18A Environmentalism and a New Ethics

(Adapted from the paper "The Changing of the Guard," by Leiffer, P., Graff, R.W., Lee, B.K., and Batts, M., presented at the ASEE Annual Conference, 2009)

Environmental writer Aldo Leopold introduced a new approach to ethics. Leopold suggested in his Sand County Almanac that our interaction with nature should be in terms of what he called a "land ethic," which he defined in this way: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." [1]

The specific terminology and development of "deep ecology" arose from the writings of Norwegian philosopher Arne Naess. Naess called his approach "deep ecology" because it dealt with the deep questions of life and survival.

The eight points of the"Deep Ecology Platform" set forth its basic principles:

"1. The flourishing of human and non-human life on Earth has intrinsic value. The value of non-human life forms is independent of the usefulness these may have for narrow human purposes.

2. Richness and diversity of life forms are values in themselves and contribute to the flourishing of human and non-human life on Earth.

3. Humans have no right to reduce this richness and diversity except to satisfy vital needs.

4. Present human interference with the non-human world is excessive, and the situation is rapidly worsening.

5. The flourishing of human life and cultures is compatible with a substantial decrease of the human population. The flourishing of non-human life requires such a decrease.

6. Significant change of life conditions for the better requires change in policies. These affect basic economic, technological, and ideological structures.

7. The ideological change is mainly that of appreciating life quality (dwelling in situations of intrinsic value) rather than adhering to a high standard of living. There will be a profound awareness of the difference between big and great.

8. Those who subscribe to the forgoing points have an obligation directly or indirectly to participate in the attempt to implement the necessary changes." [2]

One website summarizes deep ecology in these terms: "Deep Ecologists emphasize that human beings are only part of the ecology of this planet, (and) believe that only by understanding our unity with the whole of nature can we come to achieve full realization of our humanity. Deep Ecology believes that all organisms are equal: Human beings have no greater value than any other creature, for we are just ordinary citizens in the biotic community, with no more rights than amoebae or bacteria." [3]

Lawrence Johnson later combined the land ethic of Leopold with the deep ecology of Naess to formulate a system of "morally deep ethics." Johnson develops his philosophy on the following beliefs:

1. "There is an intrinsic moral significance in wildernesses, ecosystems, species, and so forth, in addition to their significance for humans." [4]

2. "If there is a moral universe at all, it must extend beyond the human sphere." [5]

3. "Morality is not the exclusive domain of rational beings…sub-rational animals can act morally, and sometimes do so." [6]

4. "Animals, plants, ecosystems, and even species have interests, and that these interests are, to the extent of each interest, morally significant." [7]

5. The interests of animals and nature include their basic survival and freedom from suffering as experienced by each individual member.

6. Species count more than individual animals.

Johnson's guiding principle for morally deep ethics is the following: "Give due respect to all the interests of all beings that have interests, in proportion to their interests." [8]

The final step in the philosophical transition, promoted by engineering professor George Catalano, was to link Johnson's morally deep ethics to engineering ethics. The noble yet misguided goal expands the boundaries of engineering problems and attempts to develop a new mindset in engineering practitioners.

In 2006 Catalano explained the new thinking as follows: "If we are to make sense of our place in this natural world, we need a very different sense of ethics. One attempt at providing such an ethical framework has been offered by Johnson in his development of a morally deep world…Johnson discusses how non-sentient land can count morally and focuses upon the concept of a living being. For Johnson, a living being is best thought of not as a thing of some sort but as a living system, an ongoing life-process. A life-process has a character significantly different from those of other processes such as thermodynamics processes for example. Our character, as living beings, is the fundamental determinant of our interests." [9]

Environmentally-based ethics and the changing definition of engineering

Environmentally-based ethics essentially redefines the nature of engineering itself. Engineering design is classically understood as a distinctly human endeavor, performed primarily for the

human community. If an activity impacts the environment, we should act responsibly to preserve the environment. If an activity does not affect the environment, we should not weaken its meaning and focus by forcing environmental considerations.

Dym et. describe engineering design in this way: "Design is fundamentally a human endeavor. It involves the interactions among members of a design team, the relationships between designers,

clients, and manufacturers, and the ways that purchasers of designed devices use them in their lives…To design means to accept responsibility for creating designs for people." [10]

The NSPE code of ethics states that "Engineers shall hold paramount the safety, health, and welfare of the public." A recent book (Engineering, Poverty, and the Earth) suggests that "the fundamental canon of the new code of ethics is the following: Engineers, in the fulfillment of their professional duties, shall hold paramount the safety, health and welfare of the identified integral community." [11] This recommendation represents a significant change to the meaning of the ethical code.

Morally deep ethics implies a change to our definition of engineering. According to ABET, engineering is understood to be: "the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of mankind." [12]

A new definition based on morally deep ethics must substitute "the benefit of the environment" or "the benefit of the integrated community" for "the benefit of mankind." Many engineers face issues of public safety, honest reporting, and conflict of interest. Relatively few will be required to consider the broadest aspects of the environment.

Catalano provides an example of identifying the integral community in an engineering decision. The scenario involves a project in the area around White Sands Missile Range in New Mexico:

"Johnson would challenge us to first identify all the members of the community. For this example a listing would include the following:

• Wolves

• Prey animals including domestic sheep and cattle as well as deer, rabbits, coyotes, and others

• Desert lands

• Ranchers and sheep farmers

• Hunters

• US Fish and Wildlife Service and other state and local government agencies

• US Department of Defense

• Residents of White Sands and nearby towns and settlements

• Residents of New Mexico and the entire United States

• Native American residents." [13]

The sheer numbers of variables introduced here make such a problem unworkable. Engineers agree not to practice outside of their area of competence or expertise. In this case, the engineer requires the expertise and knowledge of multiple species. In some design areas it may be

reasonable to pull in a biologist, an environmental engineer, or other expert as a member of the design team, but most engineering decisions do not occur at this level.

The engineering design process would also be modified by basing it upon the environment. In addition to the steps of investigation, reflection, and creation, a new step of transformation would be added: "The fourth and final step asks the following questions of the engineer: Has the suffering in the world been reduced? Have the social injustices that pervade our global village been even slightly ameliorated? Has the notion of a community of interests been expanded? Is the world a kinder, gentler place borrowing from the Greek poet Aeschylus?" [14]

This transformational consideration is a positive idea; however, it is not always possible to examine. (For example, suffering and social justice do not enter in the design of a gear.)

The suggestion has also been made that the ABET Criteria be modified to include an additional outcome for Engineering programs beyond the given outcomes (a) through (k):

"Engineering programs must demonstrate that their students attain… (outcome l) A fully integrative approach to engineering problems incorporating both reason and compassion in the development of solutions." [15]

In addition, the article "Promoting Peace in Engineering Education: Modifying the ABET Criteria" urges three modifications to ABET Criterion 3:

"Modification 1: Promote peace through the development of an individual plan for the lifelong cultivation of an awareness of the interdependence of all and of the qualities of compassion, caution, and reflection…

Modification 2: Promote peace through an improved understanding of other cultures…

Modification 3: Promote peace through employing the principles of peaceful conflict resolution." [16]

While these are noble goals, some will question whether they are measurable skills that are compatible with engineering accreditation.

The change to morally deep ethics could lead to unprecedented results, eventually eroding the practice of engineering since the radical environmental movement often holds hostility to technology itself. Repercussions of this transition would lead to the conclusion that the best action an engineer could take would be to do no engineering at all; that is, simply leave the natural system alone, because the very presence of humans in a natural environment is detrimental to that environment.

De Laplante describes ecological pessimists who "understand natural resources primarily in material terms, as fixed stocks of energy and matter in the environment that are drawn down by human consumption and that have a slow or nonexistent rate of renewal; they use this conception of resource use to argue that human beings are at imminent risk of irreversibly degrading the environmental resource base on which the welfare of current and future generations depends." [17]

Environmentally-

Morally deep ecology is insufficient to serve as a foundation for engineering ethics because of its inherent ambiguity. Virtually all decisions are subjective. Nothing is fixed except the requirement to respect the interests, wellbeing, and moral standing of all living things.

Johnson clearly indicates the limitations of his morally deep ethics: "I must say right now that I cannot offer an adequate formula for determining the nature and scope of our moral obligations. I cannot do so even in the case of humans, and certainly I cannot pretend to do so with regard to the nonhuman world." [18]

Johnson continues, "It would be quite handy if we had an adequate set of moral principles –a philosopher's stone- by means of which we could, at least in principle decide what we ought to do in a given case. However, quite apart from considerations having to do with nonhumans, we humans have not worked out any completely satisfactory set of principles for getting along with one another." [19]

Engineers we are familiar with the need for standards in making measurements. If one cuts a piece of string to a given length he uses a ruler. When cutting several pieces of string of the same length, it is folly to use each successive piece as the measuring instrument for the next piece. If the standard for ethics is not an established constant, our entire system of ethics will eventually become unrecognizable. Morally deep ethics contains no hierarchy of humans and animals, no principles for ethical decision, and no solution for conflicting interests. Environmentally-based ethics creates confusion in design, in the sense that there are no specific guidelines for favoring one species above another. Engineers are called upon to make decisions regarding biological systems far outside their areas of competence.

The issues raised are large:

≠ What does it mean to involve all living forms in an ethical decision? Can we even know all the species that will be affected?

≠ Is it truly possible to predict the effect of decisions on all species in an environment?

≠ Who decides that all living things are equal?

≠ If all things are equal, is anything of special value? Are humans no more valuable than worms?

≠ Who defines the interests, wellbeing, and rights of animals?

≠ Who determines what actions may be taken in the integrated community?

Those who argue for the absolute equality of all living species find themselves facing a contradiction when it comes to human survival. In self-defense we will kill animals that attack us, even if the attack is their normal instinct. We will end the life of plants to have vegetables for

our dinner. We will use antibiotics and sterilizers to kill pathogenic bacteria. In a further step, technology makes life more comfortable for humans by exterminating cockroaches, keeping birds out of orchards, and spraying lawns for weeds. We make a region more comfortable for humans and less comfortable for other local species. In times of emergency (flood, tornado, hurricane, fire) all resources are first directed to the rescue of persons. Environmental considerations are temporarily secondary and are dealt with afterwards.

While humans and other species share the same environment, they are not morally equal. Humans make deliberate large-scale and small-scale choices which could enhance or destroy most living species. (An example would be nuclear warfare.) Humans ask moral questions (moral reflection) and define moral behavior. Humans are morally responsible for their choices.

The foundation for engineering ethics must be a set of values that is codified. Morally deep ethics has nothing specific to say about our particular responsibilities to employers, clients, public users, and other engineers. On the other hand, it is a small logical step from "Do unto others as you would have them do unto you," "Love your neighbor as yourself," and being "your brother's guardian" to defining ethical responsibilities.

Environmentally-base ethics -Requires a shift in worldview

Morally deep ethics specifically requires a shift in worldview. The term worldview, in its broadest sense, means a person's outlook on life. A worldview, more specifically, is a foundational set of philosophical presuppositions about the nature of the universe, a filter through which we deal with reality.

In Catalano's book *Engineering Ethics-Peace, Justice, and the Earth*, the case is made that engineering historically has been based upon a "medieval worldview." Such a worldview was based upon a "great chain of being," with God on top, and the lowest animals on the bottom. Such a view, according to the author, is clearly unacceptable as a base for engineering ethics: "The ethical codes put forward by countless engineering societies and engineering education agencies are by and large locked into a world-view that was first developed in the Age of Enlightenment." [20]

In its foundational presuppositions, environmentally-based ethics follows from a non-Western worldview. A recent article on engineering ethics from a deep ecology foundation suggests a modification of the ABET Criteria to include issues of peace with the planet: "Included in the concept of living at peace with the planet are an ecological consciousness, an understanding and commitment to biodiversity as well as an understanding and commitment to the maintenance of a

natural balance…Ecological consciousness entails identity with the cosmos, an understanding of and respect for evolutionary forces and ultimately a respect for life." [21]

Environmentally-based ethics arises out of deep ecology, in which oneness with nature, rather than our responsibility towards nature, underlies our thinking. This approach has been shown to be most closely aligned with pantheistic beliefs.

We need to distinguish between seeing ourselves as linked to other people and species as fellow creatures and sharers of the earth versus being mystically united with the universe. We should not base our worldview on the environmental results it produces, but rather on its conformance to reality.

The worldview recently suggested for environmentally-based engineering ethics is actually that of "a self-organizing system." [22] This is not a completely defined worldview in that it says nothing about origins or the actual place of humans in the universe.

Environmentally based ethics -Could prove destructive to humans-

If taken to extremes, environmentally-based ethics may be destructive to humans. While the deep ecology and animal rights movements differ in some presuppositions, they share the belief that no value distinctions should be made between animals and humans. Peter Singer, the De Camp Professor of Bioethics at Princeton University's Center for Human Values, contends that animals have the same rights as humans. He also fundamentally agrees with Michael Tooley, a philosopher who states that "new-born humans are neither persons nor quasi-persons, and their destruction is in no way intrinsically wrong". [23]

According to Beissner, "Naess sees and embraces the logical implications of his views: 'Biospherical egalitarianism-in principle…To the ecological field worker, the equal right to live and blossom is an intuitively clear and obvious value axiom. Its restriction to humans is anthropocentrism with detrimental effects upon the life quality of humans themselves…' Or as Earth First! Founder David Foreman puts it, '…man is no more important than any other species…It may well take our extinction to set things straight…' '' [24]

Gardiner warns that, "Deep ecologists demand a large population decrease worldwide. In the platform co-authored by Arne Naess and George Sessions, we find the following statement: 'The flourishing of human life and cultures is compatible with a substantial decrease of the human population. The flourishing of non-human life requires such a decrease.' These two sentences alone expose the dark heart of deep ecology. Their goal is not just zero population growth, but a great decline in human population. That this point was allowed to remain… shows how uncontroversial population reduction had become. Naess taught that the present environmental crisis is chiefly one of population and economics, and that the way to reduce our numbers is by a profound change in 'economics, technology and science, politics, education, philosophy, and religion.'" [25]

For the cases in which, for instance, an addition is made putting preservation of a species on a par with the safety of humans, the engineer may be put into a position requiring a choice between

the safety of humans and the safety of animals or plants. Different presuppositions and different worldviews would produce different results for that choice.

The authors applaud the recent call for an emphasis in engineering on peace, eliminating poverty, and protecting the environment, including the development of modules on peace and justice in engineering. The authors, however, state strongly that a move to environmental, or morally deep, ethics in engineering would be a serious mistake. Such an environmentally-based approach requires a change in the definition of engineering, a change in the ethics code, and a shift in basic worldview. The authors have no desire to leave all mention of the environment out of the Engineering Ethics statement; but the primary concern of the engineer must be to benefit humanity by satisfying stakeholder requirements, not by achieving zero change to the environment. The environment does support mankind, but in the end if it comes to a decision to kill an animal, a plant, or a man, the welfare of a human must always come first. There must be a criterion by which to choose, one or another in the Ethics statement.

References

1. Leopold, Aldo, *A Sand County Almanac*, Ballantine Books, 2005.

2. Naess, Arne, *Ecology, Community and Lifestyle*, Cambridge University Press, 1989, p. 29.

3. "Deep Ecology,"

www.thegreefuse.com.

4. Johnson, Lawrence, *A Morally Deep World: An Essay on Moral Significance and Environmental Ethics*, Cambridge University Press, 1993, p.4

5. Johnson, p. 7.

6. Johnson, p. 73.

7. Johnson, p. 6.

8. Johnson, p. 118

9. Catalano, George ,"Engineering in a Morally Deep World," American Society of Engineering Education Annual Conference, 2006.

10. Dym, C. L., and Little, P., *Engineering Design-A Product-Based Introduction*, Wiley, 2009, p. 294.

11. Catalano, G., *Engineering, Poverty and the Earth*, p. 52.

12. The Accrediting Board for Engineering and Engineering Technology.

13. Catalano (2006).

14. Catalano, G., and Baillie, C., "Engineering, Social Justice, and Peace: A Revolution of the Heart," American Society of Engineering Education Annual Conference, 2006.

15. Ibid.

16. Catalano, G.D., "Promoting Peace in Engineering Education: Modifying the ABET Criteria," *Science and Engineering Ethics*, 2006. (**12**, 399-406)

17. De Laplante, Kevin, "Can You Teach Environmental Philosophy Without Being an Environmentalist?" in *World Views: Environment, Culture, and Religion* 8:198-212, 2004.

18. Johnson, p.185.

19. Johnson, p.190.

20. Catalano,G., *Engineering Ethics*, p. 61.

21. Catalano and Baillie (2006).

22. Catalano (2006).

23. Tooley, Michael,, *Abortion and Infanticide*, Oxford University Press, 1983, p. 411.

24. Beisner, E. Calvin, "Deep Ecology, Neo-Paganism, and the Irrationalism of Global Warming Hysteria," CWIPP Think 2008, Escondido, CA, January 21-24, 2008.

25. Gardiner, A.B., "A Lesson in Deep Ecology," *First Things* Online, Sept.1, 2008,

http://www.firstthings.com/onthesquare/?p=1157