the Believing/Doubting Game strategy).
6. **Refer** to your annotations indicating your "doubts," then **write** a letter to the author, Jensen, explaining these doubts. Now, **revisit** your two letters. How do they compare to each other? To the intellectual response you wrote in #4? *So what?*

If You Think Technology Has No Place In the National Parks, Think Again

By Amelia Urry

This essay addresses the benefits of using technology in national parks. Urry considers how devices such as smart phones, cameras, sensors, and microphones, among others, are being put to good use across the country's national parks and, moreover, how inviting electronic devices into parks may, in fact, increase the number and kinds of people who visit parks annually.

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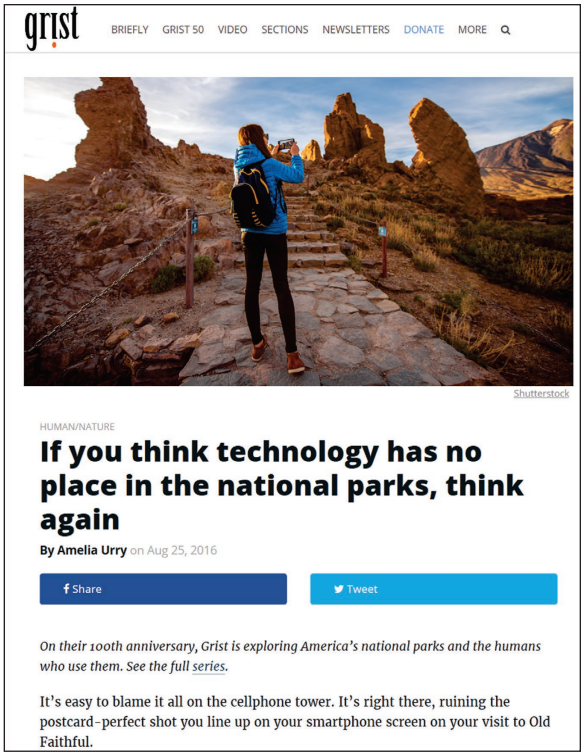
Visit http://grist.org/business-technology/if-you-think-technology-has-no-place-in-the-national-parks-think-again/



It's easy to blame it all on the cellphone tower. It's right there, ruining the postcard-perfect shot you line up on your smartphone screen on your visit to Old Faithful.

Cellphone coverage and wireless internet are seeping into the parts of the country we like to think of as one-hundred-percent-natural, frozen in pre-industrial time. Of the 412 parks and monuments administered by the National Park Service, none is more iconic than Yellowstone National Park. Yet half of this bison- and bear-filled wilderness has cellphone reception, and there has been talk of running a high-speed fiber optic cable to the park through the Tetons.

"The question is not whether technology is good or bad, or appropriate or inappropriate — it's all those things," says Gary Machlis, science advisor to the director of the National Park Service. "It can do amazing things, and it can cause unintended consequences and harm. What we've gotta do is be very thoughtful."

As the National Park Service marks its 100th trip around the sun, it faces an all-you-can-eat buffet of challenges from the fickle attention of an increasingly urbanized population to the titanic threat of climate change. Whether it's drones or data plans, the technologies that are increasing-

ly fundamental to the way we live will become a bigger and bigger part of all life on Earth. That means our parks are changing, whether we like it or not.

All that connectivity brings more than just think-pieces about the shenanigans of screen-addicted tourists (and there are plenty of those). We're also getting unprecedented access to some of the wildest places in America, for more Americans than ever before. We have better data for scientists and new vistas for would-be visitors — and all that means a better shot at protecting these places for another hundred years.

Streams, Live

I'd bet I'm in the majority of the American population when I say that I've never seen a bear. At least, not in the wild — but that distinction might turn out to mean less than you'd guess.

This summer, 2 million people tuned in to watch the grizzly bears of Katmai National Park standing knee-deep in the gushing glacial Brooks River, scooping up salmon with the lazy enthusiasm of a Thanksgiving guest going in for a third helping of mashed potatoes. Some veteran viewers, many of whom have never been closer to a grizzly than the livestream on their computer monitor, can recognize the individual bears that return year after year to the river as the salmon do. On message boards and in live chats with park rangers, they share screenshots and guess at the identity of this or that bear lumbering through the stream, trying to predict when a venerable grizzly named Otis will show up this year.

Jeffrey Skibins, a professor of conservation and park management at Kansas State University, is interested in the huge fandom these bears have accumulated online. Skibins was surprised when he learned just how popular the Katmai bear cams, hosted by the nonprofit explore.org, were. So he teamed up with fellow KSU researcher Ryan Sharpe to figure out what's going on with all this long-distance bear appreciation.

"Brazil is one of the largest international audiences," Skibins tells me on the phone. "How great is that we can reach an audience and talk about the plight of these bears with folks in Brazil who may never get a chance to see them?"

Forget Brazil — I've been glued to the Alaskan feed from my office in the Lower 48. Letting it play in the background of my monitor at work (sorry, boss!) feels like fair compensation for all the sunny days I spend shackled to my desk (in the service of you fine people of the Internet) instead of running across a real bear in the wild woods of Washington.

And I'm not the only one with a short tether to the web. Roughly three out of every four Americans spend some time online every day, and about a third of those say they are online "almost constantly," according to Pew research. Skibins wants to know if office drones blissing out to pristine Alaskan ecosystems are having the same kind of emotional experiences that flesh-and-blood visitors to Katmai feel.

"We're trying to understand, after viewing the brown bears online or on-site, what is your emotional response? And what is your connection to those animals?" Skibins says. To that end, he and Sharpe devised a survey that asks viewers to rate how much they agree with statements like "I need to learn everything I can about brown bears" and "I would alter my lifestyle to help protect brown bears."

"That's not necessarily a strictly intellectual response, that's something that's really more heartfelt," Skibins says. That emotional component — as opposed to a purely intellectual interest — can predict whether a person will actually *do* something to help the bears. "We've seen that the stronger a person's emotional response is, the greater the likelihood is that they'll participate in some action to help protect that animal."

If livestreams from a remote corner of Alaska can lead millions of people to form an emotional response to an animal they've never encountered in real life, maybe that means bears have gained millions of new defenders. At least, that's what he wants to find out.

And people say the internet is only good for porn.

Data, Data, Everywhere

Before she started teaching computers to recognize bird calls, Alexis Diana Earl was counting marmots.

At the Rocky Mountain Biological Laboratory, her days were spent conducting surveys for a decades-long study: "It was hiking miles and miles to spend an entire day sitting with your scope, taking notes on what all the marmots are doing."

Don't get it twisted: She had fun. But when it comes to collecting usable data, traditional fieldwork like this is slow and often unreliable. You know that saying: "If a tree falls in the forest and no one hears it, does it make a sound?" Well, for a long time, scientists have needed to be in the right place at the right time to be able to hear what's going on in the forest. But sending field researchers out to count seabirds or listen for frog calls is expensive and limited — a human scientist needs to sleep at some point.

A microphone, on the other hand, needs nothing but a fresh set of batteries and an empty memory card. Scientists are beginning to figure out how to use new durable, affordable cameras and microphones to take bigger, more detailed pictures of the species and ecosystems they study.

But when you start listening to the forest around the clock, you rack up a lot of data in a hurry.

Which is why Earl isn't counting marmots anymore. Now she spends most of her days in a trailer in Santa Cruz, sitting in front of a computer screen and sifting through terabytes of data as an analyst for Conservation Metrics, a three-year-old company that aims to mine and refine

environmental data to track elusive and endangered species. Once scientists get a better picture of the animal population they track, managers can make more informed decisions about how to protect them.

Although using audio recordings to track hard-to-spot species isn't new, the amount of information that companies and scientists can collect is unprecedented. Last year, Conservation Metrics' largest project collected 83,000 hours of data. "You can't work with 80,000 hours of data in an Excel file," Earl says. "You can't even open that Excel file."

Instead, the analysts at CMI break all that data down into two-second snippets. They tag a couple of these snippets that sound like what they're looking for — a certain species or a specific kind of call — and feed those examples into an algorithm that finds the similarities between them. Using those shared features, the algorithm builds a template of the sound it's looking for, and precedes to comb through unwieldy piles of data hunting down all of the matches.

In this way, the computers can chew through 83,000 hours of data and count, say, every time a spotted owl calls versus the number of barred owls that called. The results tell scientists and managers a lot that they might not otherwise ever know about the activity of a certain species, the interactions between species, and the health of the overall ecosystem.

In the Channel Islands National Park, for example, Conservation Metrics is monitoring a newly re-established breeding colony of Ashy storm petrels, a migratory seabird that was able to return to Anacapa Island after an extensive campaign to eradicate the invasive rats that had been eating the birds' eggs. Without remote-sensing devices, it would be harder to tell if all that effort to create a safe haven for the petrels had actually worked.

Earl points out that there's another benefit to using recording devices for some of the field work that biologists used to do by hand. "If you're in the field, you're just taking down data around what you're interested in at the time," she says. "But if you put out a remote-sensing device, it's collecting everything — especially if you have a network of sensors, acoustic sensors and camera traps and video. Then you have a full picture of what's going on."

If you find something interesting in the data, you can comb through it again and again, asking a different question every time.

Conservation Metrics is starting to analyze images from camera traps and drone footage, as well — and the parks are figuring out how to deploy these and other technologies. In the future, new devices that can sense minute details of air and water chemistry will help parks subtly monitor environmental changes, and algorithms will help scientists sort through genomes with ease. We will be able to sift DNA from streams and tease out subtle changes in forest ecology from satellite images.

"We're just excited to take on as much data as possible," Earl says.

The surveillance state never looked so good.

Internet Access

Right now, 68 percent of Americans own a smartphone, and 46 percent of them claim they couldn't live without it, according to research from Pew. Bemoan it all you like, we're heading to a world that is increasingly social, virtual, and mobile.

Visitors to the national parks, like so much of the public, are entranced by their smartphones. A 2015 industry survey found that when campers had access to email, they spent an average of three extra days outside. A full 88 percent of respondents took a smartphone camping with them; some brought a laptop or a tablet. Only 7 percent went totally tech-free.

Cellphone coverage and wifi in parks could change more than just the waiting time between taking that Mount Rushmore selfie and letting the "likes" pour in. It could also help lure a wider range of people into the national parks. In a century when America will see the end of its white majority, the National Park Service still looks pretty monochromatic, from its green-hatted staff to its 307 million yearly visitors.

According to a new survey from New America Media, people of color don't feel they have the same access to public lands as white people. Some of that is because of a knowledge gap — half of respondents said that one big obstacle is not knowing that much about public lands. Smartphones could help bridge that gap.

Maybe that's one reason that, in that industry camping survey, African-Americans were the group most likely to favor campgrounds with free wifi. One of the major reported uses of technology on camping trips is to do research on nearby attractions and look up directions. If technology can make this information more accessible to a segment of the American population who might not have parents or friends to induct them into the culture of the outdoors, then it has enormous potential to make parks more democratic.

And that can only strengthen a Park Service hoping to cultivate a new generation of advocates. Overall, younger, non-white people are more likely to say mobile technology enriches their experience of the outdoors, according to a survey by Michael Schuett, a professor of recreation at Texas A&M.

Of course, some people don't want cellphones in the wild, no matter what. "There is, at the core of the parks service, a conservative nature," says Machlis, the Park Service's science advisor; hence all those conservative conservationists complaining about the kids and their Facebooks. The mission statement of the NPS includes a mandate to preserve parks "unimpaired" for future generations, after all. It also includes an inducement to provide "for the enjoyment, education, and inspiration" of the public.

"It's often said that those two are contradictory, but they're not," Machlis says. "They're really organically connected, because it's 'preserve unimpaired' so it can provide a special, distinctive 'enjoyment.' The two fit together."

Timelines

Nothing and no one gets stuck in time, not really — not even sacred cows. In the 21st century, the national parks need to cultivate 21st century fans. Maybe we are all busier, more distracted, and more urban than we were in 1916. We're also more integrated with the social and virtual worlds that technology opens up to us.

"For a long time, the premise has been, national parks thrive on that emotional response people have by being there," says Skibins, the Kansas State professor. "Who isn't awestruck by standing in Yosemite, or Yellowstone, or the Everglades?"

But what if you can get that same awestruck feeling by watching bears swipe up salmon 1,500 miles away, or by that photo your friend posted of the sun rising over over the Grand Canyon, or the lushly saturated pictures the U.S. Department of the Interior's Instagram account posts to its 1.1 million followers every day?

Embracing new technology could help turn casual visitors into passionate conservationists. Virtual reality is emerging as a powerful way to immerse people in exotic settings, and services like Snapchat and Facebook Live give people an opportunity to share experiences with others around the world.

That, it turns out, is an older story than you might think. After all, the parks were established by people who had yet to see them in person.

In 1871, a U.S. Geological Survey made a 40-day expedition through what is now Yellowstone. They were some of the first Western people to marvel at the hot springs and geysers of the central plateau and stand in amazement over the Grand Canyon of the Yellowstone River.

Along with the survey were artist Thomas Moran and photographer William Henry Jackson, who used the technology of their day — paints, canvas, collodion process — to create the first pictures of what is now Yellowstone National Park.

They sent those pictures back to the U.S. Capitol, where they helped convince Congress to establish Yellowstone as the world's first national park in 1872.

"They did it because they had all been there based on virtual experiences," Machlis says. "How is that different than staring at a screen?"

Questions about "If you Think Technology Has no Place in the National Parks, Think Again"

Reading and Writing to Comprehend

1. **Rhetorically read** and **annotate** "If you Think Technology . . . " and focus on all four rhetorical elements: purpose, audience, claims, and evidence (see Chapter 2 for help with rhetorical reading). Describe Urry's purpose, intended audience, what she is arguing, and the evidence she uses to support this argument.

2. **Notice** how the article "If you Think Technology . . . " is designed and particularly the author's use of different sections such as "Streams, Live;" "Data, Data Everywhere;" and so on. Using the Say/Does approach **reread** and **annotate** the piece. How would you describe the author's use of different sections? How does each function (i.e. what does each section do) on its own and in relation to the other sections?

3. **Develop** a list of the technologies that are described in this piece as having a place in the national parks.

Reading and Writing to Respond

4. **Write** an intellectual response to the following statement, one of the first quotations author Amelia Urry uses in her piece: "The question is not whether technology is good or bad, or appropriate or inappropriate—it's all those things." (see Chapter 3 for help with intellectual responses). Be sure to address how this quote sets up some of the key issues explored in the article.

Reading and Writing to Apply and Reflect

5. **Notice** that the title of this piece is premised on the assumption that technology has no place in national parks. Come up with an example of another space or geographic location where it is assumed that technology has no place and describe why technology either is already present or should be welcome there.

Were Farmers America's First High Tech Information Workers?

By James W. Cortada

This blog post offers a look at the role of technology in farming. Cortada provides an historical perspective on the subject by exploring how farmers have relied on technology for hundreds of years.

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Visit http://blog.oup.com/2016/11/farmers-america-tech-information

Settlers in North America during the 1600s and 1700s grew and raised all their own food, with tiny exceptions, such as importing tea. In the nineteenth century, well over 80% of the American public either lived at one time on a farm or made their living farming. Today, just over 1% does that in the United States, even though there is a surge going on in small organic family farming. The majority of American food is still grown or raised in the US, although much is also imported. So, any understanding about the role of information in any century involves farmers, in the beginning because almost everyone was involved, and later because they had figured out how to industrialize its massive production so that farming only required a tiny number of people. Information made that profound switch possible.

Farmers didn't just use machinery that was invented over the past two hundred years, including the tractor in the twentieth century, which massively reduced the number of workers and animals needed to operate a farm. They also utilized data. By the 1870s, the US Government began collecting and disseminating scientific information to farmers. Beginning a decade earlier, Congress passed legislation that funded the creation of state universities for the purpose of doing research on agriculture and sharing the results with farmers. That is how the US acquired massive state universities like the University of Minnesota or the University of Wisconsin.

In 1862, Congress established the US Department of Agriculture and began a continuous program of publishing literature for use by farmers to improve their productivity and to address specific

problems, such as curing animal, and crop diseases. By the 1880s, state universities and the Department of Agriculture began hiring agricultural agents stationed in almost every agricultural county in the country to transfer research findings and best practices created at the state universities to individual farmers, one-by-one. They also disseminated information through training programs for future farmers, similar to programs like 4-H today. By the early 1900s female home economists, also funded by the US Department of Agriculture and managed by the state universities, were educating children and women about farming best practices.

Scientific research in the 1920s and 1930s expanded knowledge about plant and animal diseases, development of fertilizers, and hybrid seeds that led to higher yields of such crops as beans, corn, potatoes, and wheat. The US rapidly became one of the world's largest exporters of agricultural products.

Farm by G123E123E123K123. CC BY 2.0 via Flickr.

In the years following World War I, farmers also extended their formal education from roughly the eighth grade through to completion of high school. High schools offered courses in agriculture and home economics. By the end of the 1960s, it was not uncommon for young farmers to have completed a college education with a major in agriculture. During the post-World War II years, the volume of literature on agricultural practices expanded massively and was used by college-educated

farmers. They began attending seminars on agricultural practices sponsored by their state universities and county "ag" agents, while manufacturers of fertilizers and other products hosted these too.

Farmers gained access to the Internet in the 1990s, but largely on a wide-scale basis in the 2000s, when they accessed growing amounts of information about all manner of farming issues. They did more than use the Internet. Farmers installed micro weather stations on their properties and subscribed to aerial crop surveillance surveys, including accessing weather reports of their region from satellite-based services. Many communicated data through the Internet.

By the 2010s, wireless communications involving smart phones, laptops, and PCs had enabled farmers to build an extensive information ecosystem in support of their work. Their communications back and forth with agricultural experts, local universities, and vendors became more frequent and increased in volume.

By the 2010s, young farmers had taken to social media. If you subscribe to a CSA (Community Supported Agriculture) providing you with vegetables every week, then you probably also are receiving e-mails from your farmer reporting on the status of this week's crops, also sending along recipes for cooking kohlrabi, and links to other food topics, such as recipes and about the "pros" and "cons" of genetically modified seeds, food, and animals. Go to a food market on a Saturday morning and invariably you will see a few tables with literature about agricultural issues.

The answer to our question is a resounding yes. Farmers used a combination of new tools, science-based information, innovations in fertilizers, seeds, and medicines, and every form of information and its technologies from the 1600s to the present. In each century, they were as "high-tech" and as advanced in the use of information as any other segment of society. And there is no sign that their appetite for big data, use of artificial intelligence, robotics, or digital sensors is going to decline. They continue to use these more than many other professions.

Featured image credit: Farm by Michael Pereckas. CC BY 2.0 via Flickr.

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Questions about "Were Farmers America's First High Tech Information Workers?"

Reading and Writing to Comprehend

1. **Consider** the importance. According to this article, how has data or information been important to farming?

2. **Analyze** the message. What does this article say we must remember when exploring the role of information in any century?

3. **Reread** this piece using a reading strategy of your choice that allows you to **explain** why it is important to recognize the role that information has played in farming for centuries. In other words, what are the implications of recognizing this? Why, how, and for whom does this matter?

Reading and Writing to Respond

4. **Multimodal Option.** With the goal of making Cortada's argument that much more persuasive, develop a multimodal project in which you re-present his argument about the relationship between farming and information technology. Then, write a short reflection about the decisions you made in creating this project.

Reading and Writing to Apply and Reflect

5. **Research**. This article mentions that in the late 1800s the United States acquired universities that could conduct research on agriculture and share that information with farmers. These universities are often called land grant institutions. Conduct some research on your own and locate the land grant institution closest to your own college or university. Perhaps you even attend a land grant institution. **Read** about the university's history via its website. Then, **write** an intellectual response in which you describe this specific school's contribution to farming and the extent to which you see Cortada's argument about information as relevant to this specific example (see Chapter 3 for help with intellectual responses).

Long Writing Assignments Based On Readings in Chapter 10: The Environment and Technology

1. **Develop** a synthesis in which you put at least 3 of the selections from this chapter into conversation with each other (see Chapter 3 for help with syntheses). Look back at the annotations you already have on the texts to determine how

helpful those are. It is likely that you will need to reread the selections by applying a reading strategy that you think will be most effective for completing this particular assignment.

2. **Develop** an argument. Using your annotations, develop an argument that considers how the selections in this chapter largely avoid the binaries often associated with technology (i.e. technology is good or bad). What kinds of questions seem most central to this approach? Are there moments where the authors fall into binary thinking? How do you account for those? What are the implications of binary and non-binary approaches to questions surrounding technology? Look back at the annotations you already have on the texts to determine how helpful those are. It is likely that you will need to reread the selections by applying a reading strategy that you think will be most effective for completing this particular assignment.

3. **Multimodal Option.** Develop a multimodal advertisement for a national park that takes into account key rhetorical aspects, including purpose, audience, claims, evidence, and appeals (see Chapter 2 for help with these rhetorical components). Then, write a reflection in which you outline your rhetorical choices.

4. **Multimodal Option.** Develop a website that explores an argument about the relationship between technology and the environment. You may quote the selections in this chapter and other sources throughout the website to both support and develop this argument. Then, write a reflection that describes the argument you are making and the decisions you made while developing the website.

Reflecting On Your Reading Strategies and Annotations

Consider the different reading strategies you applied while reading the selections in this chapter. Which were most useful for understanding the text? For figuring out what you think? For responding to the text? Anticipate future uses of these reading strategies in this class, in other classes, and in other contexts. Also, consider previous courses and contexts in which these strategies would have been helpful.