SEVENTH-DAY ADVENTIST FAITH AND ENVIRONMENTAL STEWARDSHIP

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In the last several decades, we have witnessed a global tsunami of growing concern for the natural environment. Although the environmental revolution has been embraced by a kaleidoscope of individuals representing virtually all socioeconomic classes, ethnic groups, nations, and religions, not all have jumped on the environmental bandwagon. Numerous studies reveal that individuals who identify themselves as political, social, and fiscal conservatives—including many among the evangelical bloc and so-called "Christian right"—are less concerned about environmental degradation than the general public (e.g., Guth et al. 1995, Schultz et al. 2000, McRight and Dunlap 2003, Allen et al. 2007, Sherkat and Ellison 2007, Konisky et al. 2008, Peterson and Liu 2008). Many—but certainly not all—conservatives perceive environmentalism as an ill-conceived threat to human freedom and prosperity.

The vast majority of Christians–including Seventh-day Adventists–are genuinely concerned about human welfare, yet many neglect to link the quality of human life to the quality of the natural environment. As a consequence, Christian views of the natural environment and biological diversity are as diverse as the cardinal points of the compass (for discussion of various perspectives, see Hall 1990, Land and Moore 1992, Oelschlaeger 1994, Van Dyke et al. 1996, Scharper 1998, Hessel and Ruether 2000, Bouma-Prediger 2001, Edwards and Worthing 2005, Berry 2006, Gottlieb 2006, Deane-Drummond 2008). In this chapter, we briefly summarize the diversity of Christian views about the environment, outline a Biblical mandate for environmental stewardship, and discuss distinct Adventist perspectives on the environment. We then explore environmental education, research, and opportunities for student involvement in Adventist educational institutions, and conclude that the knowledge and understanding of environmental issues should permeate all levels of church membership.

Christian Views of the Environment

Most Christians are moderate in their views of the environment, but there is a broad spectrum of perspectives (e.g., Guth et al. 1995, Shultz et al. 2000, Sherkat and Ellison 2007, Peterson and Liu 2008). At one extreme, some Christians view environmentalists and conservationists with suspicion—as radical, left-wing wackos who conspire to achieve political control of our hearts, minds, and bank accounts. In an effort to distance themselves from environmental extremists, such Christians may appear indifferent or even hostile toward environmental stewardship.

Many Christians believe that God bequeathed us with an unlimited cornucopia of natural goods for our personal consumption and pleasure, and that limiting or denying access to such God-given blessings is a transgression of God's will for individual freedom. Those who embrace this materialistic perspective overlook the limited rate of renewal of natural resources and services imposed by natural processes, the currently unsustainable exploitation of natural resources for economic gain, and the fact that these blessings were not bestowed equally and fairly among all humans. Furthermore, materialism can become a form of idolatry.

Still others believe that no environmental problem exists which cannot be resolved by nature itself or, as a means of last resort, by human ingenuity and technology. However, Christians who cling to this assumption appear oblivious to the plight of those living in extreme poverty in regions where environmental degradation is already severe and the technology required to reverse it is lacking or unaffordable (e.g., Haiti; International Crisis Group 2009). Blind faith in technology can also become a form of idolatry.

Many Christians despise the Earth as a hostile, evil world that is merely a temporary home which they are passing through and will soon escape from. This otherworldly view of future life fosters an attitude of apocalyptic apathy: because the Earth and everything on it will be destroyed when Jesus

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comes, why waste precious time and money trying to clean up or preserve what will be destroyed anyway? Nevertheless, such Christians continue to take care of their personal homes, vehicles, and other possessions, including their own bodies, all of which will also be destroyed.

Some Christians acknowledge that we should be concerned about the environment and biological diversity, but insist that the problems are exaggerated by scientists seeking more funding for their research and by environmentalists aspiring for political power. Suspicion of science is especially prevalent among Christians who struggle to reconcile the conflict between scripture and science when it comes to the origin of life on the planet and the application of biotechnology (Ellison and Musick 1995, Morgan and Sternke 2007).

Finally, the other extreme of Christian environmental ideology includes those who sincerely believe that God not only demands that we care for His creation but also condemns those who wantonly destroy it. Such Christians may appear to be more concerned about the environment than about human welfare and rights. Environmental extremists, including some Christians, may do their cause more harm than good by repulsing those they seek to reach.

In one sense all Christians are environmentalists, at least when it comes to their personal environment. The staunchest environmental critics aspire to breathe clean air, drink pure water, eat uncontaminated food, and remove sewage and garbage from their homes. Indeed, participation in religion often promotes private environmental actions but tends to negatively impact political environmental activism (Sherkat and Ellison 2007; c.f. Shultz et al. 2000).

So how should Christians view the environment? In 1967, a provocative and widely cited essay, published in the prestigious journal *Science* by medieval historian Lynn White, blamed the triumph of Christianity as the root cause of the modern ecological crisis (White 1967). "By destroying pagan animism," White observed, "Christianity made it possible to exploit nature in a mood of indifference to the feelings of natural objects" (p. 1205). He concluded that "we shall continue to have a worsening ecologic crisis until we reject the Christian axiom that nature has no reason for existence save to serve man" (p. 1207). White's essay kindled introspection among Christian scholars, who subsequently scrutinized the scriptures to reevaluate how Christians should relate to the environment. A new field of scholarship emerged from this study, now known as ecological theology or ecotheology (Santmire 1970).

Despite this disparity of views among Christian believers, a strong consensus emerged among ecotheologians that the Bible unequivocally mandates responsible environmental stewardship. Today, a growing number of Christians believe that we should be concerned about the access of *all* humans—not just ourselves and our closest kin, friends or neighbors—to clean air, pure water, and uncontaminated food, and that we must proactively care for and preserve *all* of God's creation, both the living and non-living components, not just for the benefit of humanity but because God cares for *all* of His creation and expects us to care as well. Christians who espouse this moderate but sincere view will more likely win converts to their cause than those who promote extreme views.

Biblical Mandate for Environmental Stewardship

So what does the Bible teach about environmental stewardship? The Bible clearly teaches that God is the designer and creator of complex life forms as well as the chemical and physical environments required to sustain life (Genesis 1 and 2, John 1:1-3, Colossians 1:16). In stark contrast with pantheistic pagan religions, which revere both inanimate and animate objects in nature as sacred, the Bible boldly declares that the Earth and everything on it is not God but instead *belongs* to God, who is ruler of His creation (Psalm 24:1, 1 Corinthians 10:26). The biogeochemical homeostasis of our planet provides evidence of God's intention for the Earth "to be inhabited" (Isaiah 45:18).

Although some Christians agree with White's (1967) "Christian axiom" that "nature has no reason for existence save to serve man," this view is not scriptural. God repeatedly pronounced as "good" his creative acts *before* humans were created (Genesis 1:4, 10, 12, 18, 21, 25, 31). Thus, every aspect of creation, both the living and non-living, was bestowed with *intrinsic* value—the value of something independent of its value to anything else—rather than mere *utilitarian* value—the value something has as a means to another's ends, in this case for the benefit of humans (e.g., Cobb 1988). Psalms 104 eloquently praises the intrinsic value of some forms of biodiversity apart from human presence, including cedars, pines, storks, mountain goats, rock badgers, and lions, as well as the resources essential to sustain them. God's creation was never intended to be exploited or destroyed merely to satisfy human desires.

In the creation account, God gave man "dominion" (KJV) or permission to "rule" (NIV) over all living things as well as permission to "subdue" the Earth (Genesis 1:26, 28). Was this "dominion" a license to kill or a mandate for stewardship? Although the belief by many Christians in a God-given right to dominate all other forms of life deserves some blame for the destruction of biodiversity (e.g., White 1967, Passmore 1974, Orr 2005; see excellent reviews in Berry 2006), the "dominion" was given before sin entered the planet (Genesis 3), before skins were needed for clothing (Genesis 3:21), and long before humans were allowed to kill animals for food (Genesis 9:3). The Hebrew word for "dominion," *radah*, invokes the dominating rule of a king, but God associated royal rulership with benevolence toward the weak and needy (Psalm 72:8-14) and specifically prohibited rulers from accumulating horses, wives, silver or gold (Deuteronomy 17:16-17). "Dominion" thus contrasts sharply with the indifference and exploitation—explicitly condemned in Ezekiel 34:2-4—that secular critics often ascribe to this term. Jesus described the ideal ruler: "whoever wants to become great among you must be your servant, and whoever wants to be first must be your slave" (Matthew 20:26-27, NIV). Therefore "dominion" was clearly a mandate for responsible stewardship.

After being placed in the Garden of Eden, Adam was mandated "to dress it and keep it" (KJV) or "to work it and take care of it" (NIV; Genesis 2:15), revealing God's intention for us to maintain and protect His creation. This instruction further clarifies the meaning of "dominion" in Genesis 1:28. The word "dress" (Hebrew *abad*) means "to work or serve," and the word "keep" (Hebrew *shamar*) means "to exercise great care over." To avoid the degradation of productive farm land from overuse, God instructed that the land be allowed to lie fallow every seventh year (Leviticus 25:2-7). Often, God found it necessary to remind the Hebrews of this mandate: "The land is mine and you are but aliens and my tenants. Throughout the country that you hold as a possession, you must provide for the redemption of the land" (Leviticus 25:23-24 NIV; see also Ezekiel 34:17-18 and Jeremiah 2:7).

The sacred scriptures repeatedly remind us of our moral obligation to treat animals humanely by providing them with sufficient rest and food (e.g., Exodus 23:5, 12; Deuteronomy 25:4), rescuing them from harm (Matthew 12:11), and never torturing them (Numbers 22:23-33). Although some environmentally-indifferent Christians loathe the United States Endangered Species Act, the first such act, ironically, was the command for Noah to bring with him living creatures into the ark, "to keep them alive with you" (Genesis 6:19 NIV). Indeed, God provides for the needs of all creatures, not just humans (e.g., Job 38:19-41; Psalms 36:6, 104:27-28, 147:9; Jonah 4:11; Matthew 6:26). Should we be any less benevolent?

In Revelation, environmental disasters of an unprecedented magnitude are portended by the seven plagues predicted to occur just before Jesus returns (Revelation 16): (1) "ugly and painful sores" (NIV); (2) the sea and (3) rivers becoming blood; (4) the sun scorching men with fire; (5) darkness upon the seat of the beast; (6) the great Euphrates River drying up; and (7) thunder, lightning, and hail, plus an earthquake. We can only speculate what the plagues refer to, but we are unequivocally informed that God will be "destroying those who destroy the earth" (Revelation 11:18 NIV).

Rightfully understood, the teachings of the Bible cannot be blamed as the root cause of modern environmental problems. Although Christendom (a society), rather than Christianity (a religion), certainly deserves its share of blame, those who persist in blaming Christians should contemplate the environmental degradation that occurred in communist and other non-Christian countries. As examples of the latter, the long-term scars resulting from deforestation, overgrazing, erosion, and overhunting in ancient civilizations that viewed nature as sacred can still be observed in modern landscapes in regions as diverse as India and China (e.g., Tuan 1970, Novak 1993), New Mexico, Central America, and many Pacific islands (e.g., Diamond 1994). The Bible identifies the root cause of environmental degradation as sin–transgressing the moral and natural laws of God (Isaiah 24:5; Hosea 4:1-3)—which all humans manifest (Romans 3:23), as greed, pride, carelessness, and ignorance (Wright 1970).

Among God's created subjects on this planet, will humans alone be redeemed? Most Christians believe that only humans who "believe" are promised eternal life (John 3:16), but various ecotheologians have proffered Biblical evidence that Jesus died to save the "world"—not just humans—from the effects of sin and suffering (e.g., John 3:16, 17). In this view, our entire planet will one day be redeemed through cleansing (2 Peter 3:10) and restoration (e.g., Isaiah 11:1-9, 65:17-23; Ezekiel 36:33-35; Romans 8:19-23; Revelation 21:1, 5) rather than destruction, and sin will ultimately be banished from the universe (Nahum 1:9; Revelation 21:4).

Today many environmental and conservation organizations are dedicated to preserve natural resources. Most of these organizations were founded and remain governed by non-religious people who care deeply about nature and human needs, although they include Christians and people of other faiths as members. Unfortunately, many Christians have essentially abandoned the care of God's creation to those who deny the Creator–despite the divine mandate for stewardship of our planet's resources.

Although White (1967) unfairly blamed Christianity for environmental problems, he conceded that "the remedy must also be essentially religious." Christianity and other faiths may play a crucial role in engaging environmental problems, for two reasons. First, nearly 90% of the world's 6.8 billion people are religious adherents; thus, the weight of the faith community can tip the scales in support of proenvironment programs. Secular organizations increasingly recognize this, and have initiated outreach programs aimed at identifying common ground and building cooperation between science and religion (e.g., Awoyemi 2008, Peterson and Liu 2008, Dudley et al. 2009, Woodhams 2009). Second, virtually all credible ideas for addressing environmental problems require some sacrifice (Hardin 1968), and religion is the most potent force that can effectively call followers to sacrifice for the common good. Although sociobiologists have demonstrated sustainable benefits for cooperative behavior, including altruism (the loss of one's own benefits for the sake of another individual), "cheaters" within a cooperative system can benefit in ways that destabilize the system (Gächter and Herrmann 2009). Religious values may reinforce the need for self-sacrifice that evolutionary theory, from a selfish gene or individual perspective, denies.

Distinct Seventh-day Adventist Perspectives on the Environment

The Seventh-day Adventist Church does not endorse any unique position on environmental stewardship, but our theological views offer some distinctive perspectives. The Adventist commitment to observe the fourth commandment—to remember the Sabbath day, keep it holy, and refrain from work (Exodus 20:8-11)—perpetually reminds us of God's creation and our moral obligation to care for it. During the Sabbath, many Adventists enjoy exploring the outdoors and learning about God's creation, thus nurturing an intimate relationship with the Creator and other created beings. The widespread degradation of the environment readily visible when exploring the outdoors is a sad reminder of the consequences of disobeying God's moral and natural laws. Adventists believe that sin will ultimately be banished from the universe (Nahum 1:9; Revelation 21:4) and that the planet will one day be restored to its original perfection (Revelation 21:1).

Adventists regard the human body as "a temple of the Holy Spirit" (1 Corinthians 6:19 NIV) and strive to balance the physical, mental, and spiritual aspects of human nature through conformity with God's moral and natural laws. The prolific writings of Ellen White encouraged Adventists to live simply in the rural countryside (White 1946), to develop the mind, character, and personality through education (White 1903, 1977), and to live a healthy lifestyle (White 1905, 1938). Many Adventists aspire to live the ideal Adventist lifestyle in a rural area, breathing fresh air, engaging frequently in vigorous exercise, consuming a balanced diet of natural foods, drinking wholesome beverages, and worshipping both individually and corporately.

Living the ideal Adventist lifestyle reduces an individual's ecological footprint. To give an example, many Adventists are vegetarians, a lifestyle choice that contributes to their greater longevity compared with the general population (Fraser 2003). Significantly, vegetarianism also benefits the environment. A recent study by Loma Linda University researchers calculated that, for the combined differential production of 11 food items for which consumption differed between Seventh-day Adventist vegetarians and nonvegetarians in California, the nonvegetarian diet required 2.9 times more water, 2.5 times more primary energy, 13 times more fertilizer, and 1.4 times more pesticides than did the vegetarian diet (Marlow et al. 2009).

The Adventist church has issued several declarations about the need to exercise environmental stewardship. These official statements were approved by vote in 1992, 1995, and 1996 (see Appendix 1). The first statement emphasized Adventist beliefs in a Creator God, the Sabbath as a memorial of God's creative act, and the environmental degradation that resulted from breaking the original order of creation. Recognizing the interrelatedness of environmental degradation and quality of life, church leaders called for sustainable development of resources while meeting human needs.

The second statement acknowledged the megalomaniacal destruction of Earth's resources, largely due to human selfishness and the egocentric overutilization of resources, and recognized that our failure to rule the natural environment in a faithful and fruitful way has led to widespread human suffering. Adventists were urged to lead a simple, wholesome lifestyle, showing respect for creation and exercising restraint in the use of the world's resources. The third statement, which emerged during an Annual Council session held in Costa Rica, emphasized the same points as the second statement and commended the government and people of Costa Rica for their support of a comprehensive policy of sustainable development in harmony with nature.

In 2008, Jan Paulsen, at that time the General Conference President, issued an informal but clear mandate for increased discourse on environmental stewardship (Paulsen 2008). He reminded us that the dominion God extended to humanity was an act of trust, a special responsibility to administer wisely the resources He has generously bestowed upon us.

Although Adventist leadership has voiced clear concern for environmental stewardship, no institution, department, or appointed leader has been tasked with meeting this important need. In August 2009, the Loma Linda University board approved the creation of a new Center for Biodiversity and Conservation Studies in an effort to fill this void, as described in a subsequent section. However, from an organizational perspective, environmental initiatives may be difficult to implement without a strong consensus from stakeholders, as demonstrated by the proposed Angwin Ecovillage on the campus of Pacific Union College (see Box).

Seventh-day Adventist Environmental Education

The Bible clearly portrays our need to study and learn from nature. "But ask the animals, and they will teach you, or the birds of the air, and they will tell you; or speak to the earth, and it will teach you, or let the fish of the sea inform you" (Job 12:7-8 NIV). Object lessons from nature abound in holy writ, and Jesus himself made frequent reference to these. Ellen White likewise emphasized the importance of nature study. "God has surrounded us with nature's beautiful scenery to attract and interest the mind. It is His design that we should associate the glories of nature with His character. If we faithfully study the book of nature, we shall find it a fruitful source for contemplating the infinite love and power of God." (White 1952, p. 144). "Tell your children about the miracle-working power of God. As they study the great lesson book of nature, God will impress their minds" (White 1954, p. 57). "God's great book of nature is open for us to study, and from it we are to gain more exalted ideas of His greatness and unexcelled love and glory" (White 1958, p. 26).

Environmental education occurs at some level in virtually all Adventist institutions of learning, where nature, God's "second book," has traditionally been upheld. Some efforts by elementary and secondary schools, as well as local churches, have had a major impact on local communities. To cite a stellar example, Lomino (1999) described a project with 7th and 8th grade students who studied the ecology of Wolftever Creek, a notoriously polluted stream flowing through Collegedale, Tennessee. The students developed a museum, produced publications and a video, formed a legal non-profit corporation, raised funds, and successfully lobbied the local government to help restore the creek and protect it from further degradation.

Drawing from our own childhood, we enthusiastically advocate the approach our parents used in nurturing our interest in nature. As a family, we enjoyed frequent outdoor picnics, nature hikes, and visits to nature centers, zoos, and museums, especially on Sabbath afternoons. We also enjoyed camping on a regular basis. Our growing fascination with nature sheltered us during our teenage years from the many temptations associated with peer pressure. Rather than hanging out with peers of sometimes questionable influence, we were more content to wander the forest behind our home in search of frogs and snakes, and climbing onto the roof of our home to watch migrating birds. Our parents tolerated a small menagerie of amphibians and reptiles (the covertly acquired venomous snakes were another matter). Our local church provided occasional nature-oriented programs, particularly through the Pathfinder clubs that we participated in.

Those aspiring to become environmental scientists will need to make important decisions about their career while in college. Choosing a suitable major is an important step. Traditional science majors such as biology, chemistry, and geology generally provide a good launching pad for environmental careers. An environmental science or environmental studies major is more interdisciplinary in scope but

typically provides less training in the hard sciences. (Contrary to some perceptions, an environmental science degree is perfectly suitable for pre-medicine students, so long as the required basic science courses are also taken.) Although the job market for environmental scientists continues to expand, earning a graduate degree will certainly make one more competitive for the more desired and higher-paying jobs.

Most Adventist colleges and universities offer an introductory course on the environment. However, only a few North American institutions offer undergraduate degrees in environmental science or environmental studies. These include Canadian University College, Loma Linda University, Pacific Union College (Fig. 1), and Walla Walla University.

Post-baccalaureate students who wish to continue their environmental education in a Seventh-day Adventist university in North America can obtain relevant graduate degrees at three tertiary institutions. Andrews University and Walla Walla University offer M.S. degrees in biology that provide environmental coursework and have several faculty actively investigating environmental issues with graduate and undergraduate students. Loma Linda University (LLU) provides both M. S. and Ph. D degrees in biology and geology, both of which offer strong emphases on the environment.

Another program at LLU, the Department of Environmental and Occupational Health in the School of Public Health, takes a human-focused approach to environmental issues. The protection of the human environment from natural and man-made hazardous conditions is a major issue that affects the health and welfare of people throughout the world. This program offers several master's degrees that prepare students for careers such as environmental health specialists, industrial hygienists, and geographic information system specialists.

Students seeking careers in environmental science should consider non-traditional approaches to their education that broaden their training. Conventional undergraduate degrees in the sciences provide a strong background, but these programs commonly lack training in the human sciences. Graduate programs also tend to be relatively narrow, primarily emphasizing the development of technical skills associated with research. As the workforce has become increasingly interdisciplinary, global, and collaborative, professional environmental scientists must often rely on a diverse set of skills that includes problem-solving and evaluation, teamwork, conflict resolution and negotiation, planning, communication, organization, management, and leadership (Pérez 2005, Kroll 2007). Other valuable knowledge and skills include public speaking and communication, environmental law and ethics, policy analysis, marketing and social psychology, and economics and fundraising (Pérez 2005). Students should consider coursework in the social sciences that addresses these skills (Fisher et al. 2009).

Although theory is important, training in environmental science must also include practical experiences. Environmental scientists need to develop problem-solving skills and apply them in real-world situations (Kainer et al. 2006). Further, students should be exposed as much as possible to outdoor inquiry-based learning, which inspires fascination and respect for the environment, and fosters the development of naturalistic intelligence (Hayes 2009). Learning can also begin early; for example, students given an opportunity to participate in original scientific research while in high school are more likely to enter a career in science (Roberts and Wassersug 2009). (If your professors fail to include a significant field or other practical component in relevant courses, give them a firm but gentle nudge in the right direction!)

Seventh-day Adventist Environmental Research

Many Christians, including Seventh-day Adventists, tend to disparage studies of obscure microorganisms, plants, animals, and ecosystems that have no obvious relevance to human health. However, many examples demonstrate the importance of learning about our planet's fellow inhabitants. One can seldom predict how significant a seemingly trivial discovery may become!

As one example, basic research into *Thermus aquaticus*, an obscure, thermophilic bacterium that thrives in the hot springs of Yellowstone National Park, ushered in a new era in molecular biology and modern medicine. An enzyme isolated from this organism, relied on today for amplifying tiny bits of DNA, became *Science* magazine's first "Molecule of the Year" in 1989, and netted Dr. Kary Mullis a Nobel Prize in 1993 for refining the amplification process that is a cornerstone of modern molecular biology. Unfortunately, the original discovery of the thermophilic bacterium by Thomas Brock, an Indiana University professor, and his graduate student, Hudson Freeze, is seldom recognized (Brock and

Freeze 1969). Where would we be today if someone had not conducted the basic exploratory studies of this non-descript bacterium?

As another example, our planet is rapidly being transformed by the microbes, plants, and animals that we have transplanted from one place to another, sometimes deliberately and other times unwittingly. Introduced fungi and insects wipe out our forests and devastate our crops. Introduced viruses (e.g., West Nile) kill reptiles, birds, and even humans in places where the diseases they inflict never existed before. Introduced freshwater molluscs damage boats, harbors, dams, water treatment plants, and power plants. Introduced mosquitoes, snakes, rodents, and cats have exterminated entire populations of lizards and birds on islands. The consequences of invasive species are staggering, not only for ecosystems but also to commerce. In the United States alone, invasive species inflict damage and control costs that exceed US \$138 billion annually (Pimentel et al. 2005). Could much of this have been prevented or more quickly ameliorated by basic research? Absolutely.

In reality, when we care for the fragile ecosystems around us, we truly are taking care of ourselves. The bewildering complexity and interconnectedness of even the simplest ecosystems render them highly vulnerable to disturbance. Even mild disruption of natural processes can lead to eventual ecosystem collapse. Most of us take for granted the abundant ecosystem services that we daily depend upon. These include provision of food and water; pollination of native and agricultural plants; cycling of nutrients; moderation of extreme weather, including flood and drought mitigation; protection against erosion; regulation of plant pest and human disease organisms; decomposition and detoxification of wastes; purification of air and water; and maintenance of biodiversity. These services, provided to us for free, have been valued globally at US \$33 trillion per annum, which at the time of the study exceeded the entire human exchange economy (Costanza et al. 1997). Without these services, which we are rapidly degrading and which cannot be readily replaced, our quality of life would be fundamentally diminished.

Clearly, given the Biblical and even a recent denominational mandate, we must be active participants in the stewardship of our planet. We should be in the forefront of the cause, committed to learning more about and helping to save our planet's cohabitants and the ecosystems they require.

And now to let you in on what may be a surprise: many Adventist scientists are indeed engaged in this endeavor (Fig. 2). Much of the science relating to the environment that is conducted by Adventist scholars remains unknown to most church members, a situation we would like to change. The most visible environmental research in the church takes place at its North American tertiary campuses. Many of the faculty who publish relevant research in professional journals are listed in Table 1 (updated as of July 2010); visit their individual or departmental websites to learn about their specific work. Other church members, scattered among secular universities and at government and non-government agencies, similarly enjoy productive research careers.

Individual faculty at a handful of Adventist undergraduate institutions maintain active research programs in spite of their heavy teaching loads. Several of these individuals are quite productive, studying endangered birds, for example, in the South American tropics, describing new reptile and amphibian species in Malaysia, or examining plant-ungulate interactions in Canada. Some have even served as the editor of a peer-reviewed scientific journal.

Environmental research also takes place at the universities with graduate programs. Botanists active in research are scarce in the denomination, but Andrews University has several individuals who examine plant communities and weed control. Thanks largely to a marine station operated by Walla Walla University and a consortium of Adventists institutions, marine biology is a strength in Adventist higher education. Several of the Walla Walla biologists work with marine invertebrates, examining their ecological physiology. Another group, involving collaboration between researchers at both Andrews University and Walla University, has focused on seabird biology, netting sizeable research grants and numerous publications.

Recognizing the importance of environmental health to its mission, "to make man whole," Loma Linda University has made strides toward non-human environmental studies. The faculty and students of the Department of Earth and Biological Sciences examine a broad range of topics including the behavior, ecology, conservation, ecophysiology, and systematics of various invertebrates, reptiles, birds, and mammals. Many of these studies have focused on endangered species of sea turtles, iguanas, birds, and manatees in developing countries such as the Bahamas, Honduras, and Mexico. Their research even examines the biodiversity of ancient environments, which yields a better understanding of how different

today's world is from that of the past. The paleobiology studies frequently involve collaborating faculty from other SDA universities, including Andrews University and Southwestern Adventist University.

In August 2009, Loma Linda University established a new Center for Biodiversity and Conservation Studies. Housed within the School of Science and Technology and operated by the Department of Earth and Biological Sciences, the Center has been established to promote environmental awareness and foster a deeper sense of stewardship among Christians and other faith groups through research, scholarly dialog, and public education.

The environmental arena can bring together two, often-polarized enterprises—science and religion—for a common good. As pointed out by Harvard biologist Edward O. Wilson, "Science and religion are two of the most potent forces on Earth and they should come together to save the Creation" (Cromie 2006). Some perceive that Adventist biologists and geologists face religious bias, and therefore are unable to publish in legitimate scientific venues. Fortunately, there is no truth in this, as faculty and students at our Adventist colleges and universities have an excellent track record for their contributions to science. This should be no surprise; a large minority of North American university professors is religious, including nearly 40% of biologists and psychologists—the disciplines with the highest proportion of professed atheists or agnostics (Gross and Simmons 2009). By participating in research, students at our institutions gain hands-on experience with cutting edge technology, develop critical thinking and communication skills, and greatly enrich their learning experience.

Opportunities for Student Involvement

Students should realize that environmental problems are not caused by society, but instead are caused by individuals; as a consequence, resolving environmental problems must begin with the individual (Ness 1991). Student opportunities for involvement abound. Students who engage environmental issues can profoundly influence the attitudes of their family, peers, academic institution, local churches, and, ultimately, their denomination. Here, we suggest specific activities that can be implemented on a high school, college, or university campus. Many of these may require a faculty or department sponsor. Most important, we encourage students to avoid politicizing environmental issues, which tends to be divisive, and focus instead on issues of common concern.

- Organize or participate in an environmental club. Strength accrues with numbers. If one or more such clubs already exist (e.g., with the biology department), consider an alternative club and theme that appeals to a different interest group (e.g., Musicians for the Environment). If possible, organize a speaker program for club members or for the campus at large. The SEEDS program at Oakwood University (http://www.oakwood.edu/seeds/index.html) serves as an excellent model for the diverse range of activities it sponsors.
- Organize or participate in a recycling program. These programs tend to be highly visible and can potentially generate income. Special collection bins with an attractive appearance, including a catchy slogan or logo, will draw further attention to your cause. Permission will be needed to distribute these bins. If your campus already has a program in place, consider ways to improve it. Local businesses or communities may also benefit from a more visible recycling program, so consider extending your program to the off-campus community.
- Write for your school or community paper. You can highlight local issues or the activities of specific individuals, or simply share general concepts or experiences.
- Work with a faculty sponsor to design and conduct an environmental study for your senior or honors research. Projects may range from ecological studies to surveys of student attitudes and, when well-done, may result in publication in a professional journal (e.g., Shultz et al. 2000, Peterson and Liu 2008).
- Request that occasional worships and sermons focus on environmental issues. Consider oncampus speakers (e.g., from the biology department), off-campus authorities, fellow students, or volunteer yourself. You can supply relevant information to potential speakers, including your campus chaplain or local church pastor.
- Organize or participate in a community project that draws attention to environmental issues. Examples include cleanup, planting trees, carpooling, building a nature trail, plant or animal surveys, a fund-raising project for a specific program, and a recycling drive. Be creative in generating ideas.

Although higher-profile projects may draw more attention to your cause, mere participation will be meaningful to those who help out.

- Participate in programs that educate the public about environmental issues. Consider arranging or giving a talk to an elementary or high school classroom, a special church group, a local business group, a local nature organization, a retirement community clubhouse, or even an Indian reservation. Remember: illustrated talks always work better!
- Volunteer to work at or seek an internship with an environmental group. ADRA (Adventist Disaster and Relief Agency) engages environmental issues to some extent, and many opportunities exist in the broader community. The internet is a good place to search for opportunities. If you are clever, you just might find yourself in an exotic location, gaining valuable experience during what may seem like a dream vacation!
- Reduce your personal ecological footprint at home, at work, and at play. Think in terms of energy consumption (e.g., lighting; clothes dryer, television, and other appliance use; room temperature control; food preparation), water usage (e.g., shower use, lawn watering, dishwashing, car washing), material consumption (e.g., buying used furniture and vehicles, reusing shopping bags, avoiding drinks in plastic bottles), transportation (e.g., walking, biking, or carpooling when possible), and waste disposal (e.g., reduce, reuse, recycle).

Conclusions

Let's summarize. Christianity is often blamed, unfairly, as the primary cause of environmental degradation, but careful scholarship demonstrates a clear biblical call for environmental stewardship. In practice, Christians express a wide range of attitudes towards environmental concerns, with many conservative Christians suspicious of environmentalism. Influenced by Ellen White's writings, Adventists have historically emphasized the study of nature, God's "second book." However, in spite of official statements released by the church endorsing a simple lifestyle, sustainable development, and environmental sensitivity, many Seventh-day Adventists remain skeptical of environmental concerns.

Fortunately, many educators within the church have sought to increase both discourse and action. Our colleges and universities, in particular, have provided leadership that may galvanize change. We advocate increased curricular emphasis on environmental issues and, when possible, active research programs involving students—our future thought leaders. We should strive to become the most fervent environmental leaders. Our hope is that a new generation of environmentally-sensitive Adventists will energize the church and usher in an exciting new era of environmental consciousness, stewardship, and witness.

Acknowledgments

This paper is dedicated to the memory of Jimmy Ha, an Assistant Professor of Religion and budding ecotheologian at Pacific Union College whose light flickered out much too soon—yet continues to shine in the lives of those whom he illuminated.

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Table 1. Faculty at North American Seventh-day Adventist colleges and universities who are engaged in environmental research and publish in peer-reviewed scientific journals and volumes.

Andrews University (Michigan, USA)

H. Thomas Goodwin – ancient environments (fossil vertebrates)

James L. Hayward – animal behavior and ecology, ancient environments (birds, fossil vertebrates)

Shandelle M. Henson – animal behavior and ecology (terrestrial invertebrates, birds)

Dennis W. Woodland – plant systematics, biodiversity, biogeography

Robert Zdor – plant physiological ecology (terrestrial plants)

Canadian University College (Alberta, Canada)

Noble T. Donkor – plant and animal ecology (terrestrial plants, mammals)

Florida Hospital College of Health Sciences (Florida, USA)

J. Russell Butler – animal ecology (birds)

La Sierra University (California, USA)

L. Lee Grismer – animal ecology, systematics (amphibians, reptiles)

Shereen Sabet – environmental microbiology (bacteria, viruses)

Lloyd A. Trueblood – animal physiological ecology (marine invertebrates)

Loma Linda University (California, USA)

Leonard R. Brand – ancient environments (fossil vertebrates)

H. Paul Buchheim – ancient environments (fossil invertebrates and vertebrates)

Ronald L. Carter – animal behavior and ecology, conservation, systematics (reptiles)

Stephen G. Dunbar – marine biology, ecological physiology (marine invertebrates, marine vertebrates)

David T. Dyjack – environmental health (humans)

Ricardo Escobar – animal behavior and ecology, conservation (reptiles)

Raul Esperante – ancient environments (fossil vertebrates)

William K. Hayes – animal behavior and ecology, conservation, systematics (arthropods, reptiles, birds)

V. Leroy Leggitt – ancient environments (fossil invertebrates and vertebrates)

Harold J. Marlow – environmental health (humans)

Kevin E. Nick – ancient environments (fossil vertebrates)

Joan Sabate' – environmental health (humans)

Samuel Soret – environmental health (humans)

Padma P. Uppala – environmental health (humans)

Pacific Union College (California, USA)

Floyd E. Hayes – animal behavior and ecology, conservation, systematics (marine invertebrates, birds)

Southern Adventist University (Tennessee, USA)

Benjamin J. Thornton – environmental toxicology (terrestrial invertebrates)

Neville A. Trimm – animal behavior and ecology (birds)

Southwestern Adventist University (Texas, USA)

Arthur V. Chadwick – ancient environments

Union College (Nebraska, USA)

Amy C. Utt – animal behavior and ecology, conservation (birds)

Walla Walla University (Washington, USA)

David L. Cowles – marine biology and ecological physiology (marine invertebrates)

Robert A. Cushman, Jr. – ancient environments (plants and pollen)

Joseph G. Galusha – animal behavior and sociobiology (birds)

James R. Nestler – animal physiology (marine invertebrates, birds, rodents)

BOX: ADVENTIST SUSTAINABLE COMMUNITIES?

Throughout the world Adventist communities have developed around Adventist institutions of education or health care. Following the counsel of Ellen White, most were initially established in rural areas, but some were subsequently overrun with urban sprawl. In recent decades urban planners have strived to develop sustainable communities, which aspire to satisfy the basic needs of humans without degrading or depleting natural resources. Because Adventist communities are often located in rural areas and as a consequence are relatively self-sustaining, such communities are ideal for implementing modern designs for sustainable communities.

Perched atop a ridge above California's verdant Napa Valley, Pacific Union College (PUC) is in a unique position to establish itself as a sustainable community. More than half a century ago (1959), PUC launched its own wastewater treatment plant. More than a decade ago PUC opened its own recycling center, which reduced the cost of disposing its garbage in the nearby landfill. In 2006, PUC established its own cogeneration plant, which substantially reduced its costs for purchasing electricity and generating steam. And in 2007, PUC and Triad (a developer) filed an application with the County of Napa for developing the Angwin Ecovillage on the college campus.

The Angwin Ecovillage proposed constructing 275 new housing units and a 105-unit retirement/assisted living center, all compactly clustered on 30.1 acres of PUC's campus, which represent less than 2% of PUC's 1,900 acres. Plans for the ecovillage incorporated state-of-the-art technology for energy efficiency, including photovoltaic panels, solar water heaters, geothermal heat pumps, and buildings designed with passive lighting and shading. Water conservation plans included the capture of rainwater and reclamation of wastewater for irrigation. Plans for reducing vehicular use included cash incentives to residents for not parking vehicles, a shuttle bus, shared bicycles, shared electric vehicles, and a transportation resource center which would coordinate transportation options for residents. An agricultural conservancy would be organized to cultivate 50 acres of locally grown, certified organic fruits and vegetables.

Despite the popularity of new ecovillages budding across the country, the Angwin Ecovillage may never materialize due to the prevailing anti-growth political environment of Napa County and the current economic depression. A local grassroots organization has fiercely opposed the project—which it dubbed as "ecopillage." The Adventist community has been bitterly divided by the issue. Opponents of the ecovillage, which include many Adventists, believe it is contrary to the county's agricultural and slow-growth policies as well as Adventist principles of simple rural living. Opponents have often cited Ellen White's comment on what transpired at Healdsburg College before it was moved to Angwin: "While men slept, the enemy sowed houses" (White 1982, p. 176). However, she never wrote the comment; instead, it was overheard by M. E. Cady, one-time president of Healdsburg College, and was given at a time when Healdsburg College needed to expand but was unable to because much of its land had been sold to developers (White 1982). Proponents of the ecovillage point out that PUC is struggling financially and has far more land than it needs for its educational mission, and they consider the ecovillage a modern version of Ellen White's vision of an Adventist community, harmonious with biblical principles of healthful living and sustainable stewardship of natural resources.

We believe Adventists should heed Ellen White's specific counsel for PUC, which is also applicable for any other Adventist institution contemplating more sustainable designs: "Now let us all take hold interestedly to make this school what the Lord would have it to be. We need to seek wisdom from God, who has so wonderfully blessed us in preparing this place for our use" (White 1909, par. 12).

Appendix 1. Official Seventh-day Adventists Statements

1992 - Caring for Creation: A Statement on the Environment

The world in which we live is a gift of love from the Creator God, from "Him who made the heavens, the earth, the sea, and the springs of water" (Revelation 14:7; 11:17, 18). Within this creation He placed humans, set intentionally in relationship with Himself, other persons, and the surrounding world. Therefore, as Seventh-day Adventists, we hold its preservation and nurture to be intimately related to our service to Him.

God set aside the seventh-day Sabbath as a memorial and perpetual reminder of His creative act and establishment of the world. In resting on that day, Seventh-day Adventists reinforce the special sense of relationship with the Creator and His creation. Sabbath observance underscores the importance of our integration with the total environment.

The human decision to disobey God broke the original order of creation, resulting in a disharmony alien to His purposes. Thus our air and waters are polluted, forests and wildlife plundered, and natural resources exploited. Because we recognize humans as part of God's creation, our concern for the environment extends to personal health and lifestyle. We advocate a wholesome manner of living and reject the use of substances such as tobacco, alcohol, and other drugs that harm the body and consume earth's resources; and we promote a simple vegetarian diet.

Seventh-day Adventists are committed to respectful, cooperative relationships among all persons, recognizing our common origin and realizing our human dignity as a gift from the Creator. Since human poverty and environmental degradation are interrelated, we pledge ourselves to improve the quality of life for all people. Our goal is a sustainable development of resources while meeting human needs.

Genuine progress toward caring for our natural environment rests upon both personal and cooperative effort. We accept the challenge to work toward restoring God's overall design. Moved by faith in God, we commit ourselves to promote the healing that rises at both personal and environmental levels from integrated lives dedicated to serve God and humanity.

In this commitment we confirm our stewardship of God's creation and believe that total restoration will be complete only when God makes all things new.

This statement was approved and voted by the General Conference of Seventh-day Adventists Executive Committee at the Annual Council session in Silver Spring, Maryland, October 12, 1992.

1995 – A Statement on the Environment

Seventh-day Adventists believe that humankind was created in the image of God, thus representing God as His stewards, to rule the natural environment in a faithful and fruitful way.

Unfortunately, corruption and exploitation have been brought into the management of the human domain of responsibility. Increasingly men and women have been involved in a

megalomaniacal destruction of the earth's resources, resulting in widespread suffering, environmental disarray, 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 depletion of the protective mantel of ozone, the massive destruction of the American forests, and the so-called greenhouse effect, are all threatening the earth's eco-system.

These problems are largely due to human selfishness and the egocentric pursuit of getting more and more through everincreasing production, unlimited consumption and depletion of nonrenewable resources. The ecological crisis is rooted in humankind's greed and refusal to practice good and faithful stewardship within the divine boundaries of creation.

Seventh-day Adventists advocate a simple, wholesome lifestyle, where people do not step on the treadmill of unbridled consumerism, goods-getting, and production of waste. We call for respect of creation, 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) and was released by the Office of the President, Robert S. Folkenberg, at the General Conference session in Utrecht, the Netherlands, June 29-July 8, 1995.

1996 – A Statement on Stewardship of 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 mantel 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.

The government and people of Costa Rica are to be commended for their support of a comprehensive policy of sustainable development in harmony with nature.

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.

FIGURE LEGENDS

- Fig. 1. Students studying for a B.S. degree in Environmental Studies from Pacific Union College learn about the design and management of a wildlife refuge while taking a course in Conservation Biology.
- Fig. 2. Neville Trimm, a biologist currently at Southern Adventist University and graduate of University of the Southern Caribbean and Loma Linda University, handles a juvenile Magnificent Frigatebird as part of his research on threatened seabird populations in the Bahamas.

Figure 1



Figure 2

