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Human Health and the Environment: In Harmony or in Conflict?

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Abstract

Health policy frameworks usually construe environmental protection and human health as harmonious values. Policies that protect the environment, such as pollution control and pesticide regulation, also benefit human health. In recent years, however, it has become apparent that promoting human health sometimes undermines environmental protection. Some actions, policies, or technologies that reduce human morbidity, mortality, and disease can have detrimental effects on the environment. Since human health and environmental protection are sometimes at odds, political leaders, citizens, and government officials need a way to mediate and resolve conflicts between these values. Unfortunately, few approaches to applied bioethics have the conceptual tools to do accomplish this task. Theories of health care ethics have little to say about the environment, and theories of environmental ethics don't say much about human health. In this essay, I defend an approach to ethical decision-making that gives policy-makers some tools for balancing promotion of human health and protection of the environment.

Keywords

Human health; environment; ethics; policy; bioethics; malaria

Introduction

In the minds of the public and politicians, health promotion and environmental protection usually go hand-in-hand. Accordingly, health policy frameworks usually construe environmental protection and human health as harmonious values. Policies that protect the environment, such as pollution control and pesticide regulation, also benefit human health. Clean air and water benefit fish, frogs, beavers, birds, insects, trees, shrubs, and human beings. The US Environmental Protection Agency (EPA) was established in 1970 to protect human health and the environment (EPA 2008a). Several of the federal statutes that the EPA administers, such as the Clean Air Act, the Clean Water Act, and the Toxic Substances Control Act, give the federal government the power to protect human health and the environment (EPA 2008b).

In recent years, however, it has become apparent that promoting human health sometimes undermines environmental protection. Some actions, policies, or technologies that reduce human morbidity, mortality, and disease can have detrimental effects on the environment. For example, food is necessary to sustain human life. Malnutrition can weaken the human immune system and exacerbate many health problems, ranging from HIV/AIDS to measles to malaria (CARE 2008). Each year 6 million children under the age of 5 die from starvation and hundreds of millions of people are malnourished (CARE 2008). The production of food, however, can

have a variety of adverse environmental impacts, including deforestation, habitat destruction, loss of biodiversity, and air and water pollution (Rosen et al 1997). Although different modes of food production (i.e. industrial vs. non-industrial) have different environmental impacts, no method of producing food leaves the environment unscathed (Rosen et al 1997). Mosquito-borne illnesses, such as malaria, are a major public health problem in the developing world (Centers for Disease Control and Prevention (CDC) 2007). Some of the methods used to prevent mosquito-borne illnesses, such as draining swamps and spraying pesticides (especially DDT), can have adverse environmental impacts, such as destruction of habitats and species (Roberts et al 2000). Finally, medical care itself creates a great deal of waste and pollution that can harm the environment. Hospitals use large amounts of electricity, oil, coal and natural gas, and produce tons of hazardous medical waste, such as used syringes, bandages, and gloves, and leftover tissue and blood (Pierce and Jameton 2004).

Since human health and environmental protection are sometimes at odds, political leaders, government officials, and citizens need a way to mediate and resolve conflicts between these values. Unfortunately, few approaches to applied bioethics have the conceptual tools to accomplish this task. Theories of health care ethics have little, if anything, to say about the environment, and theories of environmental ethics tend to focus on abstract questions concerning the value of non-human species or ecosystems, but have little to say about the relationship between the environment and human health. In this essay, I will defend an approach to ethical decision-making that gives policy-makers some tools for balancing promotion of human health and protection of the environment. Before developing this view, I will expose some of the deficiencies with theories and health care ethics and environmental ethics.

Health Care Ethics

There are many different theories of health care ethics, and there is not sufficient space in this essay to review them all here. Instead, I will examine four approaches that 1) are typical of other approaches in the field, 2) different from each other, and 3) have had considerable influence. The approaches are articulated in four books: Beauchamp and Childress' (2001) *Principles of Biomedical Ethics*; Jonsen, Siegler, and Winslade's *Clinical Ethics* (2006); Gert, Culver and Clouser's *Bioethics* (1997); and Pellegrino, Thomasma and Miller's *The Christian Virtues in Medical Practice* (1996). Obviously, this is a small and potentially biased sample, but it will suffice for my limited purposes in this essay. I will not try to prove that no theories of health care ethics have anything to say about the environment. I will attempt to show, instead, that some typical and influential theories fail to establish an adequate procedure for balancing human health and the environment.

Beauchamp and Childress' *Principles of Biomedical Ethics* was originally published in 1979. The authors have revised it four times since then, responding to various critiques of their view. Their book is, without question, one of the most important and influential texts in bioethics. Beauchamp and Childress draw insights from a number of different approaches to ethics, including utilitarianism, Kantianism, social contract theory, and Ross' (1930) ethical theory. Beauchamp and Childress argue that theory of bioethics should provide decision-makers with some useful guidance, and that principles are better guides to decision-making than theories. They describe and explain four principles for reasoning about ethical dilemmas in medicine and health care: autonomy, nonmaleficence, beneficence and justice. The principles (or general rules) are intended to guide conduct and help health care professionals deal with ethical dilemmas that arise in medicine. Autonomy obligates health care professionals to respect and assist a person's right to make autonomous choices; nonmaleficence obligates health care professionals not inflict harm on others; beneficence obligates health care professionals to prevent harm, remove harm, and to promote the good; and justice obligates health care professional to distribute benefits and burdens fairly. The principle of justice include many

different principles for distributing benefits and burdens, such as distribution based on need, equality, contribution, and merit.

Beauchamp and Childress claim that their four principles are derived from moral norms shared by all morally serious persons (which they call the common morality) and medical traditions, such as the Hippocratic Oath. The moral principles can be applied to particular situations via specific moral rules. For example, rules pertaining to informed consent help to specify the principle of autonomy. Beauchamp and Childress recognize that principles and rules may conflict in specific cases. When this happens, one must decide which rule or principle to follow by balancing the different rules and principles in light of the relevant facts and circumstances. For example, autonomy and nonmaleficence may conflict when an autonomous patient requests assistance in dying. A health care professional must consider the relevant facts and circumstances in deciding whether to respect the patient's autonomous choices or to avoid causing harm (Beauchamp and Childress 2001). Beauchamp and Childress follow Ross (1930) in characterizing moral principles as *prima facie* rules that can be overridden in particular circumstances.

Beauchamp and Childress' theory is very sophisticated and nuanced, and this brief summary cannot do it justice. However, I have described the theory in enough detail to show that it does not contain the conceptual tools for thinking about conflicts between human health and the environment. The theory does not address environmental concerns. None of the principles mention the environment: they all focus on human relationships and activities. One could adapt some of their principles to environmental issues. For example, the principle of nonmaleficence could be construed as implying a duty not to harm the environment (or aspects of it), if the environment is given consideration. Likewise, the principle of beneficence could be construed as implying a duty to prevent harm to the environment, if the environment is given consideration. The principle of justice could have implications for the distribution of environmental impacts (i.e. environmental justice). However, Beauchamp and Childress never intended these principles to apply to environmental issues, and they do not mention harm to the environment (non-human species, etc.) when discussing these principles. Their focus is human autonomy, beneficence, harm, and justice.

Jonsen, Siegler, and Winslade's theory is a useful alternative to Beauchamp and Childress' principle-based approach to decision-making, because it emphasizes the importance of reasoning about cases. The authors criticize principle-based approaches as being too far removed from practical decisions, and they develop a more concrete and practical approach to clinical decision-making. The authors argue that to deal with an ethical dilemma, one must carefully describe the facts and circumstances related to dilemma. One should also attempt to answer key ethical and clinical questions about the case at hand. Jonsen, Siegler, and Winslade do not defend a set of principles or rules for resolving ethical dilemmas in medicine. They argue, instead, that health care professionals should analyze cases in terms of some key questions, which they organize into four topics: medical indications, patient preferences, quality of life, and contextual features. Medical indications includes questions relating to the appropriateness of medical treatment, such as "What is the patient's medical problem?," "What are the goals of treatment?," and "What are the probabilities of success?" Patient preferences includes questions relating to the patient's preferences for treatment, such as "What has the patient expressed about preferences for treatment?," "Has the patient been informed about the benefits and risks, understood, and given consent?," and "Is the patient mentally capable and legally competent?" Quality of life includes questions such as "What are the prospects, with or without treatment, for a return to the patient's normal life?," "Are there biases that might prejudice the provider's evaluation of patient's quality of life?," and "Is patient's present or future condition such that continued life might be judged undesirable by them?" Contextual features includes questions relating to the social, cultural, legal, and economic aspects of

medicine, such as “Are there family issues that might influence treatment decisions?”, “Are there financial and economic factors?”, and “Are there problems of allocation of resources?” (Jonsen, Siegler and Winslade 2006).

Though Jonsen, Siegler, and Winslade's four topics theory is a useful and insightful alternative to Beauchamp and Childress' four principles approach, it also does not have the conceptual tools that would be required to deal with questions concerning the relationship between human health and the environment. None of the topics deal explicitly with the environment. Only the topic labeled “contextual features” could, arguably, include environmental concerns, if the environment is understood as constituting part of the larger context of a clinical decision. However, Jonsen, Siegler, and Winslade do not include environmental issues in this topic, nor do they intend to. Like Beauchamp and Childress, Jonsen, Siegler, and Winslade focus on human beings and human concerns. The contextual features they have in mind pertain to the interface between medicine and society, not medicine and the environment.

Whereas Beauchamp and Childress focus on moral principles, and Jonsen, Siegler, and Winslade emphasize case analysis, Gert, Culver and Clouser stress the importance of moral theory. They criticize other approaches to ethical decision-making in medicine as being inconsistent, and ad hoc. Their most recent book *Bioethics: A Systematic Approach* (2006) is an extensive revision of a book they published previously, *Bioethics: A Return to Fundamentals* (1997). The subtitle of the revised text reflects Gert, Culver, and Clouser's belief in the importance of using a moral system to deal with ethical dilemmas in medicine, instead of a hodge-podge principles, rules, cases, and questions. Gert, Culver, and Clouser recognize that there is considerable disagreement about particular moral questions and dilemmas, but they maintain that most people accept a core morality—the common morality. Gert, Culver, and Clouser, unlike Beauchamp and Childress, see no need to develop special moral principles for medicine. Instead, they hold that ten rules contained in the common morality can be applied to ethical dilemmas in medicine and health care. The rules are: do not kill, do not cause pain, do not disable, do not deprive of freedom, do not deprive of pleasure, do not deceive, do not break your promises, do not cheat, do not break the law, and do not neglect your duty (Gert, Culver and Clouser 2006). Like Beauchamp and Childress, Gert, Culver and Clouser recognize that moral rules will sometimes conflict. When this happens, one must decide whether to violate one of the rules. A violation of a rule can be justified if it is impartial (i.e. would apply to all persons in similar situations), rational (i.e. rational individuals would violate the rule), and publicly acknowledged (i.e. people know that the violation would be allowed).

Gert, Culver, and Clouser's common morality approach includes many useful insights about moral decision-making in medicine, such as the importance of consistency and coherence in moral reasoning, and the relevance of moral theory, but, like the other two approaches, it lacks the conceptual tools required to deal with questions concerning the relationship between human health and the environment. None of the moral rules deal explicitly with the environment. The rules “do not kill” and “do not cause pain” could be applied to aspects of the environment, such as non-human animals, but Gert, Culver and Clouser do not do this. These two rules are intended to apply only to human beings. “Do not break the law” would imply a duty to protect the environment, if the law in question is an environmental one. However, Gert, Culver and Clouser do not spend much time dwelling on the content of particular laws. In short, like the other approaches, Gert, Culver and Clouser's approach is human-centered, having little to say about the environment in which people live.

The last theory I will consider differs markedly from the other three in that it emphasizes virtues instead of principles, theories, or topics. The other theories focus on the question, “what should I do?,” but the virtue-based approach focuses in the question, “what kind of person should I be?” Virtue-based ethical theories have a long tradition dating to the ancient Greeks. Plato and

Aristotle developed theories of human excellence (virtue) and the good life. Aristotle (330 BC) argued that the purpose of human life is to act rationally, that is, to act in accordance with virtue. He described a variety of human virtues, including courage, benevolence, justice, honesty, and moderation. Since virtues are states of character, people develop virtues through practice and imitation. Over time, a person becomes virtuous by following the examples of other virtuous people and acting in virtuous ways. Pellegrino, Thomasma, and Miller develop an approach to health care ethics that is similar to this Aristotelian account, but they adapt it to the practice of medicine. Some of the virtues they describe include fidelity to the patient, intellectual honesty, truthfulness, benevolence, courage, and compassion. All of the virtues embody the doctor's commitment to medical professionalism and the centrality of the doctor-patient relationship in medical practice (Pellegrino, Thomasma and Miller 1996).

Because they focus on moral character instead of moral reasoning, virtue-based accounts of health care ethics offer valuable insights into moral conduct and commitment, but, like the other three approaches, they have very little to say about the environment. None of the virtues described by Pellegrino, Thomasma and Miller address the environment or environmental implications of medicine and health care. The virtue of benevolence could be construed as implying some sort of consideration for the environment, since the virtue instructs the physician to benefit the patient and avoid doing harm. If harm is understood to include harm not just to the patient but also harm to the environment, then this virtue would have some implications for environmental ethics. But interpreting Pellegrino, Thomasma, and Miller's approach in this manner would be stretching it beyond its limits. Like the other approaches, the virtue-based approach is human-centered.

Environmental Ethics

Having considered some influential theories of health care ethics, I will now examine some influential theories of environmental ethics. Once again, my aim will be to consider theories that are 1) typical of other approaches in the field, 2) different from each other, and 3) have had considerable influence. I will not attempt to prove that no theory of environmental ethics has anything to say about human health. Rather, I shall attempt to show that some typical and influential approaches to environmental ethics fail to establish an adequate procedure for balancing human health and the environment.

Since ethical theories, concepts and principles have traditionally focused on human life, human rights, and justice within human societies, much of the debate in environmental ethics has addressed questions about the value of non-human life and larger entities, such as species and ecosystems. Because there is little dispute that we have moral obligations to human beings, the chief concern of environmental ethicists has been to justify and explain the basis for our moral obligations to the environment (Cochrane 2007). Some of the central issues of environmental ethics include stewardship of the environment, protection of species and ecosystem, obligations to future generations, sustainable development and population control, genetic engineering of crops and animals, globalization, and environmental justice (Attfield 2003, Shrader-Frechette 2002).

One theory of environmental ethics, known as anthropocentrism, holds that animals, plants, species, and ecosystems have value insofar as they help to satisfy human goals, wants, and interests: their value is instrumental (extrinsic) (Norton 1991; Gewirth 2001). Our obligations to the environment are based, then, on the obligations that we have toward other human beings, including those who are living now and those who will live in the future.[1] Thus, anthropocentrists argue that we should preserve a forest because we want to enjoy its beauty or we need the trees to make oxygen and remove carbon dioxide from the atmosphere. We shouldn't drive species to extinction because species because we may need species for food,

medicines, biological products and so on. Also, species occupy important niches in the ecosystems that we depend on for food, water, oxygen, etc. (Norton 1991).

One of the objections to the human-centered theory is that it does not give adequate consideration to the value of the environment (Rolston III 1994, 2006; Attfield 2003). There may be parts of the environment, such as species, that do not serve human needs. If we value the environment only as a means to satisfying human wants and needs, then we may fail to give any value to some parts of the environment that do not serve humanity (Attfield 2003). Additionally, environmental protection will not be given enough weight in public dialogues, if the environment does not have a moral value that is independent of human needs, wants, and goals. The environment must have intrinsic value. The human-centered approach does not give adequate consideration to the value of the environment: it is shallow and utilitarian and leads to exploitation and degradation of the environment for human wants or needs (Naess 1973).

In response to this criticism, some anthropocentrists distinguish between strong and weak anthropocentrism, arguing that only strong anthropocentrism inevitably leads to environmental exploitation and degradation. Unlike strong anthropocentrism, weak anthropocentrism recognizes the importance of the environment for human well-being. Environmental destruction should be avoided because it will have adverse impacts on humanity. Anthropocentrism can encourage stewardship of nature, rather than dominion of nature (Norton 2005).

As an alternative to anthropocentrism, some philosophers and ethicists have developed theories of environment ethics that treat entities other than human beings as having intrinsic value (or moral standing). These non-human entities have value in their own right, not just as a means of promoting human values. Singer (1993) and Regan (2004) have argued that sentient non-human animals, such as mice, cows, or dogs, have intrinsic moral value. Singer argues that sentient animals deserve to equal consideration in moral theorizing because they can suffer and feel pain. Treating animals as having less value than humans is to engage in a form of discrimination that Singer calls speciesism to equate it with other forms of discrimination, such as racism and sexism (Singer 1993). In deciding what to do, a person should consider how his or her actions will affect other people and animals (Singer 1993). Regan argues that sentient animals have moral rights because they have interests, such as interests in living and having their biological needs met. Many of the socially accepted ways of treating animals, such as using them as food or as experimental subjects, are immoral because they violate the rights of animals, according to Regan (2004).

Singer's and Regan's views are highly controversial and have generated considerable debate. [2] One objection to both of their views is that they do not give adequate consideration to the value of human life, human wants, and human needs. An objection to Regan's view is animal rights are conceptually flawed, because rights apply only to human beings (Cohen and Regan 2001). Rather than examining the range of objections to their views, I would like to point out that they have helped to advance the larger debate about extending the range of moral value beyond the human sphere. This debate encompasses more than questions about the moral standing of animals and includes questions about the moral standing of human fetuses, embryos, brain dead people, and so on (Steinbock 1996). Singer and Regan's views on animals help us to think more clearly about why anyone or anything should have moral standing. Singer's contribution to this debate is to raise our awareness of the importance of taking the pain and suffering of non-human animals into account when making moral decisions. Regan's chief contribution is to encourage us to consider whether members of other species can have interests and rights.

Other writers have taken the debate about moral standing beyond sentient animals and argued that all life forms, including non-sentient animals, plants, and microorganisms, should have moral standing (Taylor 1986, Varner 1998). All living things have moral value, according to some, because living things have natural goals, such as survival, and natural interests, such as acquiring the means necessary for survival, i.e. food, water, etc. Living things do not need to be aware of their goals and interests in order to have them (Taylor 1986, Varner 1998). Taylor (1986) argues that all living things have equal moral standing and equal moral interests: the needs of a human being are no more important than those of a rat.

One of the difficulties with holding that all organisms have equal moral standing is that conflicts inevitably arise among organisms. For example, even vegetarians need to exploit and kill plants in order to eat. How can we balance the interests of humans against those other organisms or species? Some writers deal with this problem by proposing that we develop a scale of value to settle conflicts, with humans at the top (Varner 1998). Attfield (2003) adjudicates conflicts among organisms and species by arguing that sophisticated biological capacities, such as sentience, should be ranked above more mundane ones, such as growth or metabolism. While these ideas for adjudicating conflicts sense in theory, they may be difficult to implement in practice, due to disagreements about where to place different species on a scale of value, or how to assess the moral worth of different capacities. While most people would agree that human beings belong at the top, the placement of other species on the scale may not be so easy. Likewise, there may be disagreements about value of different biological capacities, such as sentience, flight, agility, and so on.

Some writers extend the realm of value beyond organisms and species to larger biological units, such as ecosystems and the whole biosphere. According some writers, the value of an ecosystem derives from the value of its parts, e.g. organisms and species (Attfield 2003). Others hold that ecosystems have value that is independent of the value of the organisms and species in the ecosystem. According to Leopold (1989), for example, the value of each living thing derives from its connection to the ecological web (Leopold 1989, Callicott 1989). Theories that assign value to larger biological units also must deal with the problem of adjudicating conflict among species and these larger units. If a particular species is damaging an ecosystem, should the species be reduced in size or even eliminated to save the ecosystem? What if that species is *Homo sapiens*?

The most radical theory of environmental ethics, known as the deep ecology movement, rejects the notion of human-centered morality entirely and argues that ethics needs to be completely reformulated, from an ecological perspective. Human beings should not dominate the biosphere but should live in harmony with other species. For this to happen, human beings need to minimize their environmental impacts, including slowing down industrial activity and reducing population size. Basic facts about modern society must be changed so that non-human life may flourish (Naess 1973, 1986).

Can any of these theories of environmental ethics help policy-makers to settle conflicts between human health and environmental protection? While they all have some important and interesting things to say about the environment, they have little to say about human health per se. The theories paint the conflict between humanity in very broad brushstrokes, i.e. human interests vs. animals, other species, the ecosystem, etc. If health were the only human interest, then this way of presenting the problem might be useful, but health is by no means the only human interest. Other interests include: wealth, education, recreation, freedom, and transportation, to name a few. The human interest in question makes a considerable difference to the policy debate, because different interests have different environmental implications. For example, suppose a country is aggressively pursuing deforestation to convert forest into cropland, and that the crops will be converted into food and biofuels. It is conceivable that the

goal of protecting human health favors a policy against aggressive deforestation, because deforestation will have consequences, such as pollution, that negatively impact human health, while the goal of economic development favors aggressive deforestation, because deforestation will produce new jobs. Thus, a debate about deforestation may not be as simple as human interests vs. the forest and its species. To make sense of the debate, we must specify the human interests in question and balance them against environmental concerns. None of the approaches to environmental ethics examined in this essay contain the conceptual tools to do this well, because they engage the debate at a very general level without articulating human health as a distinct interest.

Another problem with some theories of environmental ethics is that they are oriented toward promoting an ideological agenda rather than problem-solving or policy formation. These approaches may be helpful in critiquing the status quo or inspiring collective action, but they are not very useful at suggesting practical solutions. For example, the deep ecology movement has helped to stimulate probing discussions about the value of the environment and the nature of ethical theory, and it has energized environmentalists, but it has not been a very useful tool for policy-makers who interested in balancing human health and environmental protection because it is too radical and ideologically-oriented. Politicians and citizens who are trying to develop a policy for controlling malaria, for example, probably will not find it useful to be told that malaria is good for the environment because it reduces the human population. Practical solutions to malaria control require recognition of the importance of human health and the environment.

Toward an Environmental Health Ethics

I have examined some influential theories of health care ethics and environmental ethics and argued that none of these approaches have the conceptual tools needed to mediate and resolve conflicts between human health and the environment. They are not very useful to policy-makers interested in deciding how to balance the goals of promotion of human health and protection of the environment. Up to this point, the discussion has been largely critical and negative. In the remainder of this essay, I will shift gears a bit and develop a positive account human health and the environment that can guide practical decision-making and policy formation.

I will begin my positive account by assuming a view known as value pluralism: there are some basic moral values in society that are 1) incommensurable; and 2) sometimes conflict (Gutmann and Thompson 1996; Rawls 2005). The incommensurability of basic moral values means that these values cannot be compared or assessed in terms of a common metric. The full argument for the value pluralism is beyond the scope of this essay, but the basic strategy for defending this position is to critique views that attempt to demonstrate the opposite position, i.e. value monism. Some utilitarian theorists hold that all moral values can be compared in terms of their ability to promote a single basic value, such as happiness. Economic theorists subscribe to a form of monism in that they characterize goods, services and values in terms of a person's willingness to pay, i.e. a market price. Defenders of pluralism argue that attempts to reduce all values to a single, basic value ultimately fail, because of irresolvable disagreements about how to reduce values. For example, consider the debate about human rights vs. security. Since the terrorist attacks of September 11, 2001, the Bush Administration has taken some controversial measures to enhance homeland security, such as increasing the ability of the government to conduct surveillance without judicial warrants and to hold suspected terrorists in captivity without a trial (Pious 2006). Many people are willing to sacrifice some privacy and freedom for the sake of enhanced security, while others are not. Pluralists would argue that the controversy concerning Bush's anti-terrorism policies results from the incommensurability of the values in question. Since it is natural to assume that there are a plurality of values in society, given our different value concepts and commitments, the burden of proof falls on the monist

to demonstrate that this apparent pluralism is really an illusion. In the absence a powerful and convincing argument for monism, pluralism should prevail.[3]

The next assumption in my positive account is that human health and environmental protection are basic moral values that are incommensurable and sometimes conflict. There are also other basic, incommensurable values, such as freedom, justice, well-being, community, virtue, and economic prosperity. These values also cannot be compared or balanced in terms of a common value. Since there are many different incommensurable values in society, the chief task for moral and political theorists is to develop methods and procedures for helping individuals and governments to make practical decisions and form social policies when values conflict (Gutmann and Thompson 1996). Some of the ethical theories discussed in this essay attempt to adjudicate among different values. For instance, Beauchamp and Childress provide methods and procedures for deciding among conflicts between autonomy, beneficence, nonmaleficence, and justice. Varner (1998) and Attfield (2003) have a scale of value for resolving conflicts between different organisms, species, and ecosystems. However, as I have argued earlier, the theories we have examined in this essay are not good at settling conflicts between health promotion and environmental protection, because they do not adequately address the value of human health and the value of the environment.

To better understand how human health and environmental protection conflict with each other and with other values, it will be useful to subdivide these values. Human health can be divided into individual health and population health. Individual health consists of the health of an individual human being, whereas population health is the health of a human population (or aggregate health). Both of these are important values in society. For example, vaccinating a person promotes that health of that individual, but instituting a mandatory vaccination program in a society promotes the health of the population (Bayer et al 2006). The environment can be divided into three basic categories: individual organisms, species, and communities or ecosystems. For example, regulations pertaining to animal welfare in biomedical science protect individual organisms used in research, such as laboratory mice, dogs, or rhesus monkeys (Shamoo and Resnik 2003). Endangered species laws protect individual species from hunting, fishing, habitat disruption, or other threats. A variety of laws and rules protect ecosystems, such as pollution regulations, environmental impact laws, wetlands protection laws, forest management rules, and so on (Kubaseck and Silverman 2007).

The final part of my positive account is to describe a mechanism for resolving conflicts among values. I will follow Beauchamp and Childress (2001) in holding that conflicts among values can be settled by weighing and balancing the different values in light of the facts and circumstances and the various options. Which value we decide to give priority to may vary from case to case: there is no absolute ranking of values. Careful attention to the facts and circumstances and options can help us to decide how to prioritize values in particular situations. For example, consider tobacco smoking, which pits personal freedom (freedom to smoke) against individual and public health. Some of the options for controlling tobacco smoking include: a) no restrictions on smoking; b) restrictions on smoking, such as age requirements, limitations on public smoking, and restrictions on tobacco advertisements; c) extensive restrictions on smoking, such as regulation by a federal agency; and d) no tobacco smoking permitted at all. For over sixty years, medical and epidemiological researchers have studied the harmful effects of smoking on the smoker as well as other people exposed to smoke. As evidence on the harmful effects of tobacco smoking has accumulated, governments have imposed a variety of restrictions on smoking. All states in the US forbid the sale of tobacco products to minors. Many states, municipalities, and institutions in the US have banned smoking in public places in the last fifteen years, because of mounting evidence concerning the adverse effects of passive smoking on human health. Before the harmful effects of passive smoking were accepted as fact, smoking in public was common and permissible in most places

in the US. As the evidence began to mount on the negative effects of passive smoking, the moral balance shifted toward placing additional restrictions on smoking. Regulation of tobacco by the Food and Drug Administration may be the next step in this process (Rabin and Sugarman 2001). This example shows how careful attention to the facts, circumstances, and options can help to resolve conflicts between basic, moral values.

Application: Malaria prevention and DDT

Having described an approach to human health and the environment, I will now show how it can be applied to a case. I will first describe the facts and circumstances pertaining to the case of DDT spraying to control malaria before exploring the values in conflict and the options.

Malaria is a parasitic infection (a protozoan) spread to humans by female mosquitoes of the genus *Anopheles*. The mosquito acts as a vector for the parasite, carrying it from human host to human host. Two of species malaria, *Plasmodium vivax* and *Plasmodium ovale*, can remain dormant inside liver cells and become active again after two or more years. The symptoms of malaria include fever, chills, sweating, headaches, and muscle pains. Malaria can also lead to cerebral malaria, anemia, and kidney failure. Left untreated, malaria often causes the death of the host (CDC 2007). There are about 350–500 million cases of malaria each year around the globe, mostly in sub-Saharan Africa and nations in the tropical regions of the world. Approximately one million people die from the disease each year, most of them young children. Malaria is the fourth leading cause of death of young children in developing nations. Some of the strategies for preventing the spread of malaria include spraying pesticides in homes and in mosquito breeding areas, eliminating mosquito breeding areas, using pesticide-treated bed nets, treating people who are infected with the parasite with anti-malarial drugs, or treating uninfected people as a prophylactic measure. *Anopheles* mosquitoes have become resistant to many different pesticides, and some forms of malaria have become resistant to anti-malarial drugs (CDC 2007).

Historically, dichlorodiphenyltrichloroethane (DDT) spraying has played an essential role in eradication and control of malaria. Malaria was eradicated in North America and southern Europe in the 1950s as a result of spraying with pesticides, mostly DDT, and draining swamps. In 1960s, several developing nations used the same methods to nearly eradicate malaria, but the parasite returned when they stopped spraying DDT, in response to concerns about the adverse effects of DDT on the environment and human health (Silberner 2006).

In 1962, Rachel Carson alerted the public to the hazards posed by DDT and other pesticides in her book *Silent Spring*. In the decade following the publication of Carson's ground-breaking work, scientists gathered evidence concerning the harmful effects of DDT on various animal species. Because it takes a relatively long time to decompose, DDT can accumulate in the food chain. Species at the top of the chain, such as predatory birds or fish, develop the highest concentrations of DDT and DDT metabolites. DDT causes the eggshells of bald eagles to become fragile. DDT spraying was a major cause of the decline of the bald eagle and peregrine falcon in the 1950s and 1960s. DDT is also toxic to many species of fish, crayfish, and shrimp. The Environmental Protection Agency (EPA) has classified DDT as a probable human carcinogen. In 1972, the EPA banned DDT (EPA 2007). In the 1970s, many developed nations banned DDT and discouraged developing nations from using the chemical. The World Health Organization (WHO) advocated malaria control strategies that did not involve the use of DDT, such as drug therapy for malaria victims and using bed nets to prevent mosquito bites. In 1995, the United Nations Environment Program placed DDT on a list of chemicals that should be banned or restricted or restricted around the world.

Today, there is a heated debate about whether developing nations should use DDT to fight malaria. The WHO has reversed itself and now favors limited DDT use (Silberner 2006). Other

proponents of DDT use include organizations with a commitment to fighting malaria, such as Malaria Foundation International. DDT proponents argue that DDT is one of the most effective pesticides against mosquitoes and that its risks to human health have not been clearly demonstrated. The public health benefits of using DDT significantly outweigh any risks to the environment. A limited amount of spraying in and around homes can reduce malaria transmission with a minimal impact on the environment (Roberts et al 2000). Those opposed to the use of DDT include environmental groups, such as Greenpeace and Pesticide Action Network of North America. DDT opponents argue that there are alternatives to DDT spraying that can be used to control malaria, and that DDT is not as effective as proponents claim, because many mosquito species have become or will become DDT-resistant (Berenbaum 2005). The long-term risks of DDT to the environment and human health do not justify the short-term gains that may be made against malaria. Continued use of DDT to fight malaria will lead to more DDT-resistance and environmental damage (Pesticide Action Network of North America 2007).

The debate over DDT spraying pits human health promotion against environmental protection. Malaria is one of the most devastating diseases affecting the developing world today, and DDT has been effective at controlling the mosquitoes that carry malaria. However, DDT can have adverse effects on some species in the ecosystem, including humans, and on the ecosystem as a whole. How can society resolve this conflict? As I have argued earlier, I do not think that theories of health care ethics or environmental ethics have the conceptual tools to deal with this dilemma. According to the approach I am defending in this essay, we need to describe the facts and circumstances, which we have already done, and then identify the values at stake and explore the various options. Some of the key values at stake in this debate include: promotion of human health (individual and public health), protection of species, such as fish and birds of prey, and protection of ecosystems. Some other values include economic development, since malaria can have devastating on the economies of developing countries; and social justice, since malaria tends to afflict poorer people more than richer ones, because poorer people often lack the resources necessary to prevent malaria.[4] Some of the options include: a) uncontrolled spraying of DDT, b) controlled/limited spraying of DDT (with many variations), and c) no spraying of DDT.

Putting all of this together, the resolution of some key factual questions will help us to balance these different values:

1. What is the impact of malaria on human health, economic development and social justice? How burdensome is this disease on developing nations? How much does it contribute to morality, morbidity, poverty, income disparities, health disparities, and other problems? How are the adverse impacts of malaria distributed among people living in a particular society and among people living around the world?
2. What is the impact of DDT spraying on human health? If DDT is a carcinogen, then the health effects of preventing malaria might be offset by increasing rates of cancer. If limited spraying of DDT has a minimal impact human health, then this would be an option to consider.
3. What is the impact of DDT spraying on other species, such as fish or birds of prey? If DDT spraying causes numerous non-human species to become extinct or endangered, then this would not a good option to pursue, since this could have a detrimental impact not only on those species but also on the ecosystem and on human beings. For example, if a species a fish becomes extinct that people use as a food source, this could causes famine. If a species a bird becomes extinct that preys on mice, then this could lead to overpopulation of mice, which could cause problems for

human health and agriculture. If limited DDT spraying does not cause these problems, then this would be an option to consider.

4. What is the impact of DDT spraying on the ecosystem as a whole? This is similar to the second question, but it focuses on all the species in the ecosystem. If DDT spraying causes major disruption to the ecosystem, then this would be a dubious option to pursue. However, if limited DDT spraying only causes minimal disruption, then this would be an option to consider.

If we assume the malaria has a tremendously negative impact on human populations in some developing nations—and there is considerable evidence for this assumption—then the import of the key factual questions can be boiled down to one general question: Is it possible to use DDT to control malaria without having a significant impact on human health, other species, or other ecosystem? Some scientists and organizations, such as the WHO, think the answer to this question is “yes,” while others think the answer is “no.” I will not attempt to resolve this dispute in this essay, but I think the dispute illustrates nicely the problems that can arise when human health conflicts with environmental protection and how the framework I have defended in this essay can help to solve them.

Conclusion

Promoting human health and protecting the environment are important ethical values that often harmonize but sometimes do not. When they conflict, policy-makers, government officials, and citizens need a way to mediate and balance these values. Some of the influential theories of ethical decision-making from the disciplines of health care ethics and environmental ethics lack the conceptual tools to resolve these conflicts. Theories of health care ethics tend to be human-centered and do not take the environment into account, whereas theories of environmental ethics have little to say about human health. What is needed is an approach to ethics and public policy that takes human health and the environment into account. I have tried to take some steps toward developing such an approach in this essay.[5] Since the clash between human health and the environment is likely to continue to arise many different areas of public policy, I encourage other writers to explore other ways of resolving this conflict.

Notes

1. This raises the issue of whether we have obligations to future generations at all. This is complex philosophical question that I cannot answer in this essay. See Gewirth (2001).
2. For further discussion, see LaFollette and Shanks (1996).
3. For further discussion, see Gutmann and Thompson (1996), Mason (2006).
4. For more on environmental justice issues, see Shrader-Frechette (2002).
5. It is also possible that some other influential theories of bioethics, such as Beauchamp and Childress' view or Jonsen, Siegler, and Winslade's view, could be modified to allow for proper consideration of the environment in health care decision-making, but I will not explore that option in depth here.

Abbreviations

CDC, Centers for Diseases Control and Prevention; DDT, dichlorodiphenyltrichloroethane; EPA, Environmental Protection Agency.

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