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Why Nature Matters:



Seventh-day Adventist Education in the Anthropocene

My first exposure to the notion of a conflict between human needs and the natural world occurred in 5th grade as I was deciding what project to present at the county's youth science fair. My science teacher suggested I make a presentation about the small endemic¹ butterfly called Mitchell's satyr (*Neonympha mithellii*) found in only a dozen or so wetlands in southern Michigan and northern Indiana. I enjoyed being out in nature and learning about animals, so I decided to follow his recommendation.

The issue at hand was a proposal by the Michigan Department of Transportation to extend US-31 from Berrien Springs north to I-94 in Benton Harbor. This would save commuters about 10 minutes. Many drivers and business owners were for the project; however, some concerned citizens and conservation groups were against it because the proposed high-

way would run right through one of the few remaining wetland habitats of the Mitchell's satyr butterfly. A choice had to be made. Construction began in the 1980s but came to a halt in the late 1990s due to litigation by conservation groups.

I remember visiting the small fen just north of Berrien Springs in 1994, where these butterflies live, armed with a camera provided by my teacher. I didn't see any of the butterflies, which is not surprising because the adults are only out for about two weeks a year in the summer, but I do remember appreciating the unique wetland habitat. I did not win the science fair that year (I placed second), but I learned an important lesson about the choices we make as humans and the possible consequences they have on the organisms around us.

Why does nature matter? Why should we as individuals, as members of our church, our country, the human race, care about nature? If a small butterfly that is visible for only two weeks

a year in a handful of wetlands goes extinct, does it really matter? These may sound like crude, unfair questions, but in a very real way, we ask ourselves many related ones every day, and we answer them with the choices we make. Life is all about choices. Some are easy and relatively inconsequential, like choosing what flavor ice cream to buy. Some are more difficult, like choosing the right person with whom to share one's life. Some are straightforward in terms of being moral or immoral. Others, not so clear.

My goal in this article is to challenge Adventist educators to re-examine their relationship with nature and their dependence on the vital benefits it provides. I hope to convey that nature does matter and that we are living in a unique time in terms of our impact on it. I will introduce the concept of environmental ethics and hopefully convince readers that as believers, it is our moral obligation to

care for nature and that as Seventh-day Adventist educators, it is our responsibility to inform our students about the current state of our planet and the consequences of our choices.

One doesn't have to be an ecologist to appreciate nature and the "free" benefits that it provides us. Nature not only offers esthetic beauty, it is also vital to our survival since it provides the air we breathe, the water we drink, and the food we eat. Unfortunately, most people don't realize that nature exists in a fairly delicate web of interdependence between organisms and the environments in which they live. That is to say, no organism is self-sustaining. All organisms depend on other organisms to survive. For example, it is estimated that we have as many bacterial cells as human cells in our bodies.² We depend on this human biome (the collective community of organisms that live within us) to regulate our immune system, help us digest our food, produce certain vitamins, and protect us from disease-causing pathogens.

On a larger scale, abiotic aspects of nature (the soil, bodies of water, the atmosphere) both influence and are influenced by the biotic components of nature. Plants, fungi, and bacteria change and shape the soil, which in turn allows other plants and a whole multitude of other organisms to thrive—human beings included.

Nature works by maintaining balance. Destructive relationships are not sustainable and are effectively discontinued over time. No predator consumes its prey indiscriminately. Exploitative relationships are certainly an important part of nature, but they are always balanced, or they ultimately end with the loss of one or both species. Waste is rare in nature.

To me, one of the most amazing aspects of nature is the complexity and interdependence of all things. Despite the apparent selfishness and often cruel appearance of the struggle for survival, all organisms ultimately depend on one another to survive. When we look closely at nature, we find

much more dependence and cooperation than isolation and competition.

So what's the big deal? Earth is a very large planet, and there are still wide-open spaces where there are no humans around. While that is true in a sense (although becoming less so every year), we are in fact living during an unprecedented time in human history. Our impact on the environment, referred to as our ecological footprint, is more visible than ever before.

No longer can we reasonably deny the reality that we are destroying the delicate balance of nature on which we and all life depend and changing our planet in ways that are potentially irreversible. The irony of it all is that we are ultimately destroying ourselves. Pulitzer prize winner and Harvard professor E. O. Wilson wrote in his 1998 book *Consilience: The Unity of Knowledge*, "Few will doubt that humankind has created a planet-sized problem for itself. No one wished it so, but we are the first species to become a geophysical force, altering Earth's climate, a role previously reserved for tectonics, sun flares, and glacial cycles."³

This change is so profound that in 2008, a group of geologists from the Geological Society of London considered a proposal to name a new geological epoch following the Holocene called the Anthropocene.⁴ The reasoning was an acknowledgement of the growing geological impact of human influence on ecosystems, land use, and biodiversity. Scientists continue to debate when to place the start of the Anthropocene. Some think it should extend back to the start of agriculture many thousands of years ago, while others have proposed recent dates like 1945 when the trinity nuclear tests were conducted, or 1964 when what is known as the "great acceleration" of our ability to impact the planet began. But all agree that we have entered a time when humans as a species are shaping nature on a global scale. In 2015, Lewis and Maslin wrote in the journal *Nature*, "To a large extent the

future of the only place where life is known to exist is being determined by the actions of humans."⁵

Now you might be thinking, Hold on, humans have been around a long time, why would all this be happening now? The reason is a mathematical one: *More*. More humans have more capacity to alter the environment. All civilizations have had a negative effect on their environment to some extent; however, the industrial revolution in the 19th century enabled humans to flourish and prosper at the expense of other organisms and the environment on an unprecedented scale. Since that time, human populations have skyrocketed. It took humans thousands of years to get to a population of one billion in the year 1804. The second billion took only 123 years to achieve (1927), and we have been adding a billion people each 12-14 years ever since. Ecology students will recognize this type of growth curve as exponential growth. The good news is that the growth rate peaked in the late 1960s and has begun to slow; however, adjusting for this decline in growth rate, we are still on pace to hit 8 billion in 2025⁶ and 11 billion by the end of the century. In just a blink of a geological eye, our species has grown explosively, in population and in technology, and our impact continues to be global.

Scientists estimate that currently, 83 percent of the terrestrial biosphere⁷ is under direct human influence.⁸ Land used for human food production (croplands and pastures) now occupies about 40 percent of the terrestrial surface, making it one of the largest biomes on earth.⁹ Ten percent of the total renewable fresh water is currently diverted to human use. Monocultural manmade forests, such as palm oil and timber plantations, now cover millions of square kilometers worldwide.¹⁰ A recent study used satellite tracking data of more than 70K commercial fishing ships and found that when controlling for areas where satellite data are poor, we are currently fishing about 73 percent of the ocean.¹¹

During this same time of unprecedented success in terms of human growth and advancement in technology, our atmosphere, our land and oceans, and the non-human species, have been greatly impacted. A few species have increased in number, like our domestic animals; however, most have suffered great losses, along with the habitats upon which they depend.

Two recent reports from studies that looked at insect populations over multiple decades found alarming declines. In a 27-year study (1989-2016) in a protected reserve in Germany, scientists documented a 76 percent decline in flying insect biomass.¹² Similarly, in the rainforest of Puerto Rico, scientists have documented 98 percent and 78 percent declines in biomass of ground and canopy-dwelling insects, respectively, over a 36-year period (1976-2012).¹³ Vertebrates are not doing much better. Currently, 25 percent of mammals, 12 percent of birds, and 32 percent of amphibians are threatened with extinction, according to the International Union for Conservation of Nature.¹⁴ The main cause is habitat loss, although pollution, poaching, and overharvesting are also major contributors.

You might have heard that scientists believe that species are going extinct at rates 10 to 1,000 times the “normal” baseline rates.¹⁵ The reason for the high level of variability in the estimates is that those data are so hard to collect, and the life history of each species can vary greatly. I sit on the committee that evaluates the status of manatees every decade or so, and I can tell you it is no easy task. Despite these complications, most biologists agree that we are losing species at alarming rates and that humans are directly or indirectly the cause of the problem.¹⁶

Average global temperatures have risen, and this is linked to atmospheric increases in greenhouse gasses like carbon dioxide and methane. Sea levels have risen, and glaciers have

shrunk—all in the past 50 to 60 years. The list goes on: invasive species changing local ecosystems, deforestation that exceeds planting of new trees, pollution, polar regions melting, coral bleaching. My students who have traveled to Florida and Cuba on ecology trips have witnessed many of these problems firsthand. They have seen bleached and damaged corals and plastic trash while snorkeling in the Florida Keys, and witnessed the devastating effects of invasive species like the lionfish (*Pterois* spp.) in Cuba and the Burmese python in Florida. Twenty years ago, when I participated as a student on the Florida Ecology course, I saw white-tailed deer, raccoons, and other mammals in the Everglades National Park. In 2017, when I returned as a professor with a group of students, we saw none, not even as road-kill, due to the explosive population growth of the invasive python.

The question now becomes, can we do anything about it? Indeed, *should* we do anything about it? How should we as Christian educators respond to this current global challenge? If we look at mainstream Christianity, we find that in the United States, it paradoxically tends to support development and not conservation; deregulation and not environmental protection. While it is true that in the past decade, several Christian organizations have embraced ideas relating to sustainability, they are the exception to the rule.

But what about Seventh-day Adventists? Are we any different? Our official church statement approved in the mid-1990s may surprise some because of its use of direct and strong language in speaking of our moral obligations (see Box 1 for full statement). It indicates that nature is a gift from God and that we as humans are responsible for much of the current suffering and destruction due to our “selfishness and greed.” It calls for radical change in our behavior based on “respect for nature” and the “dignity of created life.”

So why is it that we treat nature with such indifference and shortsight-

edness? Why don't we practice what we preach? Why don't we even preach it, for that matter? I think there are two possible reasons for our indifference toward nature and the cognitive dissonance between what we say and what we do. The first is unique to our denomination, and the second we share with the rest of Christianity and maybe Western society as a whole. By exploring both of these potential reasons, I hope to empower Adventist educators to be able to overcome them.

I think we tend to be indifferent to environmental problems because we don't think we will live to see the consequences. Every Seventh-day Adventist generation going back to the Millerites has believed that they were the last generation. Could our apocalyptic belief that Jesus is coming soon produce as an unintended negative side-effect—an indifference toward the disasters that human beings are causing?

A lack of basic environmental knowledge does not seem to be the primary problem. One of the few studies on Seventh-day Adventist environmental literacy found that Adventist teachers in Florida scored comparably with the general population and had at least nominal environmental literacy, with the highest scores in the cognitive (knowledge) subscale and the lowest scores in the behavioral subscale.¹⁷

Could it be that we shrug our shoulders at the current reality of our planet because we believe that Jesus is coming “very soon,” and He will simply hit the “reset button”? Meanwhile, generations pass; and as a result, we must continue to live with our shortsighted decisions and our inaction. Every new generation is left with a more degraded Earth, less resources, and larger problems. Even if the Lord were to come today, does that justify or excuse our careless actions or inaction towards environmental problems?

There are clear examples in the Bible of the connection between our sin and greed and the destruction and

Box 1. Stewardship and the Environment

“It is the belief of the Seventh-day Adventist Church that humankind was created in the image of God, and is thus to represent God as His steward and to manage the natural environment in a faithful and fruitful way. Nature is a gift from God.

“Unfortunately, men and women have been increasingly involved in an irresponsible destruction of the earth's resources, resulting in widespread suffering, environmental degradation, and the threat of climate change. While scientific research needs to continue, it is clear from the accumulated evidence that the increasing emission of destructive gasses, the massive destruction of the American rain forests, and the depletion of the protective mantle of ozone (the so-called greenhouse effect), are all threatening the earth's eco-system. There are dire predictions of global warming, rising sea levels, increasing frequency of storms and destructive floods, and devastating desertification and droughts.

“These problems are largely due to human selfishness and greed, which result in ever-increasing production, unlimited consumption, and depletion of nonrenewable resources. Solidarity with future generations is discussed, but the pressure of immediate interests is given priority. The ecological crisis is rooted in humankind's greed and refusal to practice good and faithful stewardship.

“Seventh-day Adventism advocates a simple, wholesome lifestyle, where people do not step on the treadmill of unbridled over-consumption, accumulation of goods, and production of waste. A reformation of lifestyle is called for, based on respect for nature, restraint in the use of the world's resources, reevaluation of one's needs, and reaffirmation of the dignity of created life.”

* This statement was approved and voted by the General Conference of Seventh-day Adventists Administrative Committee (ADCOM) for release by the Office of the President, Robert S. Folkenberg, at the Annual Council session in San Jose, Costa Rica, October 1-10, 1996: <https://www.adventist.org/en/information/official-statements/statements/article/go/-/stewardship-of-the-environment/>.

suffering of nature. Hosea wrote that “there is no faithfulness, no love, no acknowledgement of God in the land. There is only cursing, lying and murder, stealing and adultery; they break all bonds, and bloodshed follows bloodshed. *Because of this* the land mourns, and all who live in it waste away; the beasts of the field and the birds of the air and the fish of the sea are *dying*” (Hosea 4:1-3, NIV, italics supplied).¹⁸

It could be argued that environmental destruction is a byproduct of our sin against humanity and against God, the only entities to whom we are responsible, right? Surely the direct or indirect (in the form of inaction) destruction of the Earth is not sinful in it of itself. Will God judge us for our treatment of the land, the wildlife, the physical Earth with which He has entrusted us?

I mentioned there were two reasons for our indifference. While the first is a by-product of our apocalyptic beliefs, the second results from the lack of a land ethic. An ethic is the set of norms that help us know what is right and wrong. The Golden Rule is an example of an ethic between individuals. We base our moral decisions on our ethical views.

“There is as yet no ethic dealing with man's relationship to land and to the animals and plants, which grow upon it”¹⁹ wrote Aldo Leopold in the final chapter of his short book *A Sand County Almanac and Sketches Here and There* (1949). Leopold suggested that we need to extend the boundaries of our ethics to include the water, plants, and animals—that is, collectively, the land. This may

sound obvious, but how many of us think it is a moral issue when we make decisions about our production of trash or consumption of resources? Is there anything morally wrong about purchasing fuel-inefficient vehicles or unnecessarily large houses if we have the financial resources to do so? E. O. Wilson put it this way: “So a very Faustian choice is upon us: whether to accept our corrosive and risky behavior as the unavoidable price of population and economic growth, or to take stock of ourselves and search for a new environmental ethic.”²⁰

So, what is the moral choice we should make as Adventists living in the Anthropocene? And what role do we have as educators? I think we need to use the land ethic along with our other ethics toward humanity and God to shape our behavior. This means that we will make decisions based on the well-being of not just ourselves (humans), but also all of creation—and not just for the present time, but also for future generations of all creatures. As educators, we are tasked with teaching that land ethic together with the ethics we already teach relating to God and humanity.

Addressing Complex and Global Environmental Problems

It is essential to avoid extremes. My 15 years in conservation work have taught me that it is important to meet people in the middle and be ready to compromise. We have to be realistic. For example, most people will agree that we should try to reduce our footprint by buying responsibly farmed and harvested meats, if meat is to be consumed. Asking everyone to stop using automobiles won't work. But surely, we can agree that we must try to reduce the consumption of fossil fuels and invest resources in public transportation and in research to develop technology that provides alternatives which rely on renewable resources. It is unrealistic to ban the use of all plastics, but we can all agree that we don't want a world with more

Sidebar 1. Additional Reading

Books

David Wallace-Wells, *The Uninhabitable Earth: Life After Warming* (New York: Tim Duggan, 2019).

Gary Fuller, *The Invisible Killer: The Rising Global Threat of Air Pollution—and How We Can Fight Back* (New York: Melville House, 2019).

Beth Gardiner, *Choked: Life and Breath in the Age of Air Pollution* (Chicago: University of Chicago Press, 2019).

Articles

Humberto Rasi, "What Does the Bible Teach About Our Relation to the Environment? Ten Key Concepts," *The Journal of Adventist Education* 76:1 (October/November 2013): 4-9. <http://circle.adventist.org/files/jae/en/jae201376010406.pdf>

The complete October/November 2013 issue of *The Journal of Adventist Education* (76:1).

Michael Murdoch, "Environmental Literacy of Seventh-day Adventist Teachers in the Parochial Schools of the Florida Conference of Seventh-day Adventists," *Journal of Applied Christian Leadership* 6:2 (Fall 2012): 69-87: <https://pdfs.semanticscholar.org/b397/6c8539cbcd8381feaf821780854cac23456a.pdf>.

plastic than fish in our oceans (which could happen by 2050!).²¹

The environmental problems we face are complex and global in nature and will require not just personal change, but also political and institutional modifications. The personal decisions are widely known (e.g., use of energy-efficient light bulbs, buying locally, moral consumption of resources, family planning, etc.), so I won't focus on those here. Institutional and political changes will require applying the land ethic when we select our leaders and holding them accountable when things are going well as well as when they fail. There is much to be said about those needed changes, but the focus of this essay is on Adventist education.

What Can We Do as Adventist Educators?

1. *Develop in our students a moral character that includes a land ethic.* As educators we play a substantial role in forming our students' ethical norms. Ellen G. White wrote: "True education imparts this wisdom. It teaches the best use not only of one but of all our powers and acquirements. Thus, it covers the whole circle of obligation—to ourselves, to the world, and to God."²² We must help our students move beyond nominal (basic) environmental literacy to operational (behavioral) environmental literacy by instilling in their hearts and mind a moral conviction about caring for our planet.

2. *Inform students about the current state of the planet.* It is important that they receive the most accurate and up-to-date scientific information concerning the state of our planet and how humans are affecting it (see Sidebar 1). If those resources are not readily available in the science materials provided by our church, demand them. Request that resources be allocated at the various levels (union, division, and General Conference) so that those resources can be developed by Adventist scientists who specialize

in related fields such as earth science, geology, conservation and population biology, ecology, climate science, etc.

3. *Model living sustainably and consuming resources responsibly.* Think about the resources you use at home and in your classroom. Avoid using single-use plastics, and recycle whenever possible. Consider the garbage your school produces every day. According to the United States Environmental Protection Agency, Americans produce an average of 4.5 pounds of waste per day.²³ How much of that ends up in a landfill or in the ocean, and how long will those waste items continue to exist after you dispose of them?

4. *Challenge your students to think about the future.* Create projects in your classes that explore the problems humans are facing and challenge your students to invent solutions. Schedule an annual environmental fair where students can present their projects and ideas for solving environmental problems. Teach children about civics and the importance of voting.

5. *Elect and support leaders who understand the importance of a land ethic.* As active citizens we must support those who understand the im-

portance of a land ethic, whether church or school administrators, or local town, state/province, or national leaders. As teachers we can voice our concern when decisions are made that go contrary to this ethic. We can support initiatives that guarantee future generations the aesthetic beauty and ecological benefits we now receive from the natural world and often take for granted.

Just as communities can create horrific destruction, they can also take actions for **good**. Notice that I have used moral terminology when describing human actions that affect our planet. As local school communities, we can be an example to the larger community. Imagine if the following were to take place in our schools:

- Universities and local schools provided free gardening plots to the communities in which they are situated as well as training on how to grow vegetables organically;
- Schools and institutions not only recycled their waste but also supported or even built recycling centers where the larger community could bring their plastic, aluminum, and paper wastes;

- Schools and universities strived to be carbon neutral and focused on using mostly sustainable resources;

- Planned new buildings and retrofitted old buildings were designed to meet external environmental certification like that granted by the non-government organization LEED (Leadership in Energy and Environmental Design);

- Schools, colleges, and universities pledged to use energy in smarter and more efficient ways, and invested in sustainable energy sources like solar and geothermal.

All of these initiatives fall nicely in line with the Seventh-day Adventist Church's official statement about the environment.

Can anything really be done to reverse our current trajectory? The cynical side of me says "No, it's too late." Human greed, corporate interests, those with wealth are too powerful, and many who hold decision-making power are short sighted. But I see the new generation marching around the world advocating for change and recognition of stark environmental realities facing our world.²⁴ I hear those young people advocate for something they believe in on moral grounds. They see the urgency of the situation and want to do something about it. They recognize that we already have financially viable, science-based solutions.

Environmental policies and grassroots action have improved many of the environmental problems, resulting in improved air²⁵ and water²⁶ as well as bringing species back from the brink of extinction.²⁷ Change is difficult, and many lack the will to do so; however, I believe this new generation has the courage to implement that change.²⁸

As Adventist educators, we need to empower our young people with sound knowledge about the topic and nurture their desire for change by encouraging them to follow a land ethic, rather than becoming an additional obstacle to progress. I believe that if we adopt a land ethic and ex-

tend our moral boundaries to embrace nature as a gift from God, we can find a balance between human needs and the natural world. Will it be easy? No. It will take sacrifice, and it will come at some cost to our current lifestyle. The word *compassion* literally means "to suffer with"; that is, the feeling that arises when one is confronted with another's **suffering** and feels motivated to relieve it.

Some things are gone forever. Past generations chose a world without northern white rhinoceros (*Ceratotherium simum cottoni*), Chinese river dolphins (*Lipotes vexillifer*), and golden toads (*Incilius periglenes*). We cannot change that now. Remember the Mitchell's satyr butterflies in the fen north of Berrien Springs? Well, the last surveys in the summer of 2018 indicated that they have become extinct in that fen, although other populations of that species may exist elsewhere, and the county's plans to finish the road have been reapproved and will commence in 2021.

Back in 1999, when I was a biology student at Andrews University, *Focus*, the alumni magazine, ran an article about our environmental challenges and how the university was wrestling with them.²⁹ In that article, Dr. Woodland (then a faculty member in the biology department) outlined many of the same problems shared in this article and provided a list of things that the school could do to solve them. While the then-president supported these recommendations and agreed that they fit well with our Adventist philosophical beliefs and the university's goals, concern was raised about the potential financial burden. Today, some 20 years later, and nearly half a century after the first Earth Day celebration at the university, the same issues persist, now more serious than before. Many of our schools face similar challenges. Our official church statement on the environment was issued almost 25

years ago, and we have not acted on it in any substantial way as a denomination to address the issue.

Now, travel with me in your mind 25, 50, 100 years into the future. If Jesus hasn't returned, what will be the conversation among our Seventh-day Adventist young people living in the Anthropocene as they read and reflect on our official environmental statement published in back in 1996 and the old articles in *Focus* in 1999 and this journal in 2013 and 2019? Will it be one of disappointment about our inability to value and preserve God's creation and ultimately our own contribution to an impoverished planet? Or, of encouragement in the realization that since that time we acted as a positive force to ensure a better planet for those that came afterward and led the way through our own sacrifices? The generation before us made their choice; now it is ours to make. ✍

This article has been peer reviewed.

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Recommended citation:

Daniel Gonzalez-Socoloske, "Why Nature Matters: Seventh-day Adventist Education in the Anthropocene," *The Journal of Adventist Education* 81:3 (July-September 2019): 28-34.

NOTES AND REFERENCES

1. In ecology, endemic species are those that are only found in one geographical location or region and nowhere else.

2. Ron Sender, Shai Fuchs, and Ron Milo, "Revised Estimates for the Number of Human and Bacterial Cells in the Body," *PLoS Biology* 14:8 (August 2016): e1002533. This ratio was long thought to be much higher—in the order of 10:1 bacteria to human cells, but has recently been revised to a ratio closer to 1:1. Either way, we share our bodies with a surprisingly large number of other organisms.

3. Edward Osborn Wilson, *Consilience: The Unity of Knowledge* (New York: Vintage, 1999), 277-278.

4. See review by Colin N. Waters et al., "The Anthropocene Is Functionally and Stratigraphically Distinct From the Holocene," *Science* 351:6269 (January 2016): aad2622-1-aad2622-10. Geologists divide geologic time periods into epochs; the Holocene began after the end of the last ice age about 10,000 ybp (conventional dating). The Anthropocene comes from the root word *Anthro* which means "human," so it literally means the "age of humans."

5. Simon L. Lewis and Mark Andrew Maslin, "Defining the Anthropocene," *Nature* 519:7542 (March 2015):171-180.

6. The United Nations predicts that by 2025 the world's population will increase by one billion to approximately eight billion people. See "World Population to Increase by One Billion by 2025" (2013):<https://www.unfpa.org/news/world-population-increase-one-billion-2025>.

7. The biosphere encompasses all of the abiotic and biotic components of Planet Earth. The terrestrial biosphere includes all the land, lakes, and rivers within the biosphere (excluding the oceans).

8. Eric Sanderson et al., "The Human Footprint and the Last of the Wild," *BioScience* 52:10 (October 2002): 891-904.

9. Jonathan A. Foley et al., "Global Consequences of Land Use," *Science* 309:5734 (July 2005): 570-574. Ecologists divide different types of terrestrial habitats into biomes primarily based on the regional climate (temperature and precipitation) and the community of plants.

10. Michael Williams, "Forests." In *The Earth as Transformed by Human Action: Global and Regional Changes in the Biosphere Over the Past 300 Years*. B. L. Turner II et al., eds. (Cambridge: Cambridge University Press, 1990), 179-201.

11. David A. Kroodsma et al., "Tracking the Global Footprint of Fisheries," *Science* 359:6378 (February 2018): 904-908.

12. Casper A. Hallmann et al., "More Than 75 Percent Decline Over 27 Years in Total Flying Insect Biomass in Protected Areas," *PLoS One* 12 (October 2017): e0185809.

13. Bradford C. Lister and Andres Garcia, "Climate-driven Declines in Arthropod Abundance Restructure a Rainforest Food Web," *Proceedings National Academy of Sciences* 115:44 (October 2018): E10397-E10406.

14. Secretariat of the Convention on Biological Diversity *Global Biodiversity Outlook* 3. Montreal (2010), 94 pages.

15. Megan Lamkin and Arnold I. Miller, "On the Challenge of Comparing Contemporary and Deep-Time Biological-Extinction Rates," *BioScience* 66:9 (September 2016): 785-789. <https://doi.org/10.1093/biosci/biw088>.

16. See for example, William K. Hayes and Floyd E. Hayes, "How Does Human Activity Affect Species Extinctions?" *The Journal of Adventist Education* 76:1 (October/November 2013): 23-29: <http://circle.adventist.org/files/jae/en/jae201376012307.pdf>.

17. Michael Murdoch, "Environmental Literacy of Seventh-day Adventist Teachers in the Parochial Schools of the Florida Conference of Seventh-day Adventists," *Journal of Applied Christian Leadership* 6:2 (2012): 69-87. Environmental literacy can be measured in three scales, **nominal** environmental literacy (basic understanding of terms), **functional** environmental literacy (broader knowledge and understanding of the interactions between human and natural systems), and **operational** environmental literacy (greater depth and breadth in understanding, where the person evaluates the impact and consequences of his or her actions). Murdoch found that Adventist teachers had at least nominal environmental literacy, which was comparable with the rest of the general population, but that did not correlate with positive behaviors and action regarding the environment.

18. Hosea 4:1-3. *New International Version* (NIV). Holy Bible, *New International Version*®, NIV® Copyright © 1973, 1978, 1984, 2011 by Biblica, Inc.® Used by permission. All rights reserved worldwide.

19. Aldo Leopold, *A Sand County Almanac and Sketches Here and There* (New York: Oxford University Press, Inc., 1949), 203:<http://www.umag.cl/facultades/williams/wp-content/uploads/2016/11/Leopold-1949ASandCountyAlmanac-complete.pdf>.

20. Wilson, *Consilience: The Unity of Knowledge*, 277, 278.

21. World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, "The New Plastics Economy—Rethinking the Future of Plastics" (2016): <https://ellenmacarthurfoundation.org/publications/the-new-plastics-economy-rethinking-the-future-of-plastics-catalysing-action>.

22. Ellen G. White, *Education* (Mountain View, Calif.: Pacific Press, 1903), 225 (italics supplied).

23. United States Environmental Protection Agency, "Advancing Sustainable Materials Management: 2015 Fact Sheet" (July 2018): https://www.epa.gov/sites/production/files/2018-07/documents/2015_smm_msw_factsheet_07242018_fnl_508_002.pdf.

24. On Friday March 15, 2019, an esti-

mated 1.5 million young people in more than 2,000 locations across 123 countries skipped classes and marched in a global school strike for climate change called #FridayForFuture. See Chad Frischmann, "The Young Minds Solving Climate Change," BBC Future (March 29, 2019): <http://www.bbc.com/future/story/20190327-the-young-minds-solving-climate-change>.

25. John Bachmann, David Calkins, and Margo Oge, "Cleaning the Air We Breathe: A Half Century of Progress," *EPA Alumni Association* (September 2017): 52: <https://www.epaalumni.org/hcp/air.pdf>. Prior to the Clean Air Act Amendments in 1970, major U.S. cities suffered from dense smog and acid rain, and the problem was getting worse. In the half-century since the law was enacted, a variety of programs have cut air pollution emissions by 70 percent while the economy has more than doubled. U.S. air quality has dramatically improved, providing significant benefits to the environment and human health.

26. David A. Keiser and Joseph S. Shapiro, "Consequences of the Clean Water Act and the Demand for Water Quality," *NBER Working Paper No. 23070* (January 2017), 48: <https://www.nber.org/papers/w23070.pdf>. Like the Clean Air Act, the Clean Water Act passed by the U.S. Congress in 1972 has dramatically improved the environmental state of watersheds and reduced pollution levels. It however still has a long way to go to meet the original goals of making all U.S. waters fishable and swimmable by 1983 and having zero water pollution discharge by 1985. Most American streams, lakes, and coastal areas still violate water quality standards.

27. Several species have recovered from the brink of extinction due to the enforcement of environmental laws and protection. The classic U.S. example is the bald eagle (*Haliaeetus leucocephalus*). See Wade L. Eakle et al., "Wintering Bald Eagle Count Trends in the Counterminous United States, 1986-2010," *Journal of Raptor Research* 49:3 (January 2015): 259-268.

28. The October/November 2013 issue of *The Journal of Adventist Education* (Volume 76, No. 1) featured several articles about environmental care and green schools. There are also many institutions that are making strides toward being more environmentally conscious; however, more can and should be done to raise awareness, protect the environment, and diminish waste.

29. Chris Carey, "It's Not Easy Being Green: Twenty-nine Years After the First Earth Day, Andrews Still Struggles to Address Environmental Issues on Campus," *Focus* 35 (Spring 1999): 10-14: <https://digitalcommons.andrews.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1034&context=focus>.