



AS I SEE IT

Human impact: the ethics of I=PAT

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ABSTRACT: Global change, driven by increasing levels of human population, growing consumption by the rich, and poor choices of technologies and social arrangements to supply that consumption, have generated a suite of environmental problems that threaten civilization. This in turn has brought to the fore a daunting array of ethical issues that, sadly, are not being widely addressed. I sample some of these and discuss them in a way that hopefully will generate some of the needed discourse.

KEY WORDS: Population · Consumption · Affluence · Technology · Cultural evolution · Climate · Extinction

INTRODUCTION

The I=PAT equation subsumes a vast diversity of ethical issues because it allows insights into the 'perfect storm' of environmental problems now facing humanity. The equation reflects the truism that the impact (I) of a human society on its environment can be viewed as the product of its population size (P), its level of affluence (A) as measured by its per-capita consumption, and 'technology' (T), a factor considering not only the technologies used to service the consumption (e.g. bikes vs. automobiles), but also the political, social, and economic arrangements (such as environmentally malign subsidies) involved. But many complexities lie buried in that nexus. The 3 factors, for instance, are not independent of one another; for more than 40 yr we have known that their interactions are usually nonlinear and connected to some of the most serious social dilemmas confronting humanity (Ehrlich & Holdren 1971). This results in many difficult ethical issues arising in resolving the unprecedented problems that constitute the human predicament.

That predicament includes the interrelated crises of overpopulation, wasteful consumption, increasing climate disruption leading to rapidly weakening life-

support systems, devastation of the oceans, growing economic inequity, human-rights abuses, increasing hunger, toxification of the planet, declining resources, a looming threat of resource wars (especially over oil, gas, and fresh water), a deteriorating epidemiological environment that enlarges the probability of unprecedented pandemics (Pauly & Watson 2003, Ehrlich & Ehrlich 2013), and persistent racial, gender, and religious prejudices that make the environmental problems more difficult to solve. This means, as I hope to show, that ethical considerations involve not just how we treat our life-support systems, but how we treat other people directly and how we treat people and other organisms through our impacts on the environment.

WHAT ARE ETHICS?

Ethics, of course, are standards of behavior agreed upon by human groups; no other organisms can have ethics because they lack the language with syntax required to generate discussions and produce such agreement. Different groups obviously can agree to different ethics, as, for instance, the difference between Quaker religious ethics and Nazi SS ethics

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shows so clearly. It would be wonderful to have a framework that would guide us in environmental decision making, to let us always be able to judge the ethical trade-off we inevitably face. But sadly a satisfactory framework remains elusive—indeed, I suspect one is unobtainable. In this essay, I will assume a basically consequentialist position, dealing with issues, such as the results of commercial hunting of elephants, without reference to some of the detailed questions philosophers have explored in the area (McNaughton & Rawling 1991, 1992). Rule- or duty-based ('deontological') ethics always leaves my pragmatic self pondering the source of the obligations and duties postulated by Kant and others, even though my intuitions and (I hope) common sense frequently push me in a deontological direction, as in the Quaker vs. SS case.

I will not partake in the disputes over the 'intrinsic' value of nature (Rolston 1994, Minter 2012), since all values are human-assigned, including intrinsic ones. I will take the viewpoint of the majority of environmental scientists who fear catastrophic consequences from the roughly business-as-usual course society is now on. This is a fear shared by many non-scientists, including many religious people who may have a more deontological approach than I do and are concerned with humanity wrecking 'God's creation'. For instance, Episcopal priest Sally Grover Bingham considers climate disruption today's most pressing moral issue (Fahys 2013). Furthermore, although it is possible to find some notable exceptions (e.g. Potter & Whitehouse 1998, Potter 1999, Whitehouse 1999), what is generally referred to as 'bioethics' unfortunately does not provide much of an ethical base for considering the thorny human–nature relationships embedded in the I=PAT equation (Holdren & Ehrlich 1974, Ehrlich & Ehrlich 1981).

The rapid worsening of the human predicament means that applied ethical issues with a significant I=PAT connection—what I have called 'ecoethics' (Ehrlich 2009)—must be dealt with without waiting for the theoretical issues of interest to professional ethicists to be resolved (if they ever will be). Thus, the practical ethics of decisions on whether or not to go to war over (say) oil supplies have profound environmental consequences. Furthermore, all human relations, including those involved in international disputes, seem bound to be stressed by the escalating environmental changes civilization is facing. That implies that most of applied (or practical) ethics—agreed-upon values that involve notions of whether actual behaviors are right or wrong (Singer 1993, Jamieson 2008)—will need to evolve.

Do ecoethics come naturally to *Homo sapiens*?

We are small-group animals, both genetically and culturally accustomed over several hundred thousand years to dealing with roughly 50 to 150 other individuals (Ehrlich 2000). Furthermore, human beings have evolved wonderful mechanisms for observing and reacting to sudden changes, in part by mentally holding the environmental background constant to make the changes stand out. But individuals are not so well equipped to perceive changes in that background, such as the gradual accumulation of greenhouse gases (GHGs) and toxic compounds in their environments. A rock hurtling toward one's head is immediately translated into an existential threat; words and charts about rising GHG concentrations are not.

Rapid cultural evolution is required if *Homo sapiens* is to transition successfully away from having a gigantic society with an economic system based on perpetual growth, teetering on global collapse (Ehrlich & Ehrlich 2013). Humanity must rapidly and successfully evolve norms and institutions producing proper responses to difficult-to-picture threats. It must also evolve what I will call 'foresight intelligence': systematically looking toward the future and acting on what is foreseen. That theoretically could lead to a revitalized society that provides everyone with a reasonable quality of life (Ehrlich & Ehrlich 2009). As I have said previously, a 'quasi-religious movement, one concerned with the need to change the values that now govern much of human activity, is essential to the persistence of our civilization.' (Ehrlich 1986, p. 17). I hope that the Millennium Alliance for Humanity and Biosphere (<http://mahb.stanford.edu>) might be the start of such a movement, helping to bring civil society together for a coordinated effort to guide cultural evolution.

A sampling of ethical issues

There are so many ethical issues involved with I=PAT that I can only sample a few to illustrate their seriousness and variety. Some are very broad. Is it ethical to ignore the plight of the poor who often are those earliest and most severely affected by environmental degradation? Is it ethical to ignore the interests of future generations, who are likely to suffer much more than the present generation? Or, in more detail, is it ethical for mainstream media outlets to largely ignore the predicament? Considering the scientific consensus (National Academy of Sciences

USA 1993, Union of Concerned Scientists 1993, Bar-nosky et al. 2013), is it even ethical for scientists writing about solutions to the predicament not to point out that among the rich (including those in developing countries), perhaps the most environmentally useful step they can take is to have an absolute maximum of 2 children (barring a multiple birth at a second pregnancy) (Murtaugh & Schlax 2009). Is it ethical for economists in and out of universities to give the impression that economic growth at rates as high as 3 or 5% per annum can be long sustained? In the same vein, is it ethical to assume that people in the future will be so much richer than the rich today that they will be easily able to deal with the legacy of environmental disaster we seem determined to leave them? I believe that any consequentialist will think the answer to each of those questions, and many related to them, is 'no, all these behaviors are unethical'.

The problem of scale

The ethics of I=PAT must deal with dilemmas over a vast range of scales, from determining appropriate reproductive and consumptive activities of individuals (Dasgupta & Ehrlich 2013) to ending the destruction of the oceans (Pauly et al. 1998) and avoiding nuclear war (Toon et al. 2007, MacMillan 2013). This goes beyond what has been typically covered under the already broad rubric 'environmental ethics' (Rolston 1988). Those concerned with the ethical aspects of human impacts on the environment must struggle with issues of inter-person, -group, and -nation equity as well as the dilemmas of discounting by distance (valuing distant persons, events, costs, and benefits less than those closer to the observer in physical or mental distance). But perhaps most importantly, they must deal with the difficult dilemma of intergenerational equity—of discounting the future. That is especially troublesome because actions today can have extremely significant environmental consequences 50 or more generations from now (e.g. Solomon et al. 2009), and because we psychologically seem to care about future generations and have some dependence on the existence of a posterity (De-Shalit 1995, Scheffler 2012).

Economists have probably taken the most systematic approach to judging discount rates (e.g. Portnoy & Wyant 1999, Asheim 2010), comparing and contrasting the possible results of using different social discount rates in intergenerational projects. They have generally supported relatively high rates, based on the questionable assumption that future genera-

tions will be much richer than today's. But the whole question of discount rates in cost-benefit analyses under circumstances of high uncertainty and when there is a zero-infinity problem (Gillroy 2001) (a small chance of an event, but a catastrophe if it occurs) has been brought into focus by Weitzman (2009), who made it clear that conventional economic cost-benefit analyses of climate change were likely underestimating costs dramatically.

ETHICS AND CLIMATE DISRUPTION

Climate disruption displays the uncertainties of these issues starkly, many of them highlighted in the course of international negotiations. Consider some of these questions. First, how serious is the disruption likely to be, and how will the impacts be distributed? If expensive measures are to be taken to reduce the flux of GHGs into the environment, what share of the cost is ethically allocated to rich countries and rapidly developing economies, considering that in the course of becoming rich they emitted (and are emitting) the majority of GHGs added to the atmosphere since the industrial revolution? This is not a theoretical question. For instance, developed countries failed to support a deal with Ecuador in which the rich would pay that nation to leave a large deposit of oil in the ground under Ecuador's Yasuni forest, sparing in the process the forest's incredibly rich portion of humanity's precious heritage of biodiversity. Actual donations amounted to only \$13million of the planned \$3600 million, less than one-half of one percent of the goal, so Ecuador backed out of the deal (Watts 2013). So even when an ethical course is chosen, it is uncertain whether it will be followed (consider also international attempts to agree on climate mitigation).

At a more general level, what would be ethical behavior for rapidly developing nations, such as China, India, and Brazil, which are quickly increasing their GHG emissions? How should the likely heavier impacts of climate disruption on poor nations be compensated? What about the numerous ethical complexities that are introduced when geoengineering schemes are considered? Would they include how to decide what scheme to pursue, who gets to do it, who pays, and whether any nation has a veto? What sort of governance mechanisms might be developed to deal with such tough international issues (Barrett 2008)? What about 'soft geoengineering', such as painting rooftops white? Above all perhaps is the issue of moral hazard—how much does the 'promise' of geoengineering reduce allocation of effort to miti-

gation, the much more ethical efforts to limit emissions? And, again, when considering climate disruption, what assumptions would be ethical to make about the wealth of future generations and about what costs of climate disruption would be reasonable to pass on to those generations? These questions go beyond traditional ideas of 'justice' or 'fairness' such as equal treatment of equals. How can we determine in what aspects a future society, facing problems with the climate, is equal to today's society so we may attempt to treat our descendants fairly?

Ethics of climate and the great extinction

In my view, the Yasuni failure represents utterly unethical behavior by the well-off international community, which had a strong moral responsibility to take and finance remedial steps. Indeed, that community could aid immeasurably by taking similar steps to leave the oil in the ground under Uganda's Murchison Falls National Park and prevent the destruction of Tanzania's great Serengeti migrations for the sake of mineral exploitation. The rich generally have a large share of responsibility for launching the sixth great extinction crisis, which now threatens not only our only known living companions in the universe but also the ecosystem services upon which both rich people and the rest of humanity are utterly dependent. Those services include maintaining a livable climate, supplying fresh water, recycling nutrients essential to agriculture and forestry, providing vital food from the sea, pollinating crops, controlling crop pests, controlling floods, and providing esthetic resources. Thus, the failure of governments of rich nations, including the vastly overpopulated and environmentally destructive United States, to make substantial donations to Ecuador is not only highly unethical, but also self-destructive. After all, for example, a 3 cents per gallon gasoline tax in the United States alone would raise the money requested by Ecuador in 1 yr. The United States is already experiencing substantial losses related to climate disruption and is on track to suffer much more; raising taxes on gasoline would be one way of reducing the latter threat (of course, other trade-offs, say using the money to help poor Americans, might be judged more ethical).

There has been a long argument in philosophy about whether human attitudes toward biodiversity should be ecocentric (centered on persuading people that they should assign intrinsic values to nature) or anthropocentric (focused on the value of nature to humanity) (Curry 2011, Minter 2012). I believe

there is potential in the ecocentric view. If society had agreed to assign value to biodiversity in and for itself, regardless of its instrumental value, the overall problem of preserving Earth's other organisms would be simplified. The difficulties of making such ethical decisions in the I=PAT realm can be exemplified by the problems of preserving a prominent element of biodiversity, elephants, from the impacts of human activities.

Elephants and biodiversity ethics: tough decisions

There has been heated debate in much of Africa over whether or not it is ethical to cull elephant herds that are expanding in response to recent steps to stem the illegal ivory trade. On the one hand, the giant beasts can be serious agricultural pests and at high densities can radically alter natural landscapes; on the other, most people, when pressed, are offended by the wanton killing of these charismatic and socially intelligent animals. Like many of today's ecoethical dilemmas, this one is not easily resolved.¹ There are ways to curb the sizes of elephant populations besides killing them, including relocation and contraception. However, suitable areas into which to introduce elephants are growing scarce, and using contraceptives is difficult except in small parks and is more complicated and expensive than shooting.

Animal rights groups, in my view, are correctly concerned about cruelty to elephants, and the plight of young elephants orphaned when their mothers are killed is especially heart-rending. With some notable exceptions (e.g. Bryant et al. 2002), the issue of the rights many assign to non-human animals have been given relatively short shrift in bioethical discourse. Even when considered, they usually take a back seat to questions about the ethical treatment of people. However, overpopulation of elephants leads both to problems for them and to collisions with growing numbers of *Homo sapiens*, an overpopulated species that is capable of destroying the elephants.

The Zimbabwean 'Campfire' (Communal Areas Management Programme for Indigenous Resources) program, partially funded by USAID, was the center of a controversy about elephants in the 1990s that had a large ethical component (Frost & Bond 2008).

¹I do not wish to get into this debate here. For intelligent discussion of these issues, see Midgley (1983) and Jamieson (1999). Although I sometimes disagree with Singer's (1993 and elsewhere) conclusions (often emotionally), I always find him a clear thinker.

The US funding was to build the capacity of populations to manage local natural resources. The situation can be briefly summarized as follows: elephant herds outside of parks and reserves were capable of decimating a family's livelihood in an hour by destroying its garden plot. That led to defensive killing of raiding elephants by local people. Rogue elephants were also responsible for hundreds of human deaths each year. Defensive killing was accelerating a decline in elephant herds, at the time primarily due to poaching.

The Campfire program supported returning control of elephant herds to local communities and issued some 100 to 150 licenses per year to kill elephants on community lands. The licenses were sold to sport hunters for \$12 000 to 15 000. The money was given to rural district councils, which got to determine how the money was spent. Herds grew dramatically in the hunting areas because poaching was suppressed by the elephants' new 'owners', local people, who got more money and suffered less damage. It seemed to many it was a win-win situation. But the Humane Society of the US (HSUS) objected, saying that the intelligent and charismatic elephants should never be killed by hunters, and animal rights groups lobbied to get funding stopped. The whole issue was further clouded by arguments over how much of Campfire's motivation was centered on reopening the ivory trade (partly sanctioned by the Convention on International Trade in Endangered Species—CITES) and its impact on elephants outside of Zimbabwe, and on whether a switch to entirely photographic safaris (a trend then well under way) would not be equally effective in protecting herds (but perhaps less effective in protecting indigenous people and garden plots).

More recently, despite the shocks of a cessation of international funding and the political-economic implosion of the Zimbabwean state, the conservation benefits of Campfire remained remarkably robust (Balint & Mashinya 2008), although their present status is in doubt. The situation underlines the need to keep the ecoethics of the 'big picture' always in mind, such as the impact of political disputes on biodiversity, and to pay attention to factors such as 'political endemism' (Ceballos & Ehrlich 2002) — the disparate capabilities of different nations to protect the same species — when determining where to allocate conservation funds. And, sadly, that big picture today includes continental-scale declines for the African elephant, tied to human population growth and land-use change, climate disruption (increasing drought), and an upsurge in poaching due in large

part to growing demand from an increasingly affluent Chinese population.

The Campfire controversy highlights the ethical conflict between those who believe the key conservation issue is maintaining healthy wildlife populations and those concerned primarily about the rights of individual animals or who decry the 'utilization' or 'commodification' of nature or, as it is sometimes called, 'wise use' or 'multiple use'. This is a difference in values that is likely to persist (Ehrlich et al. 2014). Yet, in the face of values disagreement, we still have to make choices. Much as I hate to see elephants hunted by people who simply get a feeling of accomplishment from killing these magnificent animals (if they want 'sport,' they should stalk bull elephants on foot with spears), on the whole I come down on the side of the Campfire program. It seems more ethical to give local people a beneficial stake in maintaining the herds instead of permitting their extermination than it does to avoid the 'unethical' killing of non-human animals by rich hunting enthusiasts — especially when and where entire elephant populations may be doomed in the absence of hunting revenues. It would also show local people that not all conservation programs operate against their perceived interest. In addition, I think it is ethical to consider the non-charismatic animals and plants that, as I have seen in the field, can be laid waste by elephant overpopulation even while some other organisms can be dependent on normal elephant activities (Pringle 2008). So in a world in which ideal solutions are rarely available, I'd vote to continue controlled hunting for the moment, since it seems that both more people and more animals would benefit from that course.

This is primarily a consequentialist position, but I would become deontological if the sum of the benefits could be increased by culling some of the human population; to me people are more important than elephants. On the other hand, from the viewpoint of the welfare of both *Homo sapiens* and the other elements of biodiversity, the most ethical thing would be to work globally to reduce humanely the scale of the human enterprise (Ehrlich et al. 2012).

There are a number of other key I=PAT ethical dilemmas associated with biodiversity and peoples in developing countries and, especially indigenous peoples. They are exemplified by the situation of aboriginal subsistence whaling, where the big animals play important cultural roles in societies. The International Whaling Commission (the body charged with regulating whaling under an international agreement) has, since its establishment, recognized this

whaling as a separate type of activity from big-time industrial hunting. For aboriginal subsistence whaling, the objectives of regulation are to ensure that risks of extinction are not seriously increased by whaling; to enable native people to hunt whales at levels appropriate to their cultural and nutritional requirements; and to move whale populations towards healthy levels and then maintain them. This does not avoid all ethical issues — for example, the claim that it is unethical to hunt or eat meat, or whether some peoples are truly ‘aboriginal’. And, of course, the entire fisheries area is replete with ethical issues about such things as overfishing in general, the rights of artisanal fishers, pollution from land, bottom trawling, long-lines, no-take zones, and so on.

ETHICS AND THE DRIVERS

Nothing brings out ethical issues like the 2 main drivers of environmental deterioration — overpopulation and overconsumption by the rich. The big questions are obvious, and relate to sustainability and intergenerational equity. How many people should there be at any given time, place, and level of consumption; and how is agreement on those goals to be sought and the goals ethically pursued? In more detail, what are the ethics of organized pronatalism? Perhaps the most widely discussed behavior considered by many to be highly unethical in the population–consumption nexus is that of elements in the hierarchy of the Catholic Church. One can see this in the Philippines, where the anti-women policies of the late Cardinal Jaime Sin are still pursued, or in El Salvador’s Church-promoted and unbelievably misogynistic abortion laws. I should emphasize that the problem is not one of Catholics in general, whose reproductive performance tends to be like non-Catholics’ and who tend to suffer more from the hierarchy’s unethical policies than those of other faiths. Also, there seems to be some hope that Pope Francis may move the Church towards more ethical policies. The hierarchy, of course, putatively bases its actions on the directives of supernatural entities. Other motives have been documented, such as pursuing unethical policies on birth control because a reversal would threaten the doctrine of infallibility, as Pope John Paul pointed out before he assumed the office (Hasler 1981, Weisman 2013).

While actions of the hierarchy have global implications, what about the ethics of over-reproduction by Orthodox Jews in vastly overpopulated, water-short Israel? And is the treatment of women by Orthodox

Jewish men (or Islamic men) ethical, even if the women assent? Shouldn’t people who support the ‘divine command theory’ subset of deontological ethics and actually believe in following those directives, be concerned about the consequences?

Ethics based on pronatalism have been responsible for many deaths (women killed by quack abortions where the safe procedure is illegal; children drowned by a typhoon in the overpopulated Philippines, Ehrlich 2013), not to mention untold misery (unwanted children) in the past, probably much more death and misery in the future, and larger burdens placed on the children of responsible parents who limit their own reproduction but must pay part of the social costs of children of overreproducers.

Other ethical issues surrounding over-reproduction concern externalities, such as features of social arrangements, especially male dominance, that promote it. In sub-Saharan Africa, for instance, over-reproduction is supported by arrangements such as polygyny, patrilineality, communal land tenure, and fosterage. Is it ethical for men to so dominate households and control fertility decisions in Nigeria that they are traditionally addressed by their wives as ‘master’ or ‘lord,’ while the wives (and those other factors) relieve the men from paying the real price of their desires for large families (Dasgupta & Ehrlich 2013)?

Coercion and reproduction raise some of the most contentious ethical issues connected with I=PAT (e.g. Dreweke 2013) and illustrate how people in the same culture can develop strikingly different ethical views. Many people consider it to be highly moral to coerce people to limit their sexual activities to members of the opposite sex, deny sexually active people access to certain contraceptives, or force women to carry pregnancies to term (in some cases even if the pregnancy results from rape). Other people take the opposite view, believing that the ethical position is to leave reproductive choices largely to women, to a lesser degree their partners, and even more marginally to physicians. But further ethical problems are posed for those who believe women should make their own reproductive decisions and be free to have as many children as they want. What about women who want to have more children than is socially desirable, and who should decide what that number is?

In my view, any decision to have more than 2 children by anyone in a grossly overpopulated world is potentially unethical. If someone is unaware of the global population situation, or is in a position where the family’s survival depends on the labor of additional children, then, of course, I would draw a differ-

ent conclusion. Human beings live in societies, and that implies an obligation to consider one's actions ethically: decisions on childbearing have, in the aggregate, profound implications for societies. The right of people to have as many children as 'they want' is a typical made-up right, with no more justification than, say the 'right' to smoke wherever you wish, or the 'right' to carry automatic weapons into schools. Over-reproduction, among other things, can trample on children's right to live in a healthy environment.

The ethics of consumption are especially vexed. It is easy to point to ethical issues associated with the human propensity for competitive consumption (Dasgupta & Ehrlich 2013) and the whole discipline of marketing, which is designed to promote consumption on impulse. The idea is to pressure consumers to go with their 'first-order preferences' (George 2004) rather than the more considered and often socially more positive 'second order'. Surely it is more environmentally ethical for a rich person to buy a Van Gogh painting than an executive jet to use to fly to Monaco on vacations, but how about you and me and a Mac vs. a PC (or any computer at all when the energy demand of servers is escalating)?

SOME CLOSING COMMENTS

I have only scratched the surface of the ethical issues associated with I=PAT. An entire book could be written with the title 'Are borders ethical?' Many volumes have been published on the ethics of racial, gender, and governance issues, all critical to solving the human predicament. There are also special problems associated with making ethical judgments about many environmental issues because their nature does not trigger normal human moral judgment systems (Markowitz & Shariff 2012). The key point is that the ethics of the human predicament are almost never part of public discourse. Where is the discussion about the ethics of oil wars started by the United States and their impacts on other peoples today and on the environments of future generations? Why do people not debate the ethics of preserving elements of biodiversity that have no obvious instrumental value to humanity, the ethics of counting on future imagined technofixes to clean up messes generated today, or of ignoring the population driver in virtually all discussions of growing environmental problems? Why is there no talk of the ethics of risking a collapse of civilization? The very lack of discussion, in my view, is highly unethical.

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