

Environmental Ethics

Forthcoming in K. Kampourakis (ed.), *The Philosophy of Biology: A Companion for Educators*, Springer. There will likely be small changes made during the proof stage.

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Abstract A number of areas of biology raise questions about what is of value in the natural environment and how we ought to behave towards it: conservation biology, environmental science, and ecology, to name a few. Based on my experience teaching students from these and similar majors, I argue that the field of environmental ethics has much to teach these students. They come to me with pent-up questions and a feeling that more is needed to fully engage in their subjects, and I believe some exposure to environmental ethics can help focus their interests and goals. I identify three primary areas in which environmental ethics can contribute to their education. The first is an examination of who (or what) should be considered to be part of our moral community (i.e., the community to whom we owe direct duties). Is it humans only? Or does it include all sentient life? Or all life? Or ecosystems considered holistically? Often, readings implicitly assume one or more of these answers; the goal is to make the student more sensitive to these implicit claims and to get them to think about the different reasons that support them. The second area, related to the first, is the application of the different answers concerning the extent of the ethical community to real environmental issues and problems. Students need to be aware of how the different answers concerning the moral community can imply conflicting answers for how we should act in certain cases and to think about ways to move toward conflict resolution. The third area in which environmental ethics can contribute is a more conceptual one, focusing on central concepts such as biodiversity, sustainability, species, and ecosystems. Exploring and evaluating various meanings of these terms will make students more reflective and thoughtful citizens and biologists, sensitive to the implications that different conceptual choices make.

1 Introduction

Most biologists care about the organisms that they study: the individual organisms themselves, the particular species, or the ecosystems in which those organisms live. As professors or teachers, they are excited to share these passions with their students, and usually find a ready audience. Some even hope to share those passions with the wider public, especially because many species and ecosystems are threatened or endangered. And there are many large-scale human-caused phenomena that threaten organisms and their ecosystems: global climate change, habitat loss, water and air pollution, water shortages, invasive species, human overpopulation, increased extinction rates, etc. Many actions are proposed to deal with these threats: We should reduce our reliance on fossil fuels by providing new transportation and energy options. We should halt large-scale deforestation. We should assist local peoples so that they can afford to live in harmony with the organisms around them. We should improve agricultural methods to reduce impact on the environment. Some even call for widespread vegetarianism, or at least a reduction in the amount of meat consumed.

What is often left out of these discussions – what is often left out of the biology classroom – is *why* we should care about organisms and their ecosystems, and why we ought to consider taking these actions to protect them. Surely it isn't *just* because we find them personally interesting. We would not be considering, and enacting, such sweeping changes if that were all there were to it. And surely, even those who have not chosen to be biologists care about these organisms and ecosystems even if they don't study them every day. As much as we sometimes think of humans as selfish, concerned only with money or with their own needs, widespread support for environmental organizations, environmental initiatives, and environmental reserves and public parks, suggests otherwise. But again, why should we care – why should students study these organisms and their ecosystems, and why should the general public act to protect them? Is it only because humans depend on non-human organisms and ecosystems? Or do the organisms and ecosystems matter ethically themselves?

The area of philosophy that studies these questions in depth is known as *environmental ethics*.¹ Although there are many facets to this field, one of the central ones has explored the question of which entities – only humans, all sentient organisms, all life, or ecosystems considered holistically – are deserving of moral consideration. More importantly, *why*? What characteristics of organisms and ecosystems contribute to or establish their moral status? There is an extensive literature discussing these questions. Of course, it is not expected that biology educators and their students will become environmental ethicists, although people with similar backgrounds can and have contributed productively to the field. Rather, my

¹ In some ways, environmental ethics is a subdiscipline of ethics, and in other ways it is a subdiscipline of the philosophy of biology, but it might also simply be considered a discipline unto itself.

suggestion here is that biology educators and students explore the *reasons* for their beliefs as well as the beliefs of others in order to be more thoughtful about their own research and why it matters, and to be better able to communicate with others who may or may not share their beliefs.

In fact, there are at least three areas of environmental ethics that biology educators could profitably incorporate into their classes. The first is as already mentioned: an examination of who (or what) should be considered to be part of our moral community (i.e., the community to whom we owe direct duties), and why. The second area, related to the first, is the application of the different answers concerning the extent of the moral community to real environmental issues and problems. Students need to be aware of how the different answers concerning the moral community can imply conflicting answers for how we should act in certain cases and to think about ways to move toward conflict resolution. The third area in which environmental ethics can contribute is a more conceptual one, focusing on central concepts such as biodiversity, sustainability, species, and ecosystems. Exploring and evaluating various meanings of these terms will make students more reflective and thoughtful citizens and biologists, sensitive to the implications that different conceptual choices make. In what follows, I describe each of these areas in turn.

2 The Moral Community

In this section I canvass various answers to the question of who (or what) ought to be considered part of the moral community. The answers describe various increases to the moral community, beginning with humans only, expanding to include many nonhuman animals, expanding still further to include all life, and finally, expanding to include entire ecosystems considered holistically. As with pretty much everything in philosophy, each of these views is subject to debate and disagreement. Thus, in what follows, I describe not only the views themselves and the reasons that support them, but also some major objections that have been given to those views. The idea is to give a sense of both strengths and weaknesses of each position.

2.1 Humans only

Traditionally, the field of ethics considers only humans to be part of the moral community; in other words, it is *anthropocentric*. It concerns itself with issues concerning the behavior of humans towards other humans, considering questions such as “is it ever ethical to lie?” or “is there such a thing as just war?” Although a variety of ethical theories (and many variants of these theories) have been pro-

posed, the two that have had the most influence in environmental ethics are utilitarian ethics and Kantian (deontological) ethics. I will describe each of these briefly; the reader should keep in mind that there is far more to each of these ethical theories (and ethics in general) than I will describe here.²

According to utilitarian ethics, actions are right (ethically justified) if and only if they would produce the greatest balance of happiness over unhappiness, taking into consideration all who would be affected by the proposed action³. In one formulation, “happiness” is construed in terms of physical pleasure and “unhappiness” is construed in terms of physical pain; other formulations consider “higher” pleasures or other forms of happiness and well-being. In weighing the balance of potential happiness against that of potential unhappiness, all who have the capacity for these experiences and who would be affected by the proposed actions are considered equally (e.g., no favoritism is given for those who are of the same religion or nationality), although greater pains “weigh” more than lesser ones and greater happiness “weighs” more than lesser happiness. Furthermore, on the utilitarian view, the consequences of a proposed action are the *only* factor that goes into the determination of whether an action is right; other considerations about the type of action (e.g., whether lying is involved) are not relevant. Of course, if the action has not occurred yet, it can be difficult to know with any degree of certainty what the consequences of an action will be; the utilitarian thus makes the analysis given the best available information of likely consequences and their severity. If there is another action that produces a greater balance of happiness over unhappiness, then *that* is the right action, according to the utilitarian.

The basic intuition behind utilitarianism is that, all things being equal, happiness is a good thing (and thus, it is good to bring more of it into the world) and unhappiness is a bad thing (and thus, it is good to try to reduce the amount of it in the world). There does not seem to be any *principled* way to say that one person’s pain matters more than the equivalent pain experienced by another person, so all equivalent pains count equally.⁴ Pain is pain. (As we will see below, *consistency of reasoning* is an important criterion in environmental ethics, and in ethics more generally). Furthermore, it seems as though the ability to feel pleasure and pain are *morally relevant characteristics*. If I stomp on a pen (which, of course, lacks the ability to feel pleasure and pain), I have not wronged the pen in the same way that I would wrong a person if I stomped on her foot. Even if I destroy the pen, I have not wronged *it*; at best, I have wronged other humans who might have made use of it, but that is a different matter.

In spite of its intuitive appeal, utilitarianism has been subject to a number of well-known objections. For one, it seems to countenance the production of good

² For an accessible introduction to ethics, see Rachels and Rachels (2011) or Hinman (2012).

³ Here I describe what has come to be known as “act utilitarianism.” I will leave off discussion of other forms of utilitarianism, such as “rule utilitarianism.”

⁴ Here I consider only the ethical weight of pain itself and not any other possible downstream consequences of that pain.

consequences for the many at the expense of the few, as occurred with the infamous experimentation on Jews by the Nazis, the Tuskegee syphilis experiment on African Americans, etc (see Plutynski this volume). For another, even if one does have reasonable information about future consequences, it is difficult to know how to weigh them against one another, and different people can provide different reasonable weighings. Both of these objections (and others not mentioned) have been responded to in the literature, but other philosophers think that a Kantian approach to ethics, which lacks these problems, is superior.

Rather than take as its starting point the ability to feel pain and pleasure, a Kantian approach to ethics points out that beings such as humans that are rational and autonomous (i.e., can think, have a will of their own, and can make decisions and reason about them) are importantly different from *things*. Mere things (such as my pen) do not have a will to violate; there is thus nothing wrong in using them for whatever purposes we wish. However, Kant argues, we ought not to use rational and autonomous beings, with wills of their own, as mere things, as mere means to our ends. On a Kantian view, then, rationality and autonomy are morally relevant characteristics (seemingly a higher “bar” than the ability to feel pain and pleasure). Thus, Kant states that we ought to: “Act in such a way that you treat humanity, whether in your own person or in that of another, always at the same time as an end and never merely as a means” (Kant 1785: 43)⁵. Kant does believe that we ought not to cause undue suffering to other animals, but this is because he believes that such actions would harm our abilities to act ethically towards other humans and not because of consideration towards the non-human animals themselves. Again, beings that are not rational and autonomous are mere things (and Kant included non-human animals in this category).

Perhaps foremost among the objections to Kantian ethics is its uncompromising nature. Always treating other humans as an end and never merely as a means has a consequence that we should *never* lie (or violate the autonomy of other people in any way), regardless of circumstances. Few could live up to this, and even if we could – or could aspire to – it is not clear whether we *should*.

Setting aside the particular concerns with utilitarian ethics and Kantian ethics, some environmental ethicists challenge the implication that the moral community consists of humans only. After all, the members of many other species besides humans have the ability to feel pleasure and pain; on what grounds are they excluded from the moral community? Traditional (anthropocentric) utilitarians usually defend this by invoking *other* morally relevant criteria, such as the greater rationality of humans or their ability to engage in moral deliberations⁶. However,

⁵ This is known as the Categorical Imperative; there are other formulations, but again, I focus on the one that is most relevant for environmental ethics.

⁶ Or by making claims that humans feel greater pain and pleasure than other species – but those claims are difficult to substantiate, and do not seem to be true in all cases. It would be hard to show, for example, that one’s pleasure in eating chicken outweighs the suffering of a chicken in a factory farm.

once one uses criteria such as greater rationality, greater autonomy, or ability to participate in moral deliberations, one has gone beyond the capacity of some humans, namely, those who are very young or those who suffer from a mental handicap or disorder. Indeed, it seems that the mental capacities of some non-human animals exceed those of some humans. This puts defenders of the human-only moral community in an uncomfortable position: they must 1) acknowledge that some humans do not fit their criteria and are thus not in the moral community and not deserving of direct moral consideration; 2) find some morally relevant characteristic that all humans have and all non-human animals lack (if one merely cites “being human,” then one is merely showing a biased preference for one’s species, i.e., being a “speciesist”); or 3) acknowledge that their account is based on a rank and indefensible inconsistency.

2.2 *Animals*

The inconsistency problem that plagues traditional anthropocentric ethics is often cited as a reason for recognizing that many (although perhaps not all – more on this in a moment) nonhuman animals ought to be considered as part of the moral community. The two most well-known proponents of this family of views are Peter Singer and Tom Regan; their views can be characterized as extensions to traditional utilitarianism and Kantian ethics, respectively. We will examine each of their views in turn.

Singer’s animal-centered utilitarianism was in fact predicted by the founder of utilitarian ethics, Jeremy Bentham; in an oft-quoted passage, Bentham states:

It may come one day to be recognized, that the number of the legs, the villosity of the skin, or the termination of the *os sacrum*, are reasons equally insufficient for abandoning a sensitive being to the same fate. What else is it that should trace the insuperable line? Is it the faculty of reason, or, perhaps, the faculty of discourse? But a full-grown horse or dog is beyond comparison a more rational, as well as a more conversable animal, than an infant of a day, or a week, or even a month, old. But suppose the case were otherwise, what would it avail? the question is not, Can they *reason*? nor, Can they *talk*? but, Can they *suffer*? (Bentham 1823: Chapter xvii, n. p.122; emphasis in original).

Singer, following Bentham’s line of reasoning, argues that the *ability to suffer* is that which confers moral standing and that “the fact that [a being that suffers] is not a member of our own species cannot be a moral reason for failing to take its suffering into account” (Singer 1979 p.194). To think otherwise, Singer asserts, would be “arbitrary” and “morally indefensible,” analogous to the way that white slave owners who denied moral consideration to blacks were being arbitrary; the logic of racism and “speciesism” are the same (Singer 1979, p.194). Singer clarifies that he does not think that all species are equal; some are more intelligent than others, some are stronger or better able to communicate, etc. However, he maintains that not all *humans* are equal on these grounds, either – and we would cer-

tainly not suggest that more intelligent humans be granted greater moral consideration than those who are less intelligent. Rather, the principle we accept, Singer claims (and ought to accept), is the *principle of equal consideration of interests*. On this view, equal interests count equally, regardless of the skin color of the human or the species of the animal. According to Singer, “the capacity for suffering and enjoyment is [...] sufficient for us to say that a being has interests—at an absolute minimum, an interest in not suffering”; this capacity, on Singer’s view “is a *prerequisite for having interests at all*, a condition that must be satisfied before we can speak of interests in a meaningful way” (Singer 2001, pp.7-8; emphasis in original). A rock, Singer asserts, is not sentient⁷ and thus has no interests. Singer acknowledges that whereas some animal species (such as species of mammals and birds) are almost certainly sentient and many probably are (vertebrates), assertions that others are sentient are more dubious (insects, crustaceans, mollusks) or highly improbable (plants); such differences ought to be kept in mind when weighing potential interests (Singer 1979). For example, on Singer’s account, the likely interests of a bird would outweigh the dubious interests of an insect. Finally, note that the principle of equal consideration of interests does not – by any means – dictate that the interests of nonhuman sentient animals outweigh those of humans! Rather, Singer claims only that the interests of all sentient beings who stand to be affected by a proposed action must be taken into consideration. And being taken into consideration means only that; it does not imply that all who are taken into consideration should ultimately be treated equally, since conclusions about treatment depend on the particulars of the case at hand (namely, the amounts of pain and pleasure that would be experienced by those who stand to be affected by the proposed action).

Singer suggests that his animal-centered utilitarianism would have numerous consequences for our dealings with our environment. Whereas an anthropocentric utilitarian might choose a less expensive yet more painful form of pest control, a Singer utilitarian would choose a less painful method (e.g., birth control for squirrels) even if it were more expensive. An anthropocentric utilitarian might be in favor of clearcutting a forest, whereas an animal-centered one would favor a more selective cutting (because of the negative impacts that clearcutting – a drastic change in habitat – has on sentient species). And we might change the siting of human facilities (e.g., new power plants) to locations where they have less impact on other sentient species. However, Singer asserts, all else being equal, killing an endangered sentient animal is morally equivalent to killing a non-endangered one; the scales would tip in favor of the endangered species only if there were additional negative effects on *other* sentient species (including humans).⁸

⁷ I will use the term “sentience” (or “sentient”) to refer to the capacity for suffering and enjoyment, although the reader should be aware that different authors use this term differently.

⁸ The application of Singer’s views and the other ethical views described in this section to various environmental challenges will be discussed in further detail in Section 3 below.

Regan shares Singer's concerns about the inconsistency problems with traditional anthropocentric ethics. However, he rejects Singer's animal-centric utilitarianism on the grounds that utilitarianism (regardless of whose interests are included) is inadequate as a moral theory, in part because it countenances the production of good consequences for the many at the expense of the few, as mentioned above. One way to block this unpalatable implication, Regan claims, is by recognizing that it is not individuals' pains and pleasures that matter ethically, but rather, the individuals themselves. That is, he suggests that we ought to recognize that individuals have *inherent value*; furthermore, in order to avoid sexism, racism, discrimination on the basis of intelligence, etc., we need to recognize that all who have inherent value have it equally. Thus, all individuals with inherent value "have an equal right to be treated with respect, to be treated in ways that do not reduce them to the status of things, as if they existed as resources for others" (Regan 1985: 21). From this quotation, we can see the influence of Kantian ethics on Regan's thinking. However, unlike Kant, Regan assumes that all human beings have inherent value, regardless of their capacity; note that not all who are human are rational and autonomous and not all are capable of reasoning morally (e.g., infants and the mentally handicapped). Again, though, once you make that assumption, you must (in order to be consistent) recognize that all beings who share the same capacities as human beings also have inherent value; he states, "...the basic similarity is simply this: we are each of us the experiencing subject of a life, a conscious creature having an individual welfare that has importance to us whatever our usefulness to others" (Regan 1985 p. 22). This would seem to be a slightly more demanding criterion for inclusion in the moral community than that offered by Singer. However, Regan leaves open the question of whether entities that are not "experiencing subjects of a life" have inherent value as well, saying that "we do not need to know how many individuals have inherent value before we can know that some do" (Regan 1985 p.23).

With regard to environmental issues, Regan would be opposed to *any* practice that treated experiencing subjects of a life as mere resources; each has a "fundamental right to be treated with respect." When it comes to animals in the wild, Regan urges us to "*let them be!*" (Regan 1983 p.361; emphasis in original). This would imply, for example, halting the destruction of their natural habitat and increasing surveillance on poaching activities, with stiffer fines and longer prison sentences (Regan 1983). As for members of endangered species, Regan thinks we ought to protect them, but only for the same reason that members of non-endangered species should be protected; members of endangered species should not receive *special* protection, on Regan's view (Regan 1983).

Some students may wonder if, by including non-human animals in the moral community, we are committed to saying predators act unethically when they kill other animals. This worry is understandable, but it encompasses a few misunderstandings. For one thing, most instances of predators killing other animals are required for the predators to sustain themselves; big cats, for example, arguably cannot survive on a vegetarian diet. And while there may be circumstances in

which humans must kill other animals to survive, many of us are not currently in that situation. Many humans commit themselves to eating vegetarian or vegan diets and to avoid animal-derived products, products tested on animals, etc., so human survival (for many of us) does not seem to *require* the killing of other animals. If it did, that would likely change the ethical analysis of such killings. Perhaps more importantly, the worry about predators acting unethically confuses *moral agents* with *moral patients*. When it is recognized that an entity ought to be included in the moral community, it is as a moral patient, i.e., a being that is owed moral consideration or has moral rights. However, being a moral patient does not mean that one is a moral agent, i.e., a being that is held responsible for its actions. Consider, for example, human infants. They are uncontroversially members of the moral community, and yet they are moral patients without being moral agents; if a baby were to pick up a loaded gun left on the floor and shoot her sibling, we would not hold the baby morally responsible because she lacks the capacity (such as the ability to reason morally and to act on her reasonings) to be a moral agent. The worry about predators assumes that the criteria for inclusion in the moral community (i.e., for being a moral patient) are the same as the criteria for being held morally responsible for one's actions (i.e., for being moral agent), but the scenario of baby who accidentally shoots her sibling shows that those two sets of criteria are arguably not the same. In the same way, non-human animals who lack the capacity for moral reasoning are not moral agents even if they are held to be moral patients.

Singer's and Regan's inclusion of (some) animals in the moral community is not without criticism. Mary Anne Warren (1983) argues that we must be more nuanced in our claims about which rights ought to be granted to which species, and that such rights must be based on the particular capacities of that species. For example, Warren suggests that members of species that seem to need and value freedom (humans, whales, migratory birds) have a greater right to liberty than members of species who do not. On a different tack, Gary Varner (2002) points out that humans can have biologically-based needs that make certain things in our best interests (such as getting enough ascorbic acid to avoid scurvy) even if we do not, or could not be expected to, consciously desire them. However, if biologically-based needs can give rise to interests, then it looks arbitrary to include only sentient beings (or only "experiencing subjects of a life") in our moral community, since plants (for example) have biologically based needs as well. Indeed, as Paul Taylor (1981) suggests, perhaps the criteria that we usually choose for determining entrance into the moral community (such as consciousness) are simply based on characteristics that are valuable for *us*, and are thus prejudiced and self-serving; for a plant, the ability to photosynthesize is far more valuable than consciousness.

2.3 All life

Recall Singer's view that a being that lacks the capacity to experience suffering or enjoyment lacks interests. In his words, "If a being is not capable of suffering, or of experiencing enjoyment or happiness, there is nothing to be taken into account" (Singer 2001 p. 8) Such a claim practically challenges other philosophers to identify other characteristics that might be taken into account in determining which entities are part of the moral community, such as Varner's aforementioned criterion of "biologically-based needs" – a criterion that applies to all living beings, not just animals. More specifically, Taylor (1981) maintains that every organism has *a good of its own* which can be benefitted or harmed by our actions. Actions that preserve life and well-being, that keep an organism strong and healthy, are good for the organism, whereas actions that are detrimental to the life and well-being of an organism are bad for it. In other words, actions can be for or against the interests of an organism, where having "interests" does not require the entity to be conscious of those interests (or conscious at all). Views such as Varner's and Taylor's that include all living beings in the moral community have come to be known as *biocentric*.

Let's focus on Taylor's biocentric views in particular. Unlike Singer and Regan, Taylor does not choose a utilitarian or Kantian ethical orientation, but instead tries to incorporate aspects of both in his thinking. On Taylor's account, we adopt the moral attitude of *respect for nature* when we recognize that wild living things have inherent worth; inherent worth involves two general principles, and it is here that we can see both the utilitarian and Kantian influences, respectively. According to the first principle, the principle of moral consideration, every wild living being is a member of the Earth's community of life and is for that reason deserving of moral consideration—its good must be taken into account whenever it might be affected by our actions—although its good may need to be overridden to fulfill some other good. According to the second principle, the principle of intrinsic value, the realization of the good of any wild living being is something that is intrinsically valuable, meaning that "...its good is *prima facie* worthy of being preserved or promoted as an end in itself and for the sake of the entity whose good it is" (Taylor 1981, p.201). Thus, "it must never be treated as if it were a mere object or thing whose entire value lies in being instrumental to the good of some other entity" (Taylor 1981, p.201). In sum, to say that a wild living thing has inherent worth "is to say that its good is deserving of the concern and consideration of all moral agents, and that the realization of its good has intrinsic value, to be pursued as an end in itself and for the sake of the entity whose good it is" (Taylor 1981 p.201).

The implications of biocentrism for environmental ethics are relatively clear. In deciding which actions to take, we must broaden the scope of the entities whose potential well-being or harm must be taken into account to include all living beings, whether sentient or not. If someone proposes building a movie theatre com-

plex on the site where a species of endangered butterfly lives, the welfare of the butterfly must be factored into the decision. Or, if we find out that the production of ozone due to emissions from our automobiles is harming sequoias and other trees, we must consider whether we ought to change our transportation practices.

What is less clear is how we are to act in full accordance with a biocentric ethic: how to make such difficult decisions and whether it is possible to live in accordance with them. If we endorse Regan's animal-centered Kantianism, we can give up eating animals, give up animal experimentation, give up hunting and destruction of habitat (although all of this might demand quite a bit of effort on our part), but unfortunately our species cannot give up killing plants and continue to survive. All biocentrists acknowledge this, and all have developed ways of trying to balance competing interests (e.g., Taylor 1986, Varner 2002) but the challenge is to do so without continually defaulting to the interests of humans⁹ or by developing an ethic that humans are unable to live by. It is not clear that such a challenge can be met.

2.4 Ecosystems

All of the views discussed so far have focused on *individuals*, whether individual humans, individual sentient organisms, or individual living organisms. Perhaps that is why we encounter difficulties in sorting through ethical conflicts, especially for biocentrism. Would a holistic approach be preferable?

Aldo Leopold, who is usually understood to have a holistic approach, argues that ethics "has its origin in the tendency of interdependent individuals or groups to evolve modes of co-operation" (Leopold 1949 p.201). Leopold hypothesizes that humanity's first ethics, where an ethic is "a limitation on freedom of action" or "a differentiation of social from anti-social conduct," dealt with relations between individual humans and later extended to relations between individuals and society. We accept restrictions on our actions within our society and co-operate with the fellow members of our society with whom we are interdependent. He then suggests that it is time that our ethics should be extended to the *land*, by which he means the community of "soils, waters, plants, and animals" (Leopold 1949: 204) with which we are also interdependent. That humans are interdependent with the land can be seen by looking at key points in history, which were actually the product of biotic interactions between people and land. For example, he contrasts the impact of grazing and plowing in Kentucky and the Southwest U.S.; the former led to useful bluegrass whereas the latter led to the Dust Bowl, "a progressive and mutual deterioration, not only of plants and soils, but of the animal community subsisting thereon" (Leopold 1949 p.206). That humans are interde-

⁹ Or, at least the most important interests of humans. Of course, determining what those are is a non-trivial matter and is bound to be controversial.

pendent with the land can also be seen through an examination of what Leopold calls “the land pyramid”:

Plants absorb energy from the sun. This energy flows through a circuit called the biota, which may be represented by a pyramid consisting of layers. The bottom layer is the soil. A plant layer rests on the soil, an insect layer on the plants, a bird and rodent layer on the insects, and so on up through various animal groups to the apex layer, which consists of the larger carnivores (Leopold 1949 p.215).

This energy flow is called a pyramid because the bottom layers are much more abundant than the top layers; prey tend to reproduce at a faster rate and to have more biomass overall than their predators. And humans, Leopold asserts, are at an intermediate layer with other omnivores. The land pyramid also captures lines of dependency (or “food chains”), such as “soil-corn-cow-farmer.” As all organisms are part of many such lines of dependency, the pyramid is an illustration of the interdependence of the biotic community, a community whose “functioning depends on the co-operation and competition of its diverse parts” (Leopold 1949 p.215).

Again, Leopold is suggesting that once we understand our interdependence with the land, we ought to extend our ethics to encompass it. The following two oft-quoted passages sum up Leopold’s land ethic:

In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such (Leopold 1949 p.204).

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 (Leopold 1949 pp.224-225).

These quotations – especially the second quotation – have been understood as claiming that the primary ethical value adheres to ecosystems, considered holistically, rather than the individuals that compose ecosystems; this view has come to be known as *ecocentrism* (J. Baird Callicott 1987 is probably the philosopher who has been most influential in defending this interpretation of Leopold). Consider, for example, an ecosystem in which deer were plentiful and predators absent. From a biocentric point of view, this might (albeit temporarily) be a positive state of affairs, given the number of flourishing deer; however, such an ecosystem would lack integrity (the predators are missing) as well as stability (eventually, the growing deer population would overgraze the area and starve to death). Thus, from an ecocentric point of view, this would not be a desirable state of affairs, i.e., it would be a state of affairs that we ought to avoid bringing about.

Much discussion has gone into trying to understand what Leopold means by “integrity,” “stability,” and “beauty.” However, Leopold gives us at least a reasonable idea of what he means by the first two of these. In discussing integrity, Leopold describes wildflowers and songbirds of Wisconsin, many of which cannot be put to economic use but which are nonetheless “entitled to continuance” as members of the biotic community (Leopold 1949 p.210). From this we can infer that a loss of continuance (i.e., an extinction) is a loss of integrity. With respect to stability, Leopold notes that:

When a change occurs in one part of the circuit, many other parts must adjust themselves to it [...] Evolutionary changes, however, are usually slow and local. Man's invention of tools has enabled him to make changes of unprecedented violence, rapidity, and scope (Leopold 1949 p.217).

From this we can infer that by "stability" Leopold did not mean "unchanging"; rather, in saying that we ought to act so as to preserve stability, he was suggesting that we ought to reduce the scale and the speed of the changes that we make to be more similar to ones induced by non-human forces. That is, we should only make changes that the rest of the biotic community can adjust to. Surely, the creation of the Dust Bowl¹⁰ is an example of an instance in where we did not do so.

Again, I think the implications of ecocentrism – of including ecosystems in the moral community – for environmental ethics are relatively straightforward. In preserving integrity and stability, we need to act to protect¹¹ endangered species. Furthermore, we need to put special emphasis on preserving the interactions between species, such as predator-prey or pollinator-pollinated. It might turn out that certain species are more central for such relationships; thus, Leopold might urge us to especially protect such "keystone species." Finally, biodiversity is often taken to be a factor that contributes to stability, so an ecocentrist would generally seek to preserve biodiversity.

One criticism that has been made against Leopold is that ecology no longer relies on stability models; in response, alternative ecocentrisms have been developed that do not rely on preserving stability (e.g., Hettinger and Throop 1999).¹² Another criticism is that Leopold's ecocentrism amounts to "environmental fascism" because humans are mere members of the biotic team, with the same moral standing as any other member (Regan 1983). Regan suggests that ecocentrism has the implication that if "the situation we faced was either to kill a rare wildflower or a (plentiful) human being, and if the wildflower, as a 'team member,' would contribute more to the 'integrity, stability, and beauty of the biotic community' than the human, then presumably we would not be doing wrong if we killed the human

¹⁰ The Dust Bowl was a phenomenon that occurred in the 1930s in the south-central plains of the United States. After decades of poor farming practices that destroyed the grasses protecting the soil, an extended drought hit the region, leading to massive dust storms and consequent loss of topsoil. Not much grew in the area for about a decade.

¹¹ Here one might worry about what ecocentrism is committed to with respect to "natural" (as opposed to human-caused) extinctions. By my reading, the cause of the extinction is not relevant, but rather, whether the extinction threatens the ecosystem of which the organism is a part. And here, I think that Leopold's message is that we should generally err on the side of caution and assume that the organism in question is important to the ecosystem, given our ignorance. Also, given widespread human-caused global changes such as global warming, it would be hard to say that humans did not have a hand in any given extinction.

¹² Although I think the death of stability models in ecology can be exaggerated, it is certainly worth thinking about how we ought to behave towards ecosystems that are not naturally stable. I leave the empirical question of what percentage of ecosystems are best characterized in terms of stability models and what percentage are best characterized in terms of instability models to ecologists.

and saved the wildflower” (Regan 1983 p.362). In other words, ecocentrism seems to allow individuals – sentient individuals – to be sacrificed for the good of the whole.

2.5 Reflections on the composition of the moral community

I have presented what I take to be the major ethical positions in environmental ethics; they vary in the entities included in the moral community (humans only, some animals, all life, ecosystems). It should be acknowledged that my presentation is neither complete in its depth nor its breadth (i.e., there are variations on each of these positions and there are more positions). In each case, I briefly presented the reasons supporting the position, while pointing out major criticisms. I should also acknowledge that responses to those criticisms can also be found in the literature. The question remains, then – where do we go from here? In particular, what do we teach our biology students, many of whom may not be interested in becoming environmental ethicists but who will be facing difficult environmental questions as biologists or as citizens?

We could simply choose one and defend it against the criticisms. Alternatively, we could present them all and let the students decide. However, I would like to present a third alternative, one that is inspired by a defense of holism/ecocentrism. Don Marietta (1999) suggests that no real ecocentrist is as extreme as Regan implies; note, for example, that Leopold says that his land ethic “*implies respect for his fellow-members*” as well as “*respect for the community as such*” (quoted above; emphasis added). If we were meant to respect the fellow members of our biotic community, then it would not seem as though killing off a human to save a wildflower would be justified. Perhaps instead we would seek out ways for both to co-exist. Marietta also points out that any ethical theory which reduces the value of a person to only *one* aspect of their life – their function in the ecosystem, *or* that they are alive, *or* their self-awareness, *or* their rationality, *or* their ability to feel pain – is leaving out characteristics that are morally significant. To choose one of these over the other, Marietta suggests, would be to have an incomplete moral account, one that simply dismisses the important moral insights gained over generations of human relationships¹³. Thus, Marietta argues, we have many kinds

¹³ Indeed, what does ecocentrism tell us about the ethics of lying? What does Kantian ethics tell us about the ethics of siting a power plant in the habitat of an endangered species versus a non-endangered one? What does utilitarian ethics tell us about an invasive plant species that is replacing the native ones (if, for example, it turned out that the effects on sentient creatures were negligible)? It seems as though there are questions on which each ethical theory will simply be silent and thus fail to provide any insight or guide for our behavior.

of duties: to each other, to the community, to future generations, to non-human animals, to all living beings, and yes, to the environment as a whole.

One way of adopting Marietta's position, then, is to see that each of the ethical positions described above has merit. Each picks out important, ethically relevant characteristics, and thus, none should be discarded in favor of one of the others. On this view, all living creatures as well as ecosystems considering holistically ought to be considered part of the moral community, which is not to say that our human rationality won't *at times* (but not all the time) be what is most morally significant. Of course, as Marietta acknowledges, "[t]rying to take into account everything that is morally relevant forces us to face complexity, conflicts, and confusions, but there is no justifiable alternative to hard study and the making of hard choices" (Marietta 1999 p.244). In other words, we *can* make it easier on ourselves by choosing only one morally relevant characteristic, but we cannot *defensibly* do so.

In the next section, I illustrate how the different ethical theories (and the morally relevant characteristics that they invoke) can be used as a lens to illuminate different aspects of an environmental issue, pointing out the sorts of conflicts that can arise and making general suggestions for how one might solve them.

3 Applications to Environmental Issues

As discussed at the outset of this paper, our society faces innumerable environmental challenges that raise a wide range of ethical issues. Thus, my remarks here will of necessity be illustrative rather than comprehensive.

I like to think of the different ethical theories as "lenses" that help to highlight different aspects of a case. Utilizing a range of theories to understand particular environmental issues generates a series of considerations that can help bring relevant aspects of a case to the fore. A Kantian lens forces one to consider whether any humans or non-humans are merely being used as instruments to bring about some other purpose. This would be the case if, for example, one was considering siting a power plant in neighborhood where the locals were not consulted or given incomplete information, or were not adequately compensated for their harms. A utilitarian lens forces one to exhaustively consider all sentient beings (human and non-human) who will be affected by an action, to try to estimate to what extent they are affected and whether those effects are positive or negative, and the likelihood of those consequences actually occurring. A biocentrist lens reminds us to take into account organisms other than the sentient ones that tend to draw our attention first. Finally, an ecocentrist lens lets one literally see the forest instead of just the trees, focusing on identifying and preserving the interdependencies between the species and thinking in terms of factors that would promote the longer term stability of the ecosystem.

Of course, for any given case some considerations may turn out to be more relevant than others. The point is simply that by analyzing through the lens of each ethical theory, one may turn up aspects of a case that might otherwise have not been obvious.

In making this kind of analysis, it is important to realize that there are ways in which the different ethical theories will tend to conflict. Consider again the case of siting a power plant. Suppose a site has been identified. Suppose the quickest, cheapest way to get the plant built is by informing and involving the local citizenry in the most cursory way possible. Suppose that the plant will have negative health effects on the local citizens, but that the plant will provide cheap energy to thousands of customers, most of whom live far enough away to avoid the negative health consequences. In such case, a utilitarian might argue that the benefits of building such a plant outweigh the harms. However, a Kantian ethicist would suggest that the local citizenry is being used as a means to obtain profit for corporations and cheap energy for customers. They would insist that the locals be properly informed of the health risks and that they have a say in whether the plant gets built, or at least that an acceptable means of compensation is worked out. (Here I consider only the anthropocentric forms of these theories; including other sentient animals might change the analysis).

Another classic sort of conflict is between an animal-centered perspective and an ecocentric one (Sagoff 1999). Consider, for example, the wild Hawaiian pig, a hybrid of Asian and European pigs that were brought to the Hawaiian Islands¹⁴. The Hawaiian Islands are known for their extraordinary biodiversity, with species that are found nowhere else, but the native plant species evolved in the absence of hooved animals and the pigs are very destructive to them. The feral pigs are also harmful to native birds by creating wallows that avian malaria-carrying mosquitos reproduce in and by eating nestlings of birds that nest on the ground. Finally, their digging leads to erosion and siltation of streams and reefs. In other words, the pigs are wreaking havoc on Hawaiian ecosystems and causing the extinction of species; an ecocentrist would thus tend to seek the removal of the pigs. The Nature Conservancy sought to control the pig population using snares, but People for the Ethical Treatment of Animals (better known as PETA) objected that the snares were cruel, with pigs often dying of starvation rather than asphyxiation. Some Hawaiians do not like the snares, either; hunting dogs can also get caught in them, and some Hawaiians like to hunt the feral pigs (thus, the goal has been to control rather than eradicate). From an animal-centered point of view, then, the pigs are suffering great harms only for doing that which pigs do naturally. So, while the snares may be justifiable from an ecocentrist point of view, they are not from an animal-centered one. (Note that an animal-centered utilitarian and an animal-centered Kantian would agree on this point; the pigs are both suffering and being

¹⁴ My discussion of this case relies heavily on “Case 25” of Patrick Derr and Edward McNamara’s 2003 *Case Studies in Environmental Ethics*, a book I recommend highly as a source of diverse case studies to prompt discussion and thought.

used as a means to preserve ecosystems, with their basic rights to life being taken away).

If we are not to choose one ethical theory over another in advance (as Marietta urges, the *particular details* of each case matter), how should we handle such conflicts? The immediate answer is fairly obvious – try to satisfy each theory and each set of competing values to the greatest extent possible – and yet much ground can be gained by following it.

In the power plant case, a thorough utilitarian analysis would seek out the *best* balance of happiness over unhappiness, not just a situation where happiness outweighed unhappiness. Thus, the utilitarian should consider: are there other sites where fewer people would be harmed? What sorts of compensation can be offered to locals – money? Jobs? Health care? Relocation? Will fully informing them of the potential risks and allowing them to participate in solutions raise their level of happiness and thus overall happiness for all affected? There are, of course, costs to each of these courses of action, but they might still be able to produce a reasonable utilitarian balance while going some way toward allaying Kantian concerns.

The Hawaiian feral pig situation is even more challenging, especially if we are seeking not to eradicate the pig from the Islands entirely and not to harm any other species in the process. Still, however, it seems worth exploring other ways to control the damage that pigs cause to the ecosystem in ways that cause less suffering: other sorts of traps, or a pig-specific virus, perhaps? An alternative possibility is to set aside pig-free areas and areas where pigs are allowed. I don't claim to have the answers to this challenging problem; I suggest only that we try to move beyond the pigs vs. ecosystems framing of it. It is interesting to compare the Hawaiian situation to the reintroduction of wolves to Yellowstone National Park, an act that was meant to help restore balance to the ecosystem (and it has), but of course, was at the expense of deer and other wolf-prey. My point here is not that we should introduce a pig predator into Hawaii (that might cause other problems!) but to note that it is the extreme suffering of the pigs that is creating the ecocentric/animal-centric conflict. In situations where the suffering of the animals is less (or at least, normal for the species), the conflict is less,¹⁵ and that provides a guide to our actions.

Another conflict between ethical theories is illustrated by U.S. President Bill Clinton's establishment of the Grand Staircase-Escalante (GSE) National Monument in southern Utah in 1996¹⁶. President Clinton's action pre-empted plans to open up a large-scale coal mining operation in the area, thus angering local residents who had been looking forward to jobs in the coal industry. The GSE was established because of the diversity of habitats (from desert to coniferous forest)

¹⁵ However, an animal-centric Kantian ethic implies that killing the pigs in order to preserve the ecosystem would never be justified; non-lethal means of controlling the pigs would have to be found.

¹⁶ My discussion of this case relies on "Case 16" in Derr and McNamara (2003).

and the diversity of species within those habitats. There are also significant archaeological and paleontological sites in the area. However, after the designation of the GSE, many noted that the previously infrequent human visits to the area that had preserved the different ecosystems and species had now become frequent ones, putting those very ecosystems and species at risk. So, did President Clinton do the right thing?

The worry about frequent visitation is easily dealt with; many parks have passed policies to limit human impact, by limiting the number of visitors and their activities or limiting the types and numbers of vehicles that can be used in the park, etc. However, a conflict still remains; from an anthropocentric point of view, there is the loss of future jobs and the loss of local autonomy (and so the decision seems to have been wrong one), whereas from an ecocentric – and perhaps biocentric and animal-centric – point of view there is the preservation of ecosystems and species (and so the decision seems to have been the right one). So, can this conflict be resolved, and if so, how?

Were we able to go back in time and re-do this decision, we could certainly make an effort to involve the local residents in the decision (although some would argue that these sorts of areas are for all people to enjoy, not just the local residents). More than that, though, we could again seek to maximize different values. Here, more detail is of the essence¹⁷. On the human side of the equation: How badly do the local people need jobs? What sorts of jobs are created by tourism, and how do they compare monetarily? How do they compare in terms of length of employment or in quality of life for the employee? Can energy needs be met in ways other than coal, ways that might also be job-producing (and perhaps safer)? How much enjoyment will having the area set aside as a park bring to its visitors? On the ecosystem side of the equation: How *much* diversity is in this area; how does it compare to other areas? Are there unique species? Endangered species? Unique habitats? Endangered habitats? To what extent would these be threatened by the coal mining?

The answers to these questions matter. If it turns out that the tourism jobs are sufficiently comparable to the mining jobs and that this is a “biodiversity hotspot,” then it seems as though President Clinton made the right decision. However, if the mining jobs are far superior, if locals desperately needed them, and if the area was not all that biodiverse after all, then it seems as though President Clinton made the wrong decision. However, my point is not to try to settle this case; rather, it is to say that, as hard as it is to balance competing values, asking and answering more detailed questions about the effects on all the organisms and ecosystems involved can go a long way toward making the best solution easier to see. (Getting people to agree to it and getting it implemented are even more challenging – but those actions lead us outside the scope of ethics).

¹⁷ Again, as Marietta emphasizes, such decisions should not be made in the abstract.

4 Conceptual Issues

Much of the discussion above relies on contended biological concepts: species, ecosystems, biodiversity, life, etc. (see also Justus this volume). Other conceptual questions may arise as well; for example, the question, “What is sustainability?” In discussing environmental ethics with their students, biology educators should be aware of these controversies and how they affect our ethical analyses. Once again, these are large issues, and I will only scratch the surface.

Consider the concept “ecosystem.” What is an ecosystem? Can one ecosystem be cleanly delineated from another? Or is it only that some ecosystems are able to be delineated clearly (e.g., on an island or in a pond) and others are “clear enough” (i.e., with real but fuzzy boundaries)? Or is there no privileged way of delineating ecosystems? It is evident that the answers to these questions affect how we understand ecocentrism – in other words, they affect what we take ourselves to be trying to preserve – and yet there has been much disagreement about the proper answers (Odenbaugh 2007). One sort of problematic case is illustrated by the Mauhoun river basin in Burkina Faso.¹⁸ This area is inhabited by two species of tsetse flies, *Glossina tachinoides* Westwood and *Glossina palpalis gambi-ensis* Vanderplank. The region appears to be patchy, habitat-wise, with some areas preserved as reserves while other areas have undergone agricultural development. However, when we look at the behavior of the two species of flies, we find that one forms a panmictic breeding population whereas the other only breeds within the reserves. So, is it one ecosystem or several? Or, is the concept of ecosystem species-relative¹⁹?

Or consider the concept of “species” (see Wilkins this volume). The most common one among biologists (or at least those biologists who study animals²⁰) is the biological species concept. As articulated by Ernst Mayr, this is the view that “Species are groups of interbreeding natural populations that are reproductively isolated from other such groups” (Mayr 1996 p.264). However, by one count, there are 26 concepts of species in the literature (Wilkins 2008); the question “what is the concept of ‘species’?” (or even “are there multiple legitimate concepts of ‘species’?”) is hotly contended. So, when we say that we want to preserve species, what is it that we are trying to preserve? Consider, for example, the California Tiger Salamander (CTS) and the Barred Tiger Salamander (BTS).²¹ The CTS and the BTS had been allopatric for ~5 million years, with the CTS in California and the BTS in Texas, but because of their value as bait, in the 1940s and 1950s bait dealers from the Salinas Valley imported thousands of BTS larvae into

¹⁸ My discussion of this case relies on Peck (2009).

¹⁹ As Peck (2009) argues.

²⁰ Biologists who study microbial life, for example, do *not* tend to endorse the biological species concept (see Bourrat et al. this volume); for one, some microbes do not reproduce sexually and so the biological species concept seems inapplicable to them.

²¹ My discussion here relies on that of Fitzpatrick and Shaffer (2004, 2007).

California. Since then, the BTS and the CTS have been producing viable hybrids. The BTS and the CTS have distinctive phenotypes and genetic characters. Are they two species or one? The CTS have been listed as “endangered” under the Endangered Species Act, but are they really a distinct species? What about the hybrids? Again, how we answer these conceptual questions affects how we understand the ethical issues.

Biodiversity is another thorny conceptual issue; it is often spelled out in terms of number of species. Even if we can settle the question of what species are, however, it’s not at all clear that sheer number of species is really the issue. Some species are quite different from one another, whereas others are quite similar. Is it that we want to preserve great numbers of species, regardless of how similar they are? Or do we want to preserve the greatest number of different species? (And how should that be characterized?) Or, should we consider preserving diverse subspecies? Diverse genomes? Diverse habitats? In other words, is species even the right level of the biological hierarchy at which to preserve diversity? (For discussion of the concept of biodiversity, see, e.g., Norton 1994; Callicott, Crowder, and Mumford 1999; Gaston 2004).

The reader may have noticed that a subtle shift occurred in the last paragraph from the conceptual to the normative. That is, we can seek to ask the question, “what is biodiversity?” but that question very quickly becomes “what should we preserve?” Thus, the normative and the conceptual questions are intertwined. Note that this is to some extent true of the species and ecosystem concepts as well; although those conceptual debates sometimes occur outside of the normative realm, once they are in the normative realm it is hard to keep the normative issues separated from the conceptual ones. In other words, if we are asking “what is the concept ‘species’?” with an eye to preserving endangered species, it seems as though we are partly asking what it is we would like to preserve: Distinctive genetic and phenotypic characteristics? Distinctive past evolutionary histories? Distinctive future evolutionary histories? Or something else? Similar considerations apply to ecosystems; are we preserving inter-species relationships, particular combinations of species, particular “ecosystem services,” or something else?

Some concepts are even more value-infused – sustainability, for example. Sustainability is the buzzword of the day, and yet it is highly ambiguous. Are we trying to sustain only human activities, or are non-human activities included (Callicott and Mumford 1997)? Are we trying to sustain “business as usual,” or might sustainability involve sacrifice? If agricultural sustainability is the issue, are we trying to sustain certain types of processes or a certain agricultural yield, and then, statically or dynamically (Blatz 1992)? Should sustainability be linked to carrying capacity or ecological footprint (Vanderheiden 2008)? Should we be aiming for land health rather than sustainability (Newton and Freyfogle 2005)?

Being aware of the controversies over concepts like these and how these controversies affect ethical discussions can help biology educators get students to think critically about important environmental issues of our time.

5 Conclusion

I have argued that biology students can benefit from 1) understanding different ethical theories concerning the environment as well as the reasons offered in support of and against them, in order to better understand their own views as well as the views of others; 2) seeing how different ethical theories can be used as lenses to help understand different aspects of concrete cases and to work towards solutions that maximize different values; and 3) recognizing that key concepts are often themselves controversial as well as value laden, encouraging them to explore environmental issues in all of their complexity. I thus encourage biology educators to incorporate these issues in their classes.

Acknowledgments Thanks to multiple classes of environmental ethics undergraduates at CSU East Bay and UC Davis, for helping to shape my view of what the interesting and important issues in environmental ethics are. Thanks also to my 2012 graduate seminar at UC Davis for an enlightening quarter discussing the concepts of “biodiversity” and “sustainability.” Finally, thanks to Kostas Kampourakis and James Justus for extremely helpful referee comments.

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