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***Environmental Attitudes, Behavior and Knowledge  
at a Christian Liberal Arts University: Exploring  
Faith, Stewardship and the “New Ecological  
Paradigm”***

by

Kathryn R. Rudy

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Masters of Environmental Science

Taylor University  
Department of Environmental Science  
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## **Abstract**

A survey of undergraduate students (N=208) at a private, Christian university assessed environmental attitude with the New Ecological Paradigm (NEP), environmental knowledge with the National Environment Education & Training Foundation (NEEFT)/Roper Survey, and self-reported environmental behaviors. Some additional survey components explored the relationships of Christian faith and environmental attitudes of students. Sampling occurred among students in a few select classes and via all-campus student email announcements for voluntary and anonymous responses. This survey can serve in program and curriculum development, survey tool development and as a benchmark study for Taylor University.

Students overwhelmingly recognize a relationship between their Christian faith and the natural world. Female gender positively correlated with endorsement of the NEP and self-reported pro-environmental behavior, and negatively with environmental knowledge. The NEP showed moderate predictive abilities for environmental behavior. Students who had taken an environmental science course scored significantly higher on the environmental knowledge portion. The low endorsement of the NEP by Christian students suggests some negative interaction of the NEP with Christian beliefs; those not identifying as Christians (N=11) showed significantly greater endorsement of the NEP.

Future research could involve exploration of specific Christian beliefs and how they relate to the environment, in an effort to better capture the environmental concern of Christian populations. The use of this survey in another Christian environment, such as another Christian University, may help confirm the inadequacy of the NEP in assessing Christian environmental attitudes. Other future research could include tailoring behavioral survey components to more fully reflect actions of pro-environmental college students, and a longitudinal study to assess the impact of Taylor's curriculum and programming on individuals.

**Key words:** survey, New Ecological Paradigm, NEP, environmental, education, attitude, knowledge, behavior, NEEFT/Roper survey, Taylor University, undergraduate, Christian



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## ***Introduction***

### ***Purpose of Research***

The purpose of this research is to explore the following research questions using a survey of undergraduate students at Taylor University. These research questions are important for Taylor as a Christian university working to foster servant leaders and empowered citizens. Some of this research may also aid in further developing the survey tools themselves and act as a benchmark study for future use and development.

### ***Research Questions***

- What do students at Taylor University know and think about the environment? What is their attitude and behavior toward the natural world? (summative results/discussion)
- Do students at Taylor University exhibit a difference in environmental knowledge, self-reported behavior and attitude correlated with their year at university? (Null hypothesis: No difference)
- Do students at Taylor University exhibit a difference in environmental knowledge, self-reported behavior and attitude based on their experiences with the Environmental Science Department? (Null hypothesis: No difference)
- Are environmental knowledge, self-reported behavior and environmental attitude related? Are there correlations? Does gender relate to anything? (Null hypothesis: No relationships)
- Do students at Taylor have faith-based environmental attitudes? How do they differ from or relate to the NEP? (summative results/discussion)

Before we delve into the study itself, first we must establish the need for such research questions within the Christian University.



## ***Background***

### ***The Role of the Christian Community***

As of 2005, there were over 40 explicitly Christian, and mostly Evangelical, organizations dedicated to environmental and conservation movements in the United States (Van Dyke 2005). Kempton and his colleagues, in their book entitled *Environmental Values in American Culture*, state that the influence of religion and spirituality is self-reported to be the most common source of environmental values in the United States (1995). Richard Cizik, a leader in the National Association of Evangelicals (NAE), with 30 million members and over 50 denominations, writes that when it comes to major environmental issues, “the very reputation of the gospel is at stake.” Although somewhat controversial, through its actions and statements the NAE has certainly established that environmental concerns are well within the realm of Christian beliefs (Haag 2006). Authors like Fred Van Dyke, in his book *Between Heaven and Earth: Christian Perspectives on Environmental Protection* (2010) urge believers to “rediscover” not “re-invent” their environmental ethic (iix-ix). Many Christians are working to proclaim this reality to the Church today.

Gregory Hizhusen, Ph.D. (2007), who specializes in ecotheology and faith-based environmental education, advocates for the recognition of Judeo-Christianity as an asset in environmental education. He reminds us that Biblical references, lessons and mandates regarding the natural world are obvious and abundant. We see that mankind is told to work and keep (shamar: care, guard and protect) the garden (Genesis 2:15, Fick 2009), acting as caretakers for the true owner since the “the earth is the Lord’s, and everything in it” (Ps. 24:1 ESV) and “all things were made through him, and without him was not any thing made that was made” (John 1:3, ESV). The



Sabbath rest was instituted not just for man, but for the wildlife and the land (Leviticus 25-26, Exodus 23:10). Nature can teach us about God as a second book of revelation, “so that people are without excuse” (Romans 1:20 NIV; Job 12:7–9; Ps. 19:1–4, Ps. 36:6), and nature is celebrated as beautiful and good and of great importance throughout Scriptures (Psalms, John 1:3, Hebrews 1:3, Rev. 4:11). We read of “God’s displeasure with violent, unjust, greedy people, whose disobedience and unfaithfulness . . . leads to devastation of the land (Hosea 4:1–3; Jeremiah 12:4; Zechariah 7:8–14). These warnings presage John’s prophecy of the time to come for rewarding the faithful and ‘for destroying those who destroy the earth’ (Revelation 11:18)” (Hizhusen 2007). The Bible is also clear that, like humans, creation was cursed and will likewise be redeemed. For now it “groans” and “looks forward to the day” just as we “wait with eager hope for the day” (Romans 8:18-23); and, again, “For God in all his fullness was pleased to live in Christ and by him reconciled everything to himself. He made peace with everything in heaven and on earth by means of his blood on the cross” (Col. 1:19-20, NLT, Fick 2009). These are just a few of the many passages that indicate our witness is compromised when we fail to value and care for creation.

Likewise, many theologians have identified a Biblical basis for environmental ethics over the years, developing rich concepts for Christian engagement (Hizhusen 2007, Van Dyke 2010, Horrel 2010). Even though they did not face the environmental crises we do today, leaders in the Reformed tradition, including John Wesley, “explored and developed the biblical concepts of dominion, stewardship, intrinsic value, and redemption in regard to the interactions of people and nature” (Van Dyke 2010, p. 90-91) The intrinsic value of creation compels us to protect God’s good creation for its own sake. “The created world has value, meaning, beauty, in itself: because God is the supreme craftsman, his creation is supremely lovely,” and we, being made in his



image, are to care for it by imitating Christ; a relationship corrupted by the fall (Horrell 2010 p.218, Van Dyke 2010 p. 56-57). The work of redemption extends to the natural world. “For God so loved the world [cosmos] that he gave his one and only Son . . .” initiating the collective redemption of man and all of creation by Jesus Christ. (John 3:16, NIV, Van Dyke 2010. p 71-73). The virtues of frugality, humility, diligence and simplicity (promoted by John Wesley and many others) (Van Dyke 2010, 102-106) warn against over-consumption, promote wise investment in the future, and remind us of an important message: not “all human needs and wants can be met through material means” (Cortese 2003). Stewardship has developed out of our role as caretakers for the Creator’s good works; we conserve creation both for its intrinsic value and to meet the needs of our generation and generations to come. This is closely tied with justice, or “eco-justice,” in which we understand, value and protect the environmental needs of others, especially the poor and underprivileged, and the needs of the land itself (Hizhusen 2007).

A recent study, however, found that while theologians and Christian leaders are working to educate and motivate the church for creation care, there is still a significant difference in environmental concern (including attitudes, beliefs and behavior) between church lay-people and non-Christians, with Christians showing lower levels of concern. While the authors of this study note the complexity of these relationships, they report their conclusions are supported by many other studies over the past few decades (Clements et al. 2014). Another recent study found that three out of four Americans believe climate change will cause major (54%) or moderate (20%) harm to developing countries, but “only 27% of white evangelical Protestants are climate change believers” and they “. . . are much more likely to attribute the severity of recent natural disasters to the biblical ‘end times’ (77%) than to climate change (49%)” (Jones et al. 2014). Here we clearly find conflict between Christian beliefs, virtues and actions.



Lynn White Jr. (1967) is arguably responsible for the cascade of studies on the relationship between Christian influence and environmental degradation. In his paper “The Historical Roots of our Ecocrisis,” he persuasively argues that “Christianity bears a huge burden of guilt” for our environmental woes. He accuses Christian doctrine of perpetuating beliefs of human exceptionalism and transcendence over nature and supporting the “rightful mastery” of man over the rest of creation. Christianity grants man the ability to exploit, “subdue” and “rule” over all the earth unlike any other system of faith (Genesis 1:28). White’s argument has gained traction and adherents for decades, despite a lack of empirical evidence and a misunderstanding of Christian scriptures and doctrine (Hitzhusen 2007). Theologians like Van Dyke and Hitzhusen, and many others, have spent a great deal of time researching and writing in response to and rejection of White’s hypothesis. In the same spirit, Wendell Berry makes many profound Biblical arguments for ecological stewardship throughout his large body of work. In his essay *God and Country* (1990) he writes, almost in direct response to White, that such “an extremely unintelligent misreading of Genesis 1:28 . . . is contradicted by virtually all the rest of the Bible, as many people by now have pointed out.”

Yet in 2005, David Orr wrote in the *Journal of Conservation Biology* that Christian beliefs are pitted against those of conservationists, proposing that “belief in the imminence of the end times tends to make evangelicals careless stewards of our forests, soils, wildlife, air, water, seas, and climate.” In light of wide-spread failures of ecosystems, climate change, mass extinctions due to human activity and destruction, horrific pollution and related health concerns, he argues that “right-winged” Christians focus on the return of Christ and upcoming Armageddon to the detriment of all of Creation. This lack of justice, humility and generosity is most unlike Jesus Christ (Orr 2005). A group of Christian conservationists published a response in the same



journal, however, sharing that many Christians read the Bible with the opposite effect, and that Orr's view of apocalyptic-obsessed Christians is "ill-informed and overly simplistic." They note strong faith incentives for creation care and the unique hope many Christians have as they work with their Creator to redeem His creation, believing in His future restoration of all (Stuart et al. 2005). Many other Christians have likewise responded (Van Dyke 2005, Stuart et al. 2005).

### ***The Role of the Christian University***

These ideas and problems are full of opportunity for a Christian University. Taylor University makes no apologies about seeking to shape the morals and ethics of her students. Many of us are challenged to develop a rich environmental hermeneutic in our students and ourselves, enabling our community to address the complex nature of our interactions with the people and natural world around us.

Ideas of environmental stewardship and social justice are closely related to the principles and practice of sustainability, a concept accepted and adopted on campuses and at other institutions all over the world. Sustainability is typically defined using the Brundtland Report of 1987, as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition is fleshed out in three interwoven domains: economic, social and environmental. The USEPA declares (2014), "Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations. Sustainability is important to making sure that we have and will continue to have, the water, materials, and resources to protect human health and our environment." These



principles can and should fit within the cultural values of Christian universities; we recognize the need for stewardship of our finite natural resources (environmental) and of our relationships (social and civic sustainability).

It follows that sustainability also involves increased awareness of the common good and justice in terms of inter-generational needs and our care for the poor. For we know our care for the natural world is unequivocally intertwined with our care of the poor, as they often suffer disproportionately from environmental degradation. This holistic perspective is supported by the recent findings of the Public Religion Research Institute (PRRI): “More than 8-in-10 members of all major religious groups agree that living up to our responsibility to protect future generations, respecting and taking care of the earth and preventing human suffering and harm are extremely or very important reasons to protect the environment” (Jones et al. 2014).

This call to sustainability and creation care in the larger Christian church is recognized and reflected in the mission and purposes of Taylor University. From Taylor’s Profile statement:

Taylor University is a coeducational, interdenominational Christian liberal arts college where faith, living and learning are integrated. The mission of Taylor University is to develop servant leaders marked with a passion to minister Christ’s redemptive love and truth to a world in need . . . Global engagement and service is at the core of the Taylor experience (2015).

This integration of “faith, living and learning” is imminently necessary as we approach global needs today. As Taylor hopes to promote leadership in its students, it would do well to prepare them with the requisite knowledge and ethical underpinnings needed to engage in this conversation. Empowering students to recognize the relationship between their belief system and environmental care is one of the many potential strengths of a liberal arts school like our own. In his book *Hope is an Imperative*, this same David Orr paints a picture of an ideal liberal arts



school, one that values the holistic development of the student. He writes, “Genuine liberal arts education will foster a sense of connectedness, implicatedness, and ecological citizenship, and will provide the competence to act on such knowledge” (2011, p.276). Are we training students to engage with the issue of sustainability and think critically about their relationship with the natural world? Are we enabling them to approach the human relationship with the natural world with knowledge, concern and tools to make a difference, or with apathy and cynicism (Rowe 2002)? This research addresses and begins to answer these important questions.

In addition, Taylor has the ability to reach students in their formative years, as they develop their worldviews and transition to adulthood. Anthony Cortese (2003), a sustainability consultant and former dean of environmental programs at Tufts University, strongly admonishes both secular and Christian universities when he states the following:

Higher education institutions bear a profound, moral responsibility to increase the awareness, knowledge, skills, and values needed to create a just and sustainable future. Higher education plays a critical but often overlooked role in making this vision a reality. It prepares most of the professionals who develop, lead, manage, teach, work in, and influence society’s institutions, including the most basic foundation of K–12 education.

Cortese would have us remember that we best serve our students, and all of society, when environmental education is prominent. As a Christian university, we can foster in our students a rich and better-developed understanding of our Creator God and a similarly rich relationship with the whole of His creation. It is time we claim our identity as thoughtful caretakers and generous members of the bountiful creation with which we have been entrusted.

Beyond the accepted responsibilities of a liberal arts university, Taylor has established a Foundational Core for the dynamic and broad development of its students (see appendix). These seven foundations guide curriculum and student programming. Five of these values in particular



are related to this survey and the goals of the Environmental Science Department at Taylor University: civic mindedness, scientific literacy, responsible stewardship, critical thinking and information literacy, and spiritual maturity.

### ***The Role of the Survey - Literature Review***

Overall, Taylor recognizes that the college students of today will be the stewards of our world and all of its complex systems and relationships tomorrow. The goal of this study is to equip Taylor with even more resources to better prepare students for this changing world; a world in which knowledge, behavior and attitudes towards sustainability and the environment play an integral role in the development of healthy societies and communities and meaningful civic engagement (Cortese 2003, Orr 2011, Rowe 2002). This survey can help assess where students are in this development and provide a benchmark for future comparisons.

Many other universities have begun to survey their students in the areas of sustainability, environmental awareness and attitudes. Researchers at these schools often intend to develop and use these survey tools as benchmark and before-and-after studies, to assess ongoing efforts to equip tertiary students with the tools needed for stewardship of our collective resources (Rowe 2002, ESU 2010, Rideout 2005, Shephard 2010, Shephard et al. 2009, Casey and Scott 2006, Hardaway et al. 2012, Levine and Strube 2012).

The survey for this study was designed to include elements of environmental knowledge, sustainability-oriented behavior and pro-environmental attitude in order to try to capture a more comprehensive assessment of current students than any one of those components could individually. Therefore, three major sections of this survey are included for the following reasons:



## ***Environmental Behavior***

This section has three primary purposes. First, through some published works and commonly held beliefs, Christians tend to have a bad reputation for their environmental behavior (Orr 2005, White 1967, Kanagy and Nelsen 1995), although other studies have found Christians with pro-environmental behavior equal to or even greater than their non-Christian peers (Hizhusen 2007). There is a growing body of research working to establish a richer understanding of Christian theology and environmental behavior (Hizhusen 2007, Greeley 1993). While some Christians certainly do hold anti-environmental beliefs and exhibit related behaviors, many believe these should not be ascribed to the Christian faith as a whole (Greeley 1993, Kanagy and Nelsen 1995).

Secondly, Taylor University may wish to encourage many of these behaviors for economic and financial reasons (i.e. energy and water conservation), which is a significant part of sustainability and stewardship (Brundtland 1987). This survey can help gauge compliance and a possible need for increased attention to these behaviors across campus.

Lastly, these behavioral scores will be used to explore relationships between environmental knowledge, environmental attitude and reported behavior, as noted in the following sections (Bradley et al. 1999, Coyle 2005, Dunlap 2008, Robelia and Murphy 2012, Kollmuss and Agyeman 2002). Of course, while both increased knowledge and pro-environmental attitudes are often present in the case of pro-environmental behavior, they are not the sole predictors. There are many other factors involved in mediating behavior, like situational influences, socio-demographics, implicit and explicit influences and more (Kollmuss and Agyeman 2002). While many of these are beyond the scope of the present study, we will examine a difference between



reported behaviors of men and women, as women sometimes report greater frequency of pro-environmental behavior (Levine and Strube 2012, Casey and Scott 2006).

### ***Environmental Knowledge***

Environmental educators often disseminate environmental knowledge in order to bring about changes in environmental attitudes and behavior. They desire students to make decisions that value and preserve the natural world as they come to understand its importance and limited nature. Indeed, while the influencers on attitude are widely varied, many studies have indicated that people with increased knowledge of the environment profess more pro-environmental attitudes (Bradley et al. 1999, Coyle 2005, Harraway 2012, Hayes and Marangudakis 2001, Rideout 2005). It is also well established that increased environmental knowledge is related to environmentally friendly behavior and decision-making, as knowledge is often viewed as a precondition to action (Coyle 2005, Robelia and Murphy 2012, Levine and Strube 2012). Understandably, without the requisite knowledge, it is very difficult to make decisions and solve problems that involve both care for the environment and human needs (Kaiser, Wölfling, and Fuhrer 1999, Kaiser and Fuhrer 2003). It is best to base these sorts of decisions on “robust environmental knowledge, not myths, and misconceptions. The intangible nature of many environmental problems make them difficult to understand without background knowledge” (Robelia and Murphy 2012).

Kevin Coyle, the former president of the National Environmental Education and Training Foundation (NEETF), has participated in many national studies of environmental knowledge, attitude and behavior over the years. While utilizing the NEETF/Roper knowledge survey employed in this study, he has found that, “The environmentally literate person is significantly



more likely to engage in a set of pro-environment activities than someone who is not educated on the environment” (2005).

Yet researchers caution against giving knowledge too much weight when it comes to environmental behavior. It’s important to remember that the relationship between knowledge and behavior is complicated and multifaceted (Kollmuss and Agyeman 2002, Kaiser and Fuhrer 2003). One single model, such as the knowledge deficit model that proposes a lack of environmental knowledge is to blame for poor environmental behavior, will never be sufficient to describe the many influences on behavior (Kollmuss and Agyeman 2002). We all understand this on some level, as we often know a great deal about “good” choices, but our behaviors do not always follow suit. For example, while males tend to score higher on environmental knowledge surveys (Coyle 2000, Coyle 2005), they do not always exhibit more pro-environmental attitudes and behaviors (Coyle 2005, Casey and Scott 2006, Levine and Strube 2012).

In one interesting study, Kaiser and Fuhrer (2003) use empirical evidence to show that the relationship between knowledge and behavior involves more than environmental knowledge. They write, “Before someone can act, he or she must know how things should be, and what can be done. While the first form of knowledge is composed of declarative environmental knowledge, the second consists of procedural (i.e. action-related) knowledge. The third form of knowledge, effectiveness knowledge, is particularly relevant when behavior is instrumental in optimizing a person’s cost–benefit ratio. Besides declarative knowledge, procedural knowledge, and effectiveness knowledge, social knowledge also influences ecological behavior.”

Understandably, these forms of knowledge all influence attitudes and intentions as well, which



makes program and curricular development for environmental empowerment that much more nuanced.

Nevertheless, Robelia and Murphy (2012) have extensively reviewed environmental knowledge surveys over the last few decades and recognize that “knowledge may not be solely sufficient, but the models . . . suggest that knowledge is a necessary component of informed action.” They furthermore note that national and statewide surveys reveal that the American public may not have the knowledge requisite for crafting effective environmental policies and actions. Do students at Taylor have environmental knowledge to inform their daily decisions and empower them to be the leaders of tomorrow?

### ***Environmental Attitude***

Environmental attitude (EA) can be thought of as a person’s beliefs, perspective and feelings towards the natural world. Like environmental knowledge, pro-environmental attitudes have been found to play a role in pro-environmental behavior (Kollmuss and Agyeman 2002, Dunlap et al. 2000, Rideout 2005, Levine and Strube 2012). This relationship is complicated, as one might suspect, by many other internal and external factors. For example, as pro-environmental behavior gets more expensive or other constraints are present, EA seems to have less and less of an influence on behavior (Kollmuss and Agyeman 2002, Kaiser, Wölfling, and Fuhrer 1999).

This survey employs the Revised New Ecological Paradigm (NEP) scale as a tool to gauge attitudes, currently considered a reliable, standardized measure of EA (Hawcroft and Milfont 2010). The NEP scale was created in the 1970s by Riley Dunlap and his graduate assistant and updated in 2000 by Dunlap et al. to gauge anthropocentric versus ecocentric concern, packaged altogether as a “environmental worldview” by Dunlap (2008). Milfont and Duckitt describe



ecological concern as concern for all living things (often a desired outcome of environmental education) and anthropocentric concern as concern for human flourishing especially (2006). Likewise, the NEP scale was designed to capture a hoped-for shift in the “dominant social paradigm” of anthropocentric “abundance, growth, progress, etc.” to more ecocentric thinking, including ideas of limits to growth, the environmental harm imposed by humans, and the need for better management and care of natural resources given their finite and essential nature (Dunlap 2008). Responders are asked to rank their level of agreement with 15 statements related to this “new paradigm” on a 5-point Likert scale, with higher scores associated with more ecocentric thinking.

The NEP is very widely used and accepted (Dunlap et al. 2000, Dunlap 2008, Shephard et al. 2011, Hawcroft and Milfont 2010) and research supports the NEP scale’s predictive ability for pro-environmental behavior, although moderate in nature (Dunlap 2008, Casey and Scott 2006, Dunlap et al. 2000). Researchers have also noted that female, more highly educated, and somewhat younger individuals tend to have more ecocentric scores (Casey and Scott 2006, Rideout 2005, Kollmuss and Agyeman 2002, Shephard et al. 2009, Harraway et al. 2012, Kuo and Jackson 2014). The NEP has also been used for university survey studies to determine changes in student attitudes during their tenure at university, or changes during courses specifically designed to affect EA. Harraway et al., in their publication “Exploring the Use of the Revised New Ecological Paradigm Scale (NEP) to Monitor the Development of Students” (2012), found the NEP to be “a valuable research instrument” for tracking student changes through college and useful for programming discussions within their institution. Kuo and Jackson (2014) used the NEP to determine changes in engineering students’ attitudes before/after



a course in environmental studies, in keeping with their required student outcomes, and found a statistically significant increase in pro-ecological attitude post-course.

In this particular study, however, caution must be used with the NEP scale. Current research is rather split when it comes to Christian environmental attitudes; using a few different survey tools, some studies find Christians exhibit more environmental concern, and some less (Casey and Scott 2006), but Christians do tend to score lower on this particular scale (the NEP) (Casey and Scott 2006, Dunlop et al. 2000). Yet a lower NEP score should not necessarily be assumed to mean a poorer environmental ethic; Christian beliefs may have an interesting interaction with the NEP scale. That is, in the Christian context of Biblical dominion, respondents may have a low NEP score (representing more anthropocentric/mastery thinking), but could very well have robust pro-environmental attitudes and behaviors. For example, students may strongly agree with the prompt that states “humans are meant to rule over the rule of nature” (low, anthropocentric score on the NEP) but their idea of “ruling” may be more analogous to humble care taking, in keeping with a holistic reading of the Biblical narrative and in honor of the true Ruler, the Creator of heaven and earth. It may therefore be a mistake to equate anthropocentrism with a bad creation care ethic, when really it could be a poor choice of wording and perspective that misguides the researchers and survey respondents (Lundmark 2007, Hizhusen 2007). In fact, Hizhusen (2007) writes that many researchers have found that Christians with greater mastery attitudes “did not demonstrate significantly poorer environmental behaviours . . . various studies [have] concluded that an ethic different from the anti-dominion-mastery-anthropocentrism view adopted [and valued] by researchers, perhaps an ethic of ‘stewardship,’ probably accounted for the equally virtuous environmental behaviours of Judeo-Christian adherents.” He also believes that “Especially among conservative religious citizens in the United States, ecotheology is better



suited to inspire and support an environmental ethic than secular environmental belief systems such as the NEP.”

That being the case, while I will use the Revised NEP survey within this study for reasons of broad comparison and consistency, six additional statements are included to better understand how Christian students relate to the environment around them; questions that appeal to ideas of stewardship and creation care that make up our ecotheology, not necessarily conflicting with an anthropocentric worldview. These can be “important sources of environmental values” and need to be recognized as valid environmentally sound alternatives to the NEP paradigm (Hizhusen 2007). A couple of the added prompts relate to feelings of responsibility towards the environment (e.g. “A person can be completely devoted to following Jesus without actively taking care of the environment,” from faculty at Eastern Mennonite University, EMU 2010), which is an important factor in pro-environmental attitude and behavior (Kaiser et al. 1999).

A few of the prompts were written by myself to give us insight into how students read the Bible in terms of creation care. For example, are students focusing more on the redemption and renewal of the natural world (Romans 8:21, prompt: “It is the work of a Christian to participate with our Creator in the redemption of Creation.”) or its eventual and imminent destruction and replacement (2 Peter 3:10, prompt “The Bible indicates an imminent destruction of the material world.”)? This, of course, would affect how we live here and now. If students view current environmental troubles as part of the end times rather than as direct consequences of human behavior (as found in the PRRI survey), their work to mitigate such crises may be diminished (Jones. et al. 2014). This perspective would most certainly stunt the growth of students as empowered and engaged problem-solvers.



In a recent survey study, the Public Religion Research Institute found that, “Americans generally reject the idea that God intended humans to use the earth strictly for their own benefit. Nearly 6-in-10 (57%) Americans say God gave humans the task of living responsibly with animals, plants, and other resources, which are not just for human benefit. By contrast, about one-third (35%) of Americans believe that God gave human beings the right to use animals, plants, and all other resources of the planet solely for their own benefit” (Jones et al. 2014). The prompts “God created nature to serve humans” and “Taylor University should emphasize and pursue more stewardship of creation” (and others) and may help us better see where Taylor students fall in this spectrum of use and responsibility, although they do not make for a direct comparison.



## ***Materials and Methods***

### ***Survey Tools***

See the appendix for sample portions of the survey.

### ***Sociodemographic Information***

Respondents were asked to provide their school year (Freshman-Senior), gender (Male/Female), ENS course experience (yes/no), identity as a Christian (yes/no), school of major degree (of the three schools at Taylor) and experience with service/outreach trips (yes/no).

### ***Attitude***

This study used the Revised New Ecological Paradigm scale (NEP) developed by Dunlop et al. (2000) to assess environmental attitude. Respondents use a 5-point Likert scale to express their level of agreement (5-strongly agree, 4-mildly agree, 3-unsure, 2-mildly disagree, 1-strongly disagree) with 15 different statements (e.g. Humans are severely abusing the environment).

Some of the prompts are worded so that disagreement indicated more pro-ecological worldview, but once the reverse coding is complete for these 7 prompts, a higher score is associated with a more ecocentric worldview. A lower score indicates a more anthropocentric perspective (Dunlap et al. 2000).

In terms of average revised NEP scores at Universities, a New Zealand study by Shephard et al. (2009) found an overall University NEP mean of 3.53 (N=529). Levine and Strube (2012) with the University of Michigan, surveyed 90 undergraduates enrolled in a psychology course and found an NEP average of 3.51 (SD .70). Rideout and colleagues (2005) at Ursinus College used the NEP as the first part of a systematic, longitudinal study of undergraduates and found their



students had lesser agreement with the NEP than some other studies, with a score of 3.42, although females on average expressed greater NEP agreement (3.53), a difference supported by other studies. They also found no difference in the scores of freshman and seniors.

As noted, the six additional prompts addressing more specific Christian beliefs may help further our understanding of EA. These additions were developed based on the ideas (and one direct prompt: “A person can be completely devoted to following Jesus without actively taking care of the environment”) of researchers at Eastern Mennonite University as they sought a more informative survey for their specific school and faith system (EMU 2010). One of the prompts was also used by Kempton et al. (1995) in a national survey (“Because God created the world, it is wrong to abuse it” ). I wrote the other four prompts in this section, without having tested them in any other study. These six will be coded separately, noting that a higher score should indicate a more developed creation care ethic.

## ***Behavior***

The behavior component of this study was developed by reading through other behavioral surveys (Coyle 2005, Casey and Scott 2006, Levine and Strube 2012) and deciding which components would be applicable and beneficial at Taylor University. They are socially acceptable and widely understood practices, perceived to have a more direct impact on the environment (unlike civic, educational and political activities, with more indirect environmental impacts) (Jenson 2002). I also tried to choose behaviors most easily practiced at Taylor to avoid complicating the responses with unknown constraints (Coyle 2005, Kollmuss and Agyeman 2002, Kaiser, Wölfling, and Fuhrer 1999). Overall, these behaviors will likely be everyday practices of students with developed creation care ethics. Each behavior statement is listed and



respondents choose their level of participation based on a 5-point Likert scale (5 = Always to 1 = Never). Once responses are coded, a higher score should indicate more sustainably-oriented behaviors. However, because I am only asking a limited number of self-reported and specific behavioral questions, the predictive power of the behavior section is somewhat limited (Casey and Scott 2006, Dunlap et al. 2000).

For comparison, the NEETF/Roper survey asked respondents how often they participated in certain environmental behaviors and found “the simplest behaviors top the list: 85% report that they frequently turn off lights and electrical appliances when not in use [Coyle does note this also saves money] . . . Another 59% say they frequently recycle newspapers, cans, and glass. A majority of Americans also say they frequently try to conserve water in their homes and yards (61%) or cut down on the amount of trash their households create (54%). All of these activities are connected to regular activities that are convenient to perform.” However, only 14% frequently use alternative transportation to cars, like bikes and buses, a much less convenient activity (Coyle 2005).

### ***Knowledge***

The knowledge literacy portion was directly replicated from the NEETF/Roper survey. It consists of 12 knowledge questions chosen carefully based on tests with focus groups to assess some of the most important aspects of environmental knowledge (e.g. where our waste goes, the main source of water pollution, etc.). Each question has five multiple choice answers: one the correct answer, a myth answer from public perceptions and media outlets, two plausible answers and a “don’t know” option to reduce the chances of respondents guessing the correct answer (Coyle 2005, Robelia and Murphy 2012).



The NEEFT/Roper survey has been used at multiple universities (Levine and Strube 2012, Coyle 2005, Robelia and Murphy 2012) as well as nationally and regionally in the United States for decades (Coyle 2000, Coyle 2005) meaning there is an extensive literature history of this particular survey and its results. The survey was actually developed for undergraduate students and should provide a way to compare Taylor students to other populations. For example, in the year 2000, less than 1/3 of the nation was able to achieve a passing grade (Coyle 2000). The survey has also consistently revealed that men, those with higher levels of education and those of middle-age (age 35-64) answer the most questions correctly (Coyle 2000, Coyle 2005, Levine and Strube 2012, Casey and Scott 2006, Robelia and Murphy 2012).

With regards to average scores, the national 1997 and 2000 NEETF/Roper studies found “men averaged 7.75 correct answers while women answered an average of 6.25 questions correctly.” Educators have attributed this difference to the higher ratio of men than women involved in science and technology (Coyle 2005). The NEETF/Roper studies have also found differences in performance by level of education; college grads or more with 8.6 correct, some college with 7.6 correct and high school or less with 5.8 correct. The national average in 200 was 7.00 correct (Coyle 2005). On a University level, Levine and Strube (2012) found that psychology students (N=90) at University of Michigan scored an average of 8.60 correct (SD = 2.07). Other universities have used truncated versions of the survey, so the results are not directly comparable (Coyle 2005).

### ***Departmental Use***

Four statements at the conclusion of the survey are for use by the Environmental Science Department at Taylor for program and curriculum development and general interest. For example, the prompt “I would like to see Taylor emphasize, pursue or otherwise engage in more



sustainability initiatives,” was written very similarly to “Taylor University should emphasize and pursue more stewardship of creation” in the Christian-prompt section, to see if the difference in terms (stewardship and sustainability) affected student agreement. This section is not included in the results beyond descriptive analysis and general discussion.

### ***Comments***

A box for comments at the conclusion of the survey allowed students to write any comments/concerns for the researchers. Meaningful comments are included in the appendix and referenced in the discussion.

### ***Participants***

The survey was open to all undergraduate students at Taylor University during the year of 2014-2015; from late November through early February, corresponding with the end of the fall semester and beginning of the spring semester. Taylor University is home to 1,893 traditional undergraduate students, 128 full-time faculty, and 115 undergraduate degree programs. Students, faculty and staff are required to submit a profession of Christian faith before admission and employment at the school. Accordingly, this study found the majority of respondents self-identified as Christians (94.7%, or 197 out of 208).

Some of the study participants were enrolled in an introductory environmental science class, in the final week of their semester, and encouraged to indicate they had taken an ENS course in their responses (about 40 students). Other respondents were in their first week of an introduction to environmental science course and instructed to indicate they had not previously taken an ENS course in their responses (about 60 students). The remainder of the respondents were volunteers from the student population who responded to a request for their help through student



announcement emails (about 100 students). Of the completed surveys, 86 (41%) of the respondents had taken a course in the Environmental Science department, while 122 (59%) had not. Currently, about 40-50% of students who graduate from Taylor have taken an Environmental Science course. Of those that completed the survey, 76 were male and 130 were female, 37% and 63% respectively. Taylor's current enrollment is 45% male and 55% female.

## ***Procedure***

The survey was administered online using Survey Monkey. Four e-mail reminders were sent to the entire student population through the student announcement service, meaning the request for survey participation was accompanied by a list of other student announcements and did not receive any unique treatment. Students were asked for their help, without any incentives or advantages, and without being told the subject of the survey. Students in the environmental science class were asked to participate while in lab, also without requirement or incentives. Respondents were required to agree to participate after viewing a written statement assuring them that all responses were anonymous and voluntary (see in the Appendix). The entirety of the survey was available online exclusively. While a variety of students responded, it is not possible to say for certain that respondents represent the student population at Taylor (N=208, only 10.99% of Taylor's undergraduate population). As noted, students self-selected taking the survey from the e-mail request and other students were enrolled in an environmental science class.

## ***Analysis***

Minitab statistics software was used to analyze the survey responses (Minitab 2010). Incomplete NEP portions of the survey were not included in the final analysis (256 respondents reduced to 208). Respondents answers, originally strongly agree = 5 down to strongly disagree = 1, were



coded so that higher numbers reflect more eco-centric thinking. In other words, some of the NEP statements are worded so that pro-ecological thinking is characterized by disagreement; these prompts, with a reversed (R) designation, should therefore be read as strongly agree = 1 to strongly disagree = 5. Overall, higher NEP scores reflect a greater level of agreement with an ecocentric paradigm. Some of the Christian and behavior statements also received this treatment, with reverse coding always indicated with and (R). Cronbach's alpha was used to determine if we could reasonably treat the NEP scale as a single construct (Dunlop et al. 2000). Our NEP results had an alpha of 0.77, considered more than acceptable, with only very slight increases by removing the "control" (0.78) (Humans will eventually learn enough about how nature works to be able to control it.) and "develop" (0.78) (The earth has plenty of natural resources if we just learn how to develop them.) prompts.<sup>1</sup> I therefore treated the NEP as a single, averaged score for each individual, as recommended by the NEP's original creators (Dunlop et al. 2000). The Christian-oriented prompts did not have single construct characteristics and will therefore be addressed individually. Cronbach's alpha for the behavior section was .60, marginal but acceptable for our exploratory use of the behavior section as an averaged score for individuals (Harraway et al. 2012). Removal of any of the behavior variables resulted in a decrease of alpha, so all were included in each student's average. One-way Analysis of Variance (ANOVA), Regression Analysis and the Pearson Correlation Coefficient were used to determine differences and correlations in respondents. Significance level for statistical tests is  $\alpha = .05$ .

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<sup>1</sup> Interestingly, the "develop" prompt is the one most-often receiving the least pro-ecological agreement from respondents. Both Dunlop et al. (2000) and Rideout et al. (2005) found this to be true with their undergraduate results. Rideout suggests this may be due to misinterpretation of the statement, more akin to "The earth has plenty of natural resources if we just learn how to use them appropriately."



## **Results**

A total of 208 surveys (with completed NEP sections) were included in this analysis.

### ***New Ecological Paradigm***

Table 1 shows the NEP response distribution, as well as the averages and standard deviation for each of the fifteen NEP prompts. With the 1-5 scale, the median coding is 3, so anything above 3 is considered an endorsement of the New Ecological Paradigm (mildly or strongly agree).

Overall, students show a weak endorsement of the New Ecological Paradigm; the NEP average for all respondents was 3.19, with a standard deviation of 0.50.

I found a particularly low endorsement of a few of the NEP statements (all of which were reverse coded so higher numbers reflect greater endorsement of the NEP). Nearly 4 out of 5 students (79.8%) agreed (either strongly or mildly) that “The earth has plenty of natural resources if we just learn how to develop them.” Also, over 4 out of 5 (82.2%) agreed that “Humans were meant to rule over the rest of nature.” Nearly 6 out of 10 students agreed that “Humans have the right to modify the natural environment to suit their needs.” These are all considered to be strong, anthropocentric statements by Dunlop and his colleagues (2000).

Students also did not endorse the NEP ( $m < 3.00$ ) with their responses to the following statements: Human ingenuity will insure that we do NOT make the earth unlivable (2.99), the so-called global warming/ecological crisis facing humankind has been greatly exaggerated (2.90), and the earth is like a spaceship with very limited room and resources (2.95). These means, so close to 3, indicate a nearly even split among students who agree and disagree.



| Table 1: NEP/Faith Responses (Percent Distribution, Averages and Standard Deviation)                                     |       |       |       |       |       |      |       |
|--|-------|-------|-------|-------|-------|------|-------|
| Prompt from the Attitude Section (Scale of 1 to 5)<br>scaled pro-environmentally, 5 = most pro-ecocentric                | 1     | 2     | 3     | 4     | 5     | AVG  | STDEV |
| We are approaching the <b>limit</b> of the number of people the earth can support.                                       | 5.3%  | 16.8% | 19.2% | 47.6% | 11.1% | 3.42 | 1.06  |
| Humans have the right to <b>modify</b> the natural environment to suit their needs. (R)                                  | 8.7%  | 50.5% | 15.9% | 22.6% | 2.4%  | 2.60 | 1.01  |
| When humans <b>interfere</b> with nature, it often produces disastrous consequences.                                     | 3.4%  | 20.2% | 17.3% | 45.7% | 13.5% | 3.46 | 1.06  |
| Human <b>ingenuity</b> will insure that we do NOT make the earth unlivable. (R)  | 5.3%  | 29.8% | 31.7% | 26.9% | 6.3%  | 2.99 | 1.02  |
| Humans are severely <b>abusing</b> the environment.  | 1.9%  | 10.6% | 13.9% | 52.9% | 20.7% | 3.80 | 0.95  |
| The earth has plenty of natural resources if we just learn how to <b>develop</b> them. (R)                               | 29.3% | 50.5% | 13.0% | 6.3%  | 1.0%  | 1.99 | 0.87  |
| <b>Plants</b> and animals have as much right as humans to exist.   | 4.8%  | 22.1% | 10.6% | 40.9% | 21.7% | 3.52 | 1.19  |
| The <b>balance</b> of nature is strong enough to cope with the impacts of modern industrial nations. (R)                 | 1.4%  | 13.0% | 33.7% | 40.9% | 11.1% | 3.47 | 0.91  |
| Despite our special <b>abilities</b> , humans are still subject to the laws of nature.                                   | 0.5%  | 2.4%  | 4.3%  | 40.9% | 51.9% | 4.41 | 0.73  |
| The so-called global warming/ <b>ecological</b> crisis facing humankind has been greatly exaggerated. (R)                | 13.0% | 29.3% | 21.2% | 27.4% | 9.1%  | 2.90 | 1.20  |
| The earth is like a <b>spaceship</b> with very limited room and resources.   | 6.7%  | 35.1% | 21.2% | 30.8% | 6.3%  | 2.95 | 1.09  |
| Humans were meant to <b>rule</b> over the rest of nature. (R)  | 43.3% | 38.9% | 5.8%  | 7.2%  | 4.8%  | 1.91 | 1.10  |
| The balance of nature is very <b>delicate</b> and easily upset.  | 1.9%  | 23.6% | 23.6% | 38.9% | 12.0% | 3.36 | 1.03  |
| Humans will eventually learn enough about how nature works to be able to <b>control</b> it. (R)                          | 2.9%  | 16.8% | 25.0% | 38.0% | 17.3% | 3.50 | 1.05  |
| If things continue on their present course, we will soon experience a major ecological <b>catastrophe</b> .              | 3.9%  | 10.1% | 28.9% | 42.3% | 14.9% | 3.54 | 0.99  |
| Christian-oriented Prompts (5 being a stronger association with Creation Care):  |       |       |       |       |       |      |       |
| It is the work of a Christian to participate with our Creator in the <b>redemption</b> of Creation.                      | 1.4%  | 1.4%  | 5.3%  | 26.0% | 65.9% | 4.53 | 0.79  |
| Because God <b>created</b> the world, it is wrong to abuse it.   | 1.0%  | 1.0%  | 7.2%  | 27.4% | 63.5% | 4.51 | 0.76  |
| <b>The Bible indicates an imminent destruction of the material world. (R)</b>  | 34.1% | 29.3% | 24.0% | 8.2%  | 4.3%  | 2.19 | 1.13  |
| A person can be completely <b>devoted</b> to following <b>Jesus</b> without actively taking care of the environment. (R) | 9.1%  | 29.8% | 20.7% | 31.3% | 9.1%  | 3.01 | 1.16  |
| <b>God created</b> nature to serve <b>humans. (R)</b>  | 8.7%  | 27.9% | 21.6% | 31.3% | 10.6% | 3.07 | 1.17  |
| <b>Taylor University should emphasize and pursue more stewardship of creation.</b>                                       | 1.9%  | 6.3%  | 14.9% | 46.2% | 30.8% | 3.98 | 0.94  |



## ***Christian Faith Prompts***

Also found in Table 1, respondents overwhelmingly agreed that it is the work of a Christian to participate with our Creator in the redemption of creation (92%) and that because God created the world, it is wrong to abuse it (91%). These were the most unified agreements amongst students found in all the survey responses. In addition, nearly 8 out of 10 (77%) agreed, that Taylor should emphasize and pursue more stewardship of creation.

However, over 6 out of 10 (63%) of respondents believe the Bible indicates the imminent destruction of the material world (and 24% are unsure). Students were almost evenly split (agreeing/disagreeing) about the absolute necessity of caring for the environment as a devoted follower of Jesus and believing that God created nature to serve humans. A fifth of the students indicated they were unsure about these two statements.

## ***Behavior Frequency***

Students' self-reported behavior results are shown in Table 2. Taking shorter showers was the

| <b>Table 2: Self-Reported Behavior: Percent Distribution of 200+ students</b>             |       |       |       |       |       |      |       |
|---|-------|-------|-------|-------|-------|------|-------|
| Prompts Scaled 1-5, with 5 reflecting more pro-environmental behavior (5=always, 1=never) | 1     | 2     | 3     | 4     | 5     | AVG  | STDEV |
| <b>1. I recycle everything I can: plastic, newspapers, glass, etc.</b>                    | 2.9%  | 9.6%  | 25.5% | 45.7% | 16.4% | 3.63 | 0.96  |
| <b>2. I take short showers to limit water use.</b>  | 9.6%  | 31.3% | 33.7% | 21.6% | 3.9%  | 2.79 | 1.01  |
| <b>3. In the winter, I make sure the heat in my room is not turned up too high.</b>       | 10.7% | 20.0% | 17.1% | 31.2% | 21.0% | 3.32 | 1.30  |
| <b>4. While I brush my teeth, I leave the water running. (R)</b>                          | 6.8%  | 27.5% | 10.1% | 0.0%  | 55.6% | 3.70 | 1.51  |
| <b>5. I turn off lights and electrical appliances when not in use.</b>                    | 1.5%  | 2.9%  | 15.9% | 48.3% | 31.4% | 4.05 | 0.85  |
| <b>6. Whenever possible, I ride my bike and walk rather than drive a car.</b>             | 6.3%  | 14.5% | 32.9% | 30.9% | 15.5% | 3.35 | 1.10  |



least-practiced pro-environmental behavior, followed by reducing heat during the winter. The overall behavior score for Taylor, averaging all student responses, was 3.46 (SD = 0.66).

## ***Knowledge Scores***

Table 3 shows the percent distribution of knowledge scores for all respondents. Overall, 65.4% of students received a passing grade. The average number of questions correct for all respondents was 9.14 with a SD of 2.12 (76% correct). Students who had not taken an environmental science class averaged 8.5 questions correct (71%), while those who had averaged 10.0 correct (84%).

| <b>Table 3: Knowledge Section, Number correct</b> |                           |                                  |
|---|---------------------------|----------------------------------|
| <b>Questions Answered Correctly (out of 12)</b>   | <b>Number of Students</b> | <b>Percentage of Respondents</b> |
| <b>11 or 12 correct (A)</b>                       | 60                        | 29.3                             |
| <b>10/12 (B)</b>                                  | 40                        | 19.5                             |
| <b>9/12 (C)</b>                                   | 34                        | 16.6                             |
| <b>8/12 (D) - failing grade</b>                   | 32                        | 15.6                             |
| <b>7/12 (F) - failing grade</b>                   | 14                        | 6.8                              |
| <b>6 or less correct - failing grade</b>          | 25                        | 12.2                             |

Students scored the lowest on questions pertaining to sources of air (CO) pollution (61%), sources of water pollution (49%), what we do with our nuclear waste (65%) and the function of wetlands (65%). Yet nearly all students were able to choose the correct definition of biodiversity (95%), location of most of our trash (88%), reason for most extinctions (86%), and identification of hazardous waste (88%).

## ***Departmental Prompts***

Table 4 show responses to the final prompts of the survey; prompts added for use by the Environmental Science Department. Most respondents disagreed (72.9%) and few agreed (11.4%) that sustainability initiatives and programs at Taylor positively influence their decision



to attend Taylor. However, they overwhelmingly agreed that their faith impacts their attitude towards environmental care (87.2% agreed), and that environmental management is a relevant and valuable Christian vocation (89.6% agreed). Over 7 out of 10 students (71.9%) also agreed that they would like to see Taylor engage in more sustainability initiatives.<sup>2</sup>

| <b>Table 4: Department Prompt Responses: Percent Distributions, Averages and Std. Dev.</b>            |       |       |       |       |       |      |       |
|---|-------|-------|-------|-------|-------|------|-------|
| <b>Prompts (5 being a stronger level of agreement):</b>   | 1     | 2     | 3     | 4     | 5     | AVG  | STDEV |
| Sustainability initiatives and programs at Taylor positively influenced my decision to attend Taylor. | 41.9% | 31.0% | 15.8% | 9.4%  | 2.0%  | 1.99 | 1.06  |
| I would like to see Taylor emphasize, pursue or otherwise engage in more sustainability initiatives.  | 1.5%  | 6.9%  | 19.7% | 47.3% | 24.6% | 3.87 | 0.92  |
| Environmental Management is a relevant and valuable Christian vocation.                               | 1.0%  | 2.5%  | 6.9%  | 43.8% | 45.8% | 4.31 | 0.79  |
| My faith impacts my attitude towards environmental care.  | 2.0%  | 3.0%  | 7.9%  | 48.8% | 38.4% | 4.19 | 0.85  |

## ***Relationships and Correlations***

### ***Gender***

Women scored significantly higher than men on the NEP (averaging 3.28 and 3.02, respectively,  $p\text{-value} = 0.000$ ). Women also scored slightly higher than men in frequency of self-reported environmentally friendly behaviors (averaging 3.53 and 3.32, respectively,  $p=0.035$ ). Put another

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<sup>2</sup> This is similar to the 77% that agreed Taylor University should emphasize and pursue more stewardship of creation, the main difference in these prompts being the words stewardship and sustainability.



way, female gender correlated significantly to NEP ( $r = 0.247$ ) and behavior ( $r = 0.147$ ). Men, on average, answered more knowledge questions correctly than women (9.55 and 8.89, respectively,  $p = .034$ ). Put another way, women scored an average of 74%, while men averaged 80% correct. This means that male gender correlated significantly, although moderately, to knowledge ( $r = 0.149$ ). While these  $r$ -values indicate moderate to mild relationships, the relationships are certainly supported by other studies (Coyle 2005).

### ***Christian Identity***

Students who identified as Christians averaged lower on the NEP than those not self-identifying as Christians (3.67 and 3.16, respectively,  $p$ -value = 0.001) (see Figure 1). In other words, not identifying as a Christian significantly correlated with a greater endorsement of

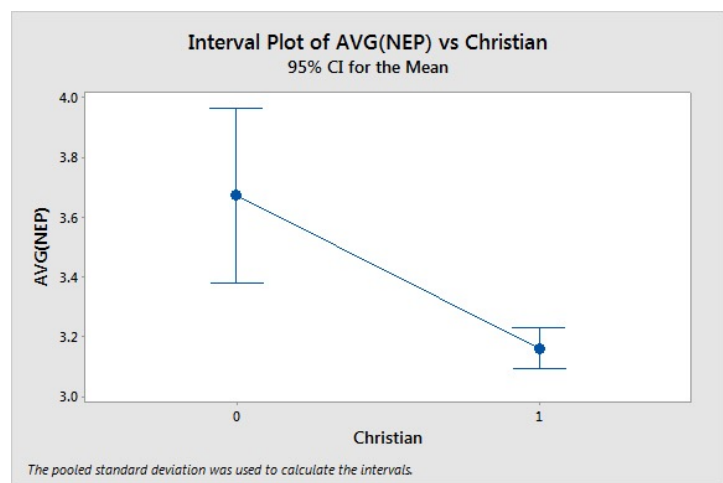


Figure 1: Non-Christian (0) show a much higher endorsement of the NEP than Christian students (1).

the NEP ( $r = -0.23$ ). There was, however, no significant difference in knowledge or behavior scores between Christians and non-Christians.

### ***Environmental Science Class***

Unsurprisingly, those who had taken a course in the Environmental Science department scored significantly higher in the knowledge section than those who had not (84% versus 71%, respectively,  $p$ -value = 0.000, with 95% Confidence Intervals of (80.08, 87.17) and (67.85, 73.82)). The correlation of ENS class participation to knowledge is a respectable  $r = 0.357$ .



Those same students, however, did not show any statistically significant differences in their self-reported behavior or NEP endorsement. I did find a slight difference in means, with those having taken an ENS class expressing greater endorsement of the NEP (3.23 and 3.16, respectively) and higher frequency of pro-environmental behavior (3.51 and 3.42, respectively), but these differences were not statistically significant ( $p>0.05$ ).

### ***Year in School***

There were no apparent relationships, correlations or differences in means between year in school (Freshman-Senior) and average NEP endorsement, knowledge score or self-reported behavior frequencies.

### ***NEP Predicting Behavior***

Both a scatterplot with a fitted line and regression analysis show that greater endorsement of the NEP predicts greater frequency of environmentally friendly behaviors (See Figure 2,  $p=0.001$ ). Scores on the NEP show significant positive correlation with self-reported behaviors, although moderate in nature ( $r=0.23$ ).

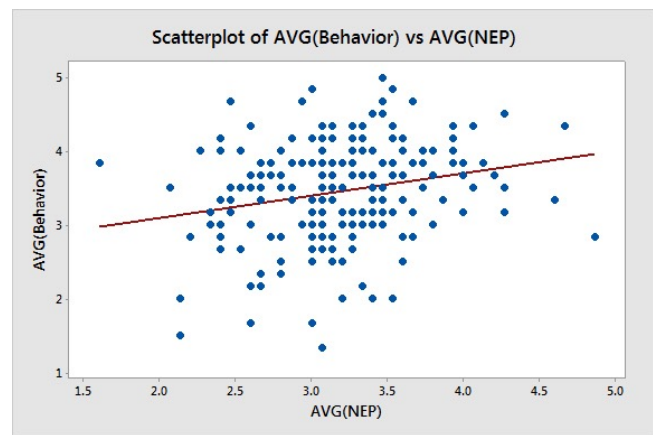


Figure 2: Greater frequency of pro-environmental behavior is reported by those with higher NEP endorsement. A positive correlation ( $r=0.23$ ).

### ***Knowledge Predicting NEP and Behavior***

While a scatterplot with fitted line shows a small positive curve for knowledge predicting behavior and NEP scores, this relationship is not considered significant in my results. Pearson's correlation revealed a mild positive relationship ( $r=0.133$ ) between knowledge a behavior, but the p-value was just a little high (0.057) to be significant.



### ***Independency of Gender and Christian-identity***

Both gender (female) and Christian-identity (non-Christian) predicted a higher NEP score, independently of each other (p-value 0.000).

## ***Discussion of Questions and Hypotheses***

### ***Discussion of Student Averages***

Study Questions: What do students at Taylor University know and think about the environment?  
What is their attitude and behavior toward the natural world?

This survey has revealed many exciting and interesting things about students at Taylor. First, students at Taylor University clearly identify interplay with their faith and environmental care, and most would like to see increased attention to such care at the University. This should be encouraging to educators at Taylor.

Yet student attitudes towards the environment are considered only marginally pro-ecological with their low endorsement of the NEP. The NEP results are the lowest I have seen, in contrast with the averages found in my literature review. Our average of 3.19 is well below those of Universities in New Zealand (3.53), Michigan (3.51) and Pennsylvania (3.42), as well other international and state studies, many in the 3.5-4.5 range (Dunlop et al. 2000, Hawcroft and Milfont 2010).

Still, the lower score on the NEP is somewhat understandable, given the relatively anthropocentric paradigm of the Christian faith. The low scores on the more anthropocentric prompts, as noted in the results section, suggest some Christian beliefs could definitely be at play. The great difference between the non-Christian and Christian mean scores (3.67 and 3.16,



respectively), also supports this idea. The discussion in the literature review addressing the discord between the anti-anthropocentric New Ecological Paradigm and Christian beliefs seems well warranted (more on this below). Further exploration of how best to assess environmental attitude on campus could be useful as the school develops sustainability initiatives and student outcomes. Perhaps a scale of anthropocentric-oriented environmental concern, more focused on stewardship, justice and eco-theology, would be better suited for largely Christian groups.

With regard to what students know, Taylor students did fairly well with the knowledge portion of the survey (average of 9.14 correct), reflecting results common to those with college degrees. Students who had taken an environmental science course (with 10.0 correct, versus 8.5 correct from those who had not) increased our overall average to above that seen on national levels (8.6 for respondents with a college education, Coyle 2005), and above scores from ninety psychology students at University of Michigan (average of 8.60 correct). This is also encouraging news for the Environmental Science Department and Taylor University. Still, more than 3 out of 10 students could not pass a basic test of environmental knowledge. Undoubtedly, some students lack sufficient knowledge of basic environmental systems and our interactions with our natural resources. As noted, research indicates this lack can lead to poor decision-making and behavior, and leaves some room for growth at Taylor.

With regards to behavior, student results were rather unsurprising. Long showers and high heat in the winter are luxuries of dorm life, when the consequences for such behavior (like higher energy costs) are non-existent. Students who do practice these behaviors are likely then doing so out of at least some concern for the environment and our natural resources, lending credibility to the behavior scale. Likewise, many students did express a desire to care for the environment and reported reducing electricity use with lights and appliances, turning off the water when brushing



and recycling more often than not. These are the top three reported behaviors in national surveys, with histories of public service campaigns and relatively convenient to practice (Coyle 2005). Taylor's recycling program and outreach makes regular recycling fairly straightforward for students.

### ***Predictive Ability of Year at School***

Study Question: Do students at Taylor University exhibit a difference in environmental knowledge, self-reported behavior and attitude correlated with their year at university? (Null hypothesis: No difference)

With regard to year in school, I found no difference in knowledge, environmental attitude or behavior based on a student's grade level at Taylor. This means I must accept my null hypothesis; there is no difference in knowledge, attitudes or behavior related to year at Taylor. However, I should note that the survey was conducted halfway through the school year, so freshman had already been influenced by Taylor's community for nearly a semester. Some of the freshman had already taken an ENS class, or experienced other classes and programs influencing their environmental attitudes, knowledge and behavior.<sup>3</sup> A longitudinal study of incoming freshman would be more indicative of change in individuals over their tenure at Taylor, if there is such a change to be seen. This lack of difference, however, may also indicate a place of potential growth for Taylor University.

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<sup>3</sup> For example, a freshman student wrote the following in the comment box at the end of the survey: "The Foundations segment with Dr. Cramer and reading Futureville by Skye Jethani really opened my eyes to our duty as Christians to be good stewards of creation. Without his influence, I'd be mostly indifferent on the issue."



## ***Predictive Ability of ENS Class Involvement***

Do students at Taylor University exhibit a difference in environmental knowledge, self-reported behavior and attitude based on their experiences with the Environmental Science Department? (Null hypothesis: No difference)

A student's participation in an Environmental Science course did predict a higher score on the environmental knowledge portion of the survey. I reject this null hypothesis, noting that ENS courses are successful in increasing, at least in the short term, basic environmental knowledge of students.

However, I must accept the null hypothesis for self-reported behavior and environmental attitudes. While there were slightly higher means for those having taken an ENS course in environmental behavior and attitude, they were not statistically significant. Again, while this survey is not as robust and could be, not capturing the full intentions and beliefs of students, and administered so soon after many completed their ENS course (not allowing time for much change in student attitudes and behavior), this may indicate some areas that need focus and intentionality in the Environmental Science department. These findings could be helpful for the department as they work to develop courses meant to create agents of environmental change. For example, do ENS and other courses addressing creation stewardship at Taylor work to address the reality of eco-crises, limits to human growth and natural resources, our limited ability and right to control nature, and the intrinsic value and delicacy of the natural world? If so, we might hope to see a significantly higher NEP endorsement in students having taken these classes, as researchers have found at other Universities (Rideout 2005, Kuo and Jackson 2014, Harraway et al. 2012). If we are impacting students with the limits of our natural resources and the importance of conservation, we might also hope to see increased frequency of pro-environmental



behaviors. Researchers have noted that higher NEP scores are often correlated with higher tendencies to conserve and recycle (Shephard et al. 2009).

### ***Correlations of Knowledge, Behavior, Attitude and Gender***

Study questions: Are environmental knowledge, self-reported behavior and environmental attitude related? Are there correlations? Does gender predict anything? (Null hypothesis: No relationships)

While some studies have found correlations between environmental knowledge and environmental attitude and behavior, the present study notes the inability of knowledge to significantly predict behavior or attitude. This is perhaps due to the complicated nature of these relationships, as noted in the literature review. We know there is not a direct path from environmental knowledge to pro-environmental behavior. Also, the behavior section of this survey could be better developed to capture the pro-environmental behaviors of college students. Possible indicators of pro-environmental behavior are wide and varied. Kaiser and Fuhrer extend environmental behavior to include “political activism, consumerism, commitment to environmental organizations and so forth” (2003). I avoided many of these areas based on situational and social constraints/barriers, given the limited scope of the survey in teasing out these aspects of behavior. For example, the ability to purchase ecologically-produced goods (like organic or carbon-free and products with higher recycled content) and donate to environmental causes is often cost-prohibitive to college students, representing an external, practical barrier to pro-environmental behavior (Kollmuss and Agyeman 2002). No such barriers exist in the case of water and electricity reduction in the dorms.

Ultimately, when trying to find simple relationships between knowledge, attitude and behavior (without delving into the “how” and the “why” of behavior), previous studies support my use of



easy-to-perform, low-cost, daily actions. Perhaps a simple increase in the number of behavioral prompts would increase the reliability of the behavior scores (Casey and Scott 2006). For example, while surveying college students, Levine and Strube (2012) used some of the same everyday behavioral indicators as this study, but also included 5 more (i.e. using public transportation whenever possible, reducing the use of AC in the summer, etc.) and achieved an interval consistency of 0.83 (far above my alpha of 0.60).

Despite the limits of the behavior section of this survey, the positive relationship found between NEP and behavior is quite common. Both the survey's original creators, as well as other researchers, have supported the NEPs predictive ability for environmental behavior (Dunlop et al. 2000, Casey and Scott 2006). The fact that this relationship is found in the present study, despite the possible presence of unique Christian interactions, further indicates its reliability. The rationale in this case is fairly straightforward, given the focus of the NEP on the limits of growth, resources and human rights, and the delicacy and intrinsic value of the natural world; if we ascribe to such a paradigm, our behavior will likely be more conservative in nature.

With regards to gender, the relationships found in this present study support those in other studies. That is, females endorse the NEP to a greater extent, with a more ecocentric attitude than men. Females also self-report participating in more environmentally friendly behavior than males. This may be due to the traditional socializing of women as caregivers, nurturers and protectors (Casey and Scott 2006). Men, also as noted, tend to score higher on the knowledge section. While this does not necessarily mean much for Taylor's planning and development, it does provide further development of the survey tools themselves.



## ***Faith-based Attitudes and Beliefs***

Study Questions: Do students at Taylor have faith-based environmental attitudes? How do they differ from or relate to the NEP?

Clearly students at Taylor have faith-based environmental attitudes. While they struggle to endorse some of the NEP statements, their immense agreement with a few of the faith-based prompts and their desire to see Taylor increase its stewardship initiatives<sup>4</sup> supports the idea that Taylor students are ready to engage in the conversation and relate their faith to environmental ethics. This is an opportunity for Taylor to develop the environmental attitudes and eco-theology of students within our Christian worldview. The even splits of respondents on some of the faith prompts, and the great number of “unsure” responses, also indicate opportunities for the theological and ethical development of students.

To some extent, Taylor students reflect national trends in America. Some 37% of surveyed students agreed that God made nature to serve humans, similar to the PRRI’s study that found one-third of Americans believe “God gave human beings the right to use animals, plants, and all other resources of the planet solely for their own benefit” (Jones et al. 2014). And the vast majority (91%) agreed with “Because God made the world, it is wrong to abuse it,” just as Kempton et al. found in their national study (1995).

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<sup>4</sup> There was very little difference between “sustainability” (mean=3.867) and “stewardship” (mean=3.976) in the Taylor prompts (72% and 77% agreement, respectively), but a slight preference for stewardship reflects the language currently in use at Taylor. The term “stewardship” tends to evoke greater spiritual implications in the Christian faith.



While identity with the Christian faith predicted a lower NEP score (less eco-centric thinking), it did not relate (positively or negatively) to either environmental behavior or environmental knowledge. This supports the work of other researchers who find Christians tend to endorse the NEP to a lower extent than non-Christians but that “there is no good evidence that the biblical emphasis on dominion results in environmental neglect” (Hitzhusen 2007).<sup>5</sup> That being said, because of the positive relationship found between NEP and behavior ( $r=0.23$ ), we should consider further the relationship between our beliefs and our behaviors. In anthropocentric paradigms, concern for the environment is related to nature’s value in promoting and sustaining human flourishing, rather than its intrinsic value. In this case, pro-environmental behavior is often hindered by perceived conflict with other desirable human-centered outcomes, like human comfort, convenience of behavior, “quality of life and the accumulation of wealth” (Casey and Scott 2006). Of course, the tension between human comfort and ecological health is ubiquitous, but how we act in response clearly has a great deal to do with our values and beliefs. If Christians are developing their environmental care ethics within an anthropocentric paradigm, care must be taken to address this tension with great respect to our Creator and His precious creation.

With regard to other Biblical influence on the development of creation care ethics, I found that while the majority of respondents believe the Bible indicates the imminent destruction of the

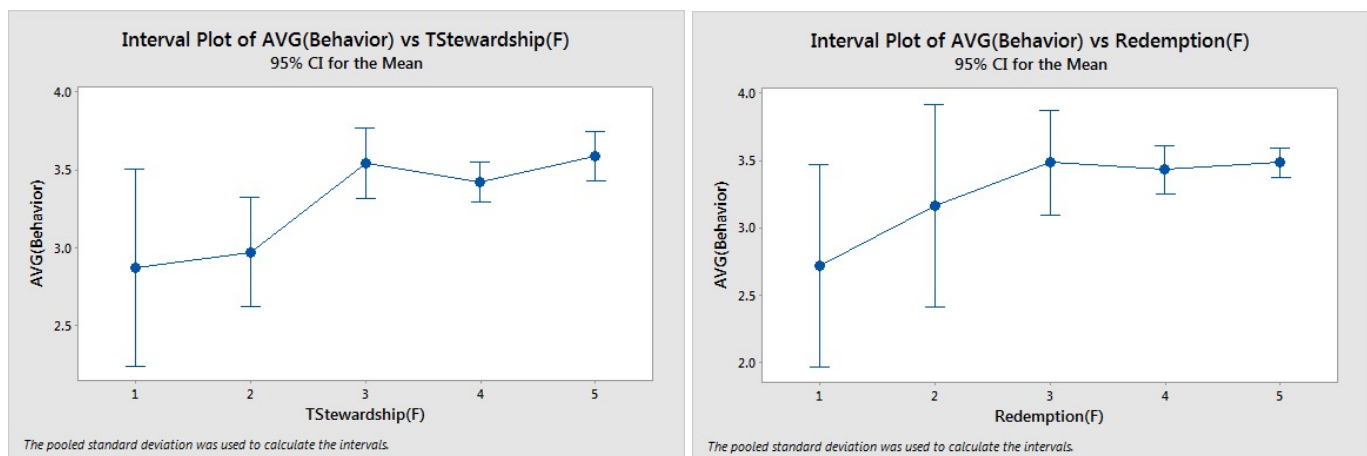
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<sup>5</sup> I should note that I had a very small sample size of students not identifying as Christians ( $n=11$ ), so significant differences between Christians and non-Christians are noteworthy, and the small sample size means that most differences are not significant. This does limit the usefulness of the results and we should take care to use them to speak only to this unique population.



material world, their level of agreement with this statement did not predict their NEP or behavior scores. This may mean students' apocalyptic beliefs are not negatively affecting their environmental concern and behavior. In fact, these same students overwhelmingly agreed that it is the work of a Christian to participate with our Creator in the redemption of Creation and because God created the world, it is wrong to abuse it. It would be helpful to learn more about student beliefs in this area with further research. Do they think the environmental crises we face are tied to the end times, or consequences of our human actions, or are both factors at play and intertwined (Jones et al. 2014)?

Interval plots of the relationship between environmental behavior and level of agreement with two of the faith-related prompts shed further light on the interplay of faith and behavior (see



Figures 3 (left) and 4 (right): A trend in self-reported pro-environmental behavior averages is seen amongst students who agree with faith related statements. Figure 3 shows agreement (5 = strongly agree) with “Taylor University should emphasize and pursue more stewardship of creation.” Figure 4 shows agreement with “It is the work of a Christian to participate with our Creator in the redemption of Creation.”

Figures 3 and 4). The plots suggest that students who agree that Taylor should pursue greater stewardship of creation (figure 3) and that Christians are to participate with the Creator in redeeming creation (figure 4) appear to report higher frequency of pro-environmental behavior.



The Pearson correlation of those who agree Taylor should pursue more stewardship of creation and their reported frequency of pro-environmental behavior is 0.196 ( $p\text{-Value} = 0.005$ ). This means those who want Taylor to engage in more stewardship activities also report engaging in moderately more stewardship-related activities themselves.

Clearly there is more at work here than Lynn White's overly simplistic model, as others have noted. For example, Kanagy and Nelsen (1995), in their study "Religion and Environmental Concern: Challenging the Dominant Assumptions," used the White hypothesis as a jumping point, looking for empirical evidence to either support or challenge White's declaration. They were very critical of studies that do not allow for principles of stewardship as environmentalism when surveying Christians; surveys with anti-mastery and ecocentric wording may unnecessarily bias Christian responses. They note studies of Christians that find a negative correlation with NEP (as expected) but a positive correlation with pro-environmental behavior (unexpected). For their particular study, they asked specific questions about people's beliefs and religious behavior (church attendance, etc.), and then correlated them with environmental values (desire to increase spending to protect the environment, etc.). Ultimately, they found that any one of the religious variables could not significantly predict the environmental variables. None of the religious variables even predicted identifying as an environmentalist. While they found some support for White's theory in a couple of instances, they found opposition to White's hypothesis in others.

I believe these complicated relationships are found in this present study. It may be that even ecologically-minded Christians do not identify with the "ecological paradigm" and instead find their basis for environmental stewardship and behaviors in a different paradigm entirely. The NEP scale would not then be sufficient to capture the environmental attitude outcomes we desire



at faith-based institutions.<sup>6</sup> The NEP may be insufficient to capture the true environmental attitudes of Christians in general.

Some respondent comments shed further light on their struggle to reconcile their beliefs with the NEP and belief prompts:

A senior, female student wrote:

A few questions seemed a bit frustrating to me. I believe that the current material world will be destroyed but I believe there will be a new earth. I don't know how, but I think there will be a restored and new earth full of beautiful nature and animals. Also, I think that Humans were told to rule over the world and subdue it but that does not mean I think we should subject animals to abuse . . . I believe animals have as much of a right to the earth as humans, but if I had a choice between saving a human life and saving any number of a kind of animal I would always choose the person . . . But that does not mean mankind should be able to do whatever it wants with the natural world. I think we need to care well for it. I guess some of the questions mad [had] more than one or two sides to them and I didn't feel like I could express my opinions in the format the survey was in.

A senior, male student wrote:

I believe that some of the prompts, particularly on the first two pages, have multiple meanings to the Bible-believing Christian aware of both the Biblical account and environmental science. For instance, prompts pertaining to the end of the world (whether related to overpopulation, global warming, etc.) can be interpreted in two distinct ways as in the case of global warming: the prevailing evangelical opinion is that God will consume the earth with fire (2 Peter 3:7) upon His physical return which will result in the destruction of the physical material world and the recreation of a new (in at least some sense) physical/material world (Revelation 21). Clearing up these ambiguities could be helpful . . . because students, such as myself, would answer prompts in a completely opposite manner

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<sup>6</sup> I believe it would be helpful to utilize this survey at another Christian University to see if similar trends and relationships emerge. This would help confirm the need for options other than the NEP in assessing environmental attitudes at faith-based institutions.



were the prompts worded only slightly differently (though the difference may seem to you/others to be inconsequential).

Far from being inconsequential, these “ambiguities” are important for the Christian and broader community to consider as we approach environmental education and educational assessment. Understanding the interplay of our faith and environmental care, in light of Biblical studies, environmental studies, student studies and more can help us determine how best to proceed as a University and Christian community.



## ***Sampling concerns***

The behavior section of the survey should be interpreted carefully, beyond the reasons listed above. First, self-reported behaviors are not actual behaviors. Secondly, the behavior section was ordered after the NEP portion of the survey. Some answers could be perceived as socially desirable, especially after the NEP section, so students may have reported greater frequency of involvement despite the anonymous nature of the survey.

This study did not ascertain the political beliefs of students, although liberalism has been shown to predict greater endorsement of the NEP by multiple studies (Dunlop et al. 2000). This variable may be at play in the current study as conservative Christians often identify as politically conservative. Unfortunately, my survey does not allow for liberal/conservative distinctions in politics ideology or religious beliefs (Clements et al. 2014).

I may also have introduced bias by not including incomplete NEP surveys in the results and analysis. Those who quit the survey without finishing the NEP portion (N=48, or 19% of those who clicked past the first page of the survey) may be those who have less concern for environmental studies at Taylor.

Lastly, it is important to note that students who self-identify as non-Christians at Taylor very likely have at least some history with the Christian faith and church. Christian faith and community is a focus at Taylor, and all students are required to submit a statement of faith for admission, as noted. Without having asked more direct questions about faith, or having allowed for more open-ended responses from students (beyond a yes/no), it's difficult to know what a "no" response to the question "Do you consider yourself a Christian?" actually means.



## ***Summary and Conclusion***

Sustainability initiatives are growing in importance to universities around the world, with pressure from both inside and outside institutions to increase these initiatives. This study finds similar incentive to increase our pursuit of sustainability and environmental ethics at Taylor University; from our students, the Christian Church, and our global community. The vast majority of survey respondents agreed that Taylor should focus more on stewardship initiatives. They believe environmental management to be a valuable Christian vocation, and recognize that their faith relates to environmental care. They recognize the importance of working with the Creator in redeeming creation and affirm that “because God created to world, it is wrong to abuse it.” Yet many are unsure that this work is an imperative of their Christian faith, as seen in the split agreement/disagreement over the statement “A person can be completely devoted to following Jesus without actively taking care of the environment.” A large majority of students also agreed (or were unsure) that the Bible indicates the imminent destruction of the world, although agreement with this belief failed to significantly predict the frequency of pro-environmental behaviors. While these various faith-related beliefs and attitudes appear to conflict, they present an opportunity for Christian institutions and researchers to develop more insightful and pertinent survey questions for Christian respondents.

The use of the New Ecological Paradigm as a single construct is supported by this study. The NEP results support the reliability of specific relationships found in the literature; females endorsed the NEP to a greater extent than males, and the NEP showed moderate predictive ability for pro-environmental behavior. These relationships may help further develop the NEP as an assessment tool.



However, given the uniquely low value of Christian endorsement of the NEP scale in this study, the NEP appears insufficient to gauge environmental attitude in a Christian context. The small number of non-Christian respondents in this study limits our ability to differentiate between Christians and non-Christians, but the significant difference in the NEP endorsement between the two groups and the lack of differences in behavior and knowledge scores supports the need for further research in this area. That is, research on specific Christian interactions with the NEP scale is warranted both at Taylor and in the broader research community. The dichotomy of the secular anthropocentric and ecocentric paradigms assessed by the NEP scale may not be the most useful for gauging environmental attitudes in a Christian environment; especially as they fail to capture the concepts of stewardship and redemption, so central in Christian eco-theology.

Further study of pro-environmental attitudes at Taylor specifically would be helpful to determine the theological and ethical basis for creation care, and to determine how best to promote these attitudes within our student population. Development of faith-based environmental conversations between departments at Taylor and with other Christian institutions would be helpful in further understanding and forming the ecotheology of our students. A faith-oriented assessment tool, including indicators for stewardship, justice, Christian responsibility, Creator/creation beliefs, eschatological beliefs, and other important concepts in Christian ecotheology could then be developed for Taylor University and other Christian institutions.

Yet the NEP scale is not wholly irrelevant. Many of the indicators are desirable attitude outcomes of environmental science curriculum, Christian or otherwise. For example, the Environmental Science (ENS) Department endorses the reality of human-induced eco-crises, limits to our natural resources, our limited ability and right to control nature, and the intrinsic



value and delicacy of the natural world. The NEP scale could remain a useful tool for assessing these values, especially given its reliability and widespread use.

This study also finds no statistically significant evidence that the students surveyed at Taylor differ in environmental attitude and behavior based on their year of study or ENS class enrollment at Taylor. Although lacking the evidence of a longitudinal study, this may mean that student environmental attitude and behaviors have been largely unaffected by their experiences at Taylor. With reference to the knowledge, however, it is clear that the work of the Environmental Science Department (via environmental science classes) increases student environmental knowledge, at least in the short term. Knowledge scores of the respondents reflect those of others with college educations in national surveys. Still, more than one-third of students did not receive a passing grade on the knowledge portion of the survey. In keeping with Taylor's mission to develop students in citizenship and leadership, there is a need for development of curriculum and programming at Taylor for fostering environmental ethics, literacy, concern and behavior. This study may help environmental education planning and determine target groups for sustainability initiatives. It could also serve as a benchmark study to help gauge progress in these areas.

Overall, while it is clear that students care about the environment, and understand that such care is related to their faith, they may not have the requisite theology, knowledge and skills needed to make pro-environmental decisions and develop pro-ecological attitudes. Development of robust eco-theologies, related programming and curriculum, and relevant assessment tools at Taylor and in the broader Christian community is warranted by this study.



## ***Acknowledgements***

Dr. Nick Babin, for his countless hours serving as consultant, mentor, guide and teacher. Your generosity and expertise made this project possible. Thank you for both.

Dr. Mike Guebert, for his never-ending devotion to Creation Care development at Taylor University. Thank you for your vision, advice and encouragement.

Dr. Grace Miller, for her passion for and pursuit of sustainable living and education at Indiana Wesleyan University. Thank you for your generous input and encouragement.

Dr. Ken Constantine, for his valuable time and expertise acting as a statistics advisor.

Mr. Leland Boren, for his funding and vision for the Environmental Science Department at Taylor.

My family, for their patience and generosity. You have all been so kind to me.



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## ***Appendix***

### ***Survey Participation Statement***

Thank you for helping me complete my Masters of Environmental Science Thesis project! This survey should take only about 10 minutes to complete.

This survey examines your environmental knowledge, attitudes and behaviors. By participating, you may benefit by becoming aware of some of your own biases and gaps in your knowledge. Your involvement will also help our Taylor community! Results from this survey could help improve student development and curriculum and Taylor University. We don't foresee any costs, risks or discomfort for you as a participant.

Your response will be kept anonymous and confidential, shared only in summary form. We will not collect personal identification information. Your participation in the survey is voluntary and you may stop at any time and resume the survey later as desired. All of the questions are optional.

The results from the survey will be available in the Spring of 2015 at Taylor. The final paper analyzing and disseminating the data will be available in the Environmental Science Department after the Spring of 2015.

Contact the principle investigator, MES Candidate Kathryn Rudy at [kathryn\\_rudy@taylor.edu](mailto:kathryn_rudy@taylor.edu) or 815.520.0405 if you have any questions about the research or methodology. For inquiries regarding the participation and rights of research subjects, please contact Taylor University's Institutional Review Board at [IRB@taylor.edu](mailto:IRB@taylor.edu) or the Chair of the IRB, Susan Gavin at 756998-5188 or [ssgavin@taylor.edu](mailto:ssgavin@taylor.edu).

Please answer each of these questions honestly, reflecting your current knowledge, beliefs and behavior. Thank you for your help!



# ***Foundational Core of Taylor University***

## **2. Civic Mindedness**

Civic mindedness involves an understanding of ideals and practices of citizenship critical to full participation in a democratic society. Greater global interdependence, illustrated by the volume of international news, communication, trade, and travel, requires more awareness of a variety of social, political, and economic systems throughout the world. Informed citizens need to have a systematic knowledge of the structure and processes of economic, political, and social systems, as applicable in a local, national, or international context. Civic mindedness entails citizens valuing knowledgeable participation in the public forum for the public good.

### **Outcomes**

1. Students will acquire knowledge of political and economic systems, and of diverse cultures and subcultures to understand current events and to have an informed opinion of these issues.
2. Students will assess, analyze, and knowledgeably participate in public discourse.
3. Students will respect and evaluate diverse opinions related to local, national, and international issues.
4. As a portion of their Christian responsibility, students will participate in local, national, and international institutions and civic organizations in order to fulfill God's mandate to be salt and light to the world.

## **5. Quantitative and Scientific Literacy**

Quantitative and scientific literacy involves theoretical, experimental, observational, and computational exploration in the context of collaboration; this entails problem solving in teams and communicating the results in a clear and logical way. Quantitative and scientific literacy enables students to explore God's creation, investigate contemporary human challenges, and use technology thoughtfully in the context of human interaction. Wise and ethical decisions that demonstrate effective stewardship of our God-given resources are the hallmark of quantitative and scientific literacy.

### **Outcomes**

1. Students will apply quantitative and scientific models to solve real-world problems.
2. Students will clearly communicate quantitative and scientific results using words, tables, graphs, and other formats as appropriate for the intended audience.
3. Students will articulate the value of natural science, mathematics, and computational technology as a means of understanding their world.
4. Students will identify, and explain, the importance of the ethical uses of science and technology in their everyday lives.

## **6. Responsible Stewardship**

Stewardship entails respect of and responsible oversight for that which belongs to another. Christian stewardship recognizes God as Creator and Owner of all things and Endower of our skills, abilities, talents, and resources. The response of the believer should be to manage purposefully all spiritual, intellectual, natural, personal, economic, technological, and physical resources provided by God with individual and social responsibility. This responsibility involves acknowledging the costs and benefits of such stewardship. As the intended caretaker, humankind is commissioned to devise and employ strategies to care for God's creation. Responsible stewardship also includes using one's body, time, talents, and personal resources in a God-honoring manner in one's vocation and personal ministry to others; one's physical, social, and spiritual wellbeing; and one's service to Him and to others in the world in which we live.

### **Outcomes**

1. Students will explain the scope of responsible Christian stewardship for all that God has created.
2. Students will demonstrate responsible use of their minds, bodies, abilities, and resources.
3. Students will identify the costs and benefits involved in the wise, responsible, moderate, and sustainable use of their resources.
4. Students will practice wise stewardship of creation in their personal lives, vocations and ministries in their communities and the world to honor God and to serve others.

## **7. Spiritual Maturity**

Spiritual maturity is the mark of a vibrant, personalized, growing faith in Jesus Christ. Students who are spiritually mature have developed a solid faith foundation, grounded in the knowledge of Scripture in its entirety, which they intentionally integrate into every aspect of their lives. This is primarily exhibited in Christ-like character (or the fruit of the Spirit), and the regular practice of spiritual disciplines including prayer, Bible study, corporate and personal worship, stewardship, and service. The foundational core curriculum will provide students with the skills by which they are able to formulate and support a personal, growing, evangelical, orthodox Christian faith.

### **Outcomes**

1. Students will articulate the biblical foundations of their faith and explain how they impact daily life.
2. Students will practice biblical principles of a growing Christian faith as evidenced by spiritual disciplines.
3. Students will express the philosophical and theological arguments which shaped the doctrinal understandings of the Christian faith
4. Students will assess cultural values and practices in the light of biblical theology to influence culture for the Kingdom of God.



## ***Select written comments from students post-survey:***

I believe that some of the prompts, particularly on the first two pages, have multiple meanings to the Bible-believing Christian aware of both the Biblical account and environmental science. For instance, prompts pertaining to the end of the world (whether related to overpopulation, global warming, etc.) can be interpreted in two distinct ways as in the case of global warming: the prevailing evangelical opinion is that God will consume the earth with fire (2 Peter 3:7) upon His physical return which will result in the destruction of the physical material world and the recreation of a new (in at least some sense) physical/material world (Revelation 21). Clearing up these ambiguities could be helpful (though it is probably too late in the process for this), but I thought that it would at least be helpful for you to be aware of this because it may affect the results of your survey on such prompts because students, such as myself, would answer prompts in a completely opposite manner were the prompts worded only slightly differently (though the difference may seem to you/others to be inconsequential). Male, Senior, Humanities, Arts and Biblical Studies

Dr. Guebert has been a tremendous influence on my opinions about environmental protection and stewardship of the Earth. I wish that more profs shared his passion for the subject. Female Senior, Humanities, Arts and Biblical Studies.

A lot of these questions were loaded in the sense that respondents would feel bad about disagreeing, for example the question about "since God created the world, we should take care of it." Questions like these contain a social desirability bias...you may take that into account if you get wacky data. Regardless, good luck with your survey. Senior, Female, Education, Social Science and Business

A few questions seemed a bit frustrating to me. I believe that the current material world will be destroyed but I believe there will be a new earth. I don't know how, but I think there will be a restored and new earth full of beautiful nature and animals. Also, I think that Humans were told to rule over the world and subdue it but that does not mean I think we should subject animals to abuse because we want food or something else. I believe animals have as much of a right to the earth as humans, but if I had a choice between saving a human life and saving any number of a kind of animal I would always choose the person. I believe they have souls and animals do not. But that does not mean mankind should be able to do whatever it wants with the natural world. I think we need to care well for it. I guess some of the questions had more than one or two sides to them and I didn't feel like I could express my opinions in the format the survey was in. But I appreciated the survey and the questions raised. Thank you. Good luck with your research! Senior, Female, Humanities Arts and Biblical Studies.

The Foundations segment with Dr. Cramer and reading Futureville by Skye Jethani really opened my eyes to our duty as Christians to be good stewards of creation. Without his influence, I'd be mostly indifferent on the issue. Freshman, Female, Humanities, Arts and Biblical Studies.

While I feel that environmental protection is beneficial, it also feels Taylor's sustainability is more political than it is helping the earth. Senior, Female, Humanities, Arts and Biblical Studies

With Taylor doing more in stewardship. I believe that Taylor is already doing such a great job that they don't need to add more areas of stewardship they just need to be excellent at what they have already started doing. Male, Senior, Social Science, Education and Business.



## Sample Survey Selections: NEP & Faith

| <i>Please read the following statements and respond using the scale provided.</i>                          | Strongly Disagree | Mildly Disagree | Unsure | Mildly Agree | Strongly Agree |
|--|-------------------|-----------------|--------|--------------|----------------|
| 1. We are approaching the limit of the number of people the earth can support.                             |                   |                 |        |              |                |
| 2. Humans have the right to modify the natural environment to suit their needs.                            |                   |                 |        |              |                |
| 3. It is the work of a Christian to participate with the Creator in the redemption of Creation.            |                   |                 |        |              |                |
| 4. When humans interfere with nature, it often produces disastrous consequences.                           |                   |                 |        |              |                |
| 5. Human ingenuity will insure that we do NOT make the earth unlivable.                                    |                   |                 |        |              |                |
| 6. Humans are severely abusing the environment.  |                   |                 |        |              |                |
| 7. Because God created the world, it is wrong to abuse it.   |                   |                 |        |              |                |
| 8. The earth has plenty of natural resources if we just learn how to develop them.                         |                   |                 |        |              |                |
| 9. Plants and animals have as much right as humans to exist.   |                   |                 |        |              |                |
| 10. The balance of nature is strong enough to cope with the impacts of modern industrial nations.          |                   |                 |        |              |                |
| 11. The Bible indicates an imminent destruction of the material world.                                     |                   |                 |        |              |                |
| 12. Despite our special abilities, humans are still subject to the laws of nature.                         |                   |                 |        |              |                |
| 13. The so-called global warming/ecological crisis facing humankind has been greatly exaggerated.          |                   |                 |        |              |                |
| 14. A person can be completely devoted to following Jesus without actively taking care of the environment. |                   |                 |        |              |                |
| 15. The earth is like a spaceship with very limited room and resources.                                    |                   |                 |        |              |                |
| 16. Humans were meant to rule over the rest of nature.   |                   |                 |        |              |                |
| 17. The balance of nature is very delicate and easily upset.   |                   |                 |        |              |                |
| 18. Humans will eventually learn enough about how nature works to be able to control it.                   |                   |                 |        |              |                |
| 19. If things continue on their present course, we will soon experience a major ecological catastrophe.    |                   |                 |        |              |                |
| 20. God created nature to serve humans.  |                   |                 |        |              |                |
| 21. Taylor University should emphasize and pursue more stewardship of creation.                            |                   |                 |        |              |                |



## Sample Survey Selections: Behavior and Knowledge

| Please read the following statements and respond using the scale provided.   | Never | Rarely | Some-<br>times | Often | Always |
|--|-------|--------|----------------|-------|--------|
| 1. I recycle everything I can: plastic, newspapers, glass, etc.              |       |        |                |       |        |
| 2. I take short showers to limit water use.                                  |       |        |                |       |        |
| 3. In the winter, I make sure the heat in my room is not turned up too high. |       |        |                |       |        |
| 4. While I brush my teeth, I leave the water running.                        |       |        |                |       |        |
| 5. I turn off lights and electrical appliances when not in use.              |       |        |                |       |        |
| 6. Whenever possible, I ride my bike and walk rather than drive a car.       |       |        |                |       |        |

### Select the best answer:

1. There are many different kinds of animals and plants, and they live in many different types of environments. What is the word used to describe this idea?

- a. Multiplicity
- b. Biodiversity
- c. Socio-economics
- d. Evolution
- e. Don't know

2. Carbon monoxide is a major contributor to air pollution in the U.S. Which of the following is the biggest source of carbon monoxide?

- a. Factories and businesses
- b. People breathing
- c. Motor vehicles
- d. Trees
- e. Don't know

3. How is most of the electricity in the U.S. generated?

- a. By burning oil, coal, and wood
- b. With nuclear power
- c. Through solar energy
- d. At hydro-electric power plants
- e. Don't know

4. What is the most common cause of pollution of streams, rivers, and oceans?

- a. Dumping of garbage by cities
- b. Surface water running off yards, city streets, paved lots, and farm fields
- c. Trash washed into the ocean from beaches
- d. Waste dumped by factories
- e. Don't know

5. Which of the following is a renewable resource?

- a. Oil
- b. Iron ore
- c. Trees
- d. Coal
- e. Don't know

6. Ozone forms a protective layer in the earth's upper atmosphere. What does ozone protect us from?

- a. Acid rain
- b. Global warming
- c. Sudden changes in temperature
- d. Harmful, cancer-causing sunlight
- e. Don't know

7. Where does most of the garbage in the U.S. end up?

- a. Oceans
- b. Incinerators
- c. Recycling centers
- d. Landfills
- e. Don't know

8. What is the name of the primary federal agency that works to protect the environment?

- a. Environmental Protection Agency (the EPA)
- b. Department of Health, Environment, and Safety (the DHES)
- c. National Environmental Agency (the NEA)
- d. Federal Pollution Control Agency (the FPCA)
- e. Don't know

9. Which of the following household wastes is considered hazardous waste?

- a. Plastic packaging
- b. Glass
- c. Batteries
- d. Spoiled food
- e. Don't know

10. What is the most common reason that an animal species becomes extinct?

- a. Pesticides are killing them
- b. Their habitats are being destroyed by humans
- c. There is too much hunting
- d. There are climate changes that affect them
- e. Don't know

11. Scientists have not determined the best solution for disposing of nuclear waste. In the U.S., what do we do with it now?

- a. Use it as nuclear fuel
- b. Sell it to other countries
- c. Dump it in landfills
- d. Store and monitor the waste
- e. Don't know

12. What is the primary benefit of wetlands?

- a. Promote flooding
- b. Help clean the water before it enters lakes, streams, rivers, or oceans
- c. Help keep the number of undesirable plants and animals low
- d. Provide good sites for landfills
- e. Don't know



## Sample Survey Selection: Departmental Prompts

| <i>Please read the following statements and respond using the scale provided.</i>                     | Strongly<br>Disagree | Mildly<br>Disagree | Unsure | Mildly<br>Agree | Strongly<br>Agree |
|---|----------------------|--------------------|--------|-----------------|-------------------|
| Sustainability initiatives and programs at Taylor positively influenced my decision to attend Taylor. |                      |                    |        |                 |                   |
| I would like to see Taylor emphasize, pursue or otherwise engage in more sustainability initiatives.  |                      |                    |        |                 |                   |
| Environmental Management is a relevant and valuable Christian vocation.                               |                      |                    |        |                 |                   |
| My faith impacts my attitude towards environmental care.  |                      |                    |        |                 |                   |