

*Taking Population
Out of the Equation*
Reformulating I=PAT



H. Patricia Hynes

I
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Taking Population

Out of the Equation:

Reformulating I=PAT

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INSTITUTE ON WOMEN AND TECHNOLOGY
North Amherst, Massachusetts (USA)

I_W_T

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INTRODUCTION

*I*N the mid 1970s, Paul Ehrlich and John Holdren put forth a simple algebraic equation that largely determined the parameters of the population-environment debate in the North in the ensuing years. Metaphors of “population bomb” and “population explosion” and images of teeming Third World cities fortified their algebraic model. Subsequently adopted by most mainstream environmental and population organizations of industrial countries, the formula became widely known as the I=PAT or IPAT equation. (1) The impact of humans on the environment (I) is a product of the number of people (P), the amount of goods consumed per person (A), and the pollution generated by technology per good consumed (T). Thus:

$$\text{Environmental Impact} = \text{Number of People} \times \frac{\text{Goods}}{\text{Person}} \times \frac{\text{Pollution}}{\text{Good}}$$

or $I = PAT$ where I is units of pollution

The appeal of IPAT lies in its simple, physical insight: All people use resources and create waste, and many have children who use more resources and create more waste. Complex, close-grained social and political factors that identify who among the universal P is responsible for *what*, and the *how* and the *why* behind much pollution—such as the military, trade imbalances and debt, and female subordination—are outside the scope of the formula. With IPAT, an atomistic view of humans’ impact on the

environment has been promulgated as sufficient analysis for public policy on population and environment.

The trademark of IPAT is its arithmetical integrity. The three factors interact in multiplicative fashion, so that an increase in any one of them—population, level of affluence, polluting technology—results in an increase in I. A small decrease in A and T is quickly offset by a small increase in population; conversely, a small decrease in P is countervailed by a small increase in A or T. IPAT works algebraically and thus appears to be internally consistent and correct.

Another drawing point of IPAT is the seeming geopolitical balance in the parameters. Regions with high P generally have low AT, and regions with high AT generally have low P. For example, just under 25 percent of the world's population consumes about 75 percent of the world's resources and energy and 85 percent of all wood products, and the same fraction of the population generates most of the world's waste and global atmospheric pollution. Most of the high consumers and polluters live in the developed countries. The world's population of 5.4 billion people is growing at a rate of 1.7 percent per year and is projected to reach 10 billion by 2050. More than 90 percent of that growth will be in developing countries (United Nations Population Fund 1991). These statistics, with their alleged evenhandedness to North and South, are used to corroborate the universality of the formula and frame the parameters of the international public policy debate on environment and development. (How balanced, though, is the environmental impact of developing and developed countries if developing countries are more responsible for the impact of only one factor P, while developed countries are more responsible for the impact of *two* factors, A and T?)



DEBATES FROM WITHIN

So entrenched is IPAT that critics and advocates alike debate from within it; like a mental boxing ring, it locks in those who take it on. Some critics have argued that A and T are more egregious than P in impact; others, that the impact of an increase in population is variable and contextual, depending on such factors as population density, and robustness or fragility of the ecosystem. This leads advocates to propose a country-by-country assessment of population limits based on a given country's ecological carrying capacity C; ultimately I=PAT regenerates as I=PACT. In other cases, critics charge the North with hypocrisy because of its inflated focus on P, near silence on A, and insufficient action on T. International mediators then propose North-South negotiations where each gives something—for example, carbon dioxide reductions in the North for demographic reductions in the South. I=PAT persists as I=P[A]T, where A sidesteps negotiation as T and P are traded off against each other.

The environmentalist Barry Commoner, one of the early and fiercest critics of IPAT, has analyzed population, consumption, technology changes, and pollutant increases in the United States between the years of rapid industrial growth 1950 to 1970 for four categories of pollutant: nitrogen oxides, phosphates, synthetic pesticides, and discarded beer bottles. Using regression analysis, he found that “the dominant contribution to the sharply rising pollution levels during that period of time was the technology factor rather than increasing population or affluence” (Commoner 1991, 201). In the post-World War II era, disposable con-

tainers replaced reusable ones; manufacture and use of synthetic fertilizers and pesticides increased exponentially; truck freight replaced rail freight; and national transportation policy favored the automobile. In comparable but modified analysis for developing countries, Commoner demonstrated similar results: The increase in motor vehicle use and electricity generation between 1970 and 1980 was significantly higher than the increase in population. He concludes that “environmental quality is . . . largely governed. . . by the nature of the technologies of production” (Commoner 1991, 225). While Commoner forcefully propounds the overriding role of industrial technology in pollution, he nevertheless leaves the IPAT paradigm intact for another generation of analysts to compute and compare the impacts of population, consumption, and technology on the environment.

In analyzing what can be learned from the 1993 United Nations Conference on Environment and Development (UNCED) for the 1994 UN International Conference on Population and Development (ICPD), senior policy analyst Susan Cohen of the Guttmacher Institute packages the key global threats to environment within the IPAT formula. The thorniest issue of

Feminists are the group that environmentalists and populationists find the most fractious in the population debate.

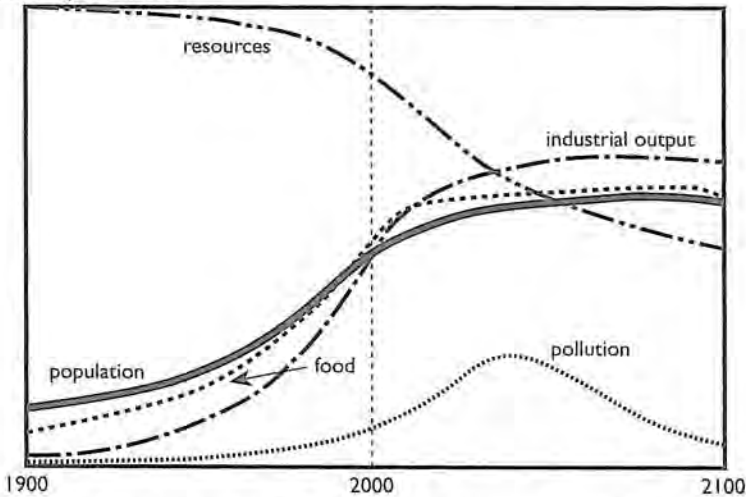
her analysis is what will make P *palatable to feminists*.

Feminists are the group that environmentalists and populationists find the most fractious in the population debate, because feminists will not disengage structural issues of poverty, male dominance, militarism, and consumerism from the population-environment debate. Cohen quotes populationists who are willing to talk reproductive rights as well as responsibilities and to link national demographic targets with economic and health ones for women. Environmentalists have a mixed record in public support for abortion and women’s rights, she notes, but some

are rapidly recognizing that the antidote to population explosion is “empowering women,” as a recent issue of the National Wildlife Federation journal puts it (Stranahan 1993). Cohen sifts and sorts through the points of consensus that feminists, environmentalists, and populationists could have on the rocky “road from Rio to Cairo.” The common ground that she maps includes linking population programs with programs for women’s literacy and economic development, engaging women in designing family planning programs from the bottom up, combining demographic with social targets, taking a reproductive health approach to family planning, and lobbying for more and better contraceptive research (Cohen 1993). Throughout the analysis, however, an undertow lurks: Feminists must break their silence about population pres-

Scenario of Stabilized Population and Industry with Technologies to Reduce Emissions, Erosion, and Resource Use Adopted in 1995.

State of the world



Reprinted from Beyond the Limits, © 1992 by Meadows, Meadows, and Randers. With permission from Chelsea Green Publishing Co., Post Mills, VT.

tures. In other words, feminists must buy into the P of IPAT, and then work from within that atomistic black box.

The authors of *Beyond the Limits*, sequel to *The Limits to Growth*, employ a system dynamics computer model to show a range of environmental and human outcomes from ecosystem collapse to sustainability, with varying rates of population growth, consumption of resources, industrial output, and generation of pollution (Meadows et al. 1992). The simulations forecast the capacity of the earth at various scenarios of P, A, and T to sustain life and to avoid or suffer overshoot (going beyond ecological limits) and environmental collapse. The authors' simulations lead them to conclude that a sustainable world would support about 7.7 billion people at a standard of living comparable to that of a Western European in 1990, provided that technologies to reduce pollution emissions, land erosion, and resource use are adopted by 1995 and that these technologies are continually improved.

A prototypical graph of a simulation reinforces the premise of IPAT, which underlies their analysis: Since people can be counted numerically, population is fundamentally a quantitative phenomenon and therefore can be treated as a physical unit comparable to pollution and industrial output.

When the number crunching is finished, the authors call for a revolution in sustainability, and, admirably, recognize that "equity" and "justice," "truth-telling" and "love" are necessary for that revolution. "The sustainability revolution will have to be, above all, a societal transformation that permits the best of human nature rather than the worst to be expressed" (Meadows et al. 1992, 233).

**Critics and
advocates
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the IPAT
model.**

It's a pity—and the nemesis of *Beyond the Limits*—that the social ideals of equity and justice are a humanistic afterword to a numerical analysis of humans in the world, rather than beacons of enlightenment that would recast the analysis up front. The quest

for a sustainable world has to originate from a passion for justice, not merely conclude with an appeal to truth and love, Scotch taped like some ethical appendage onto a quantitative input-output model of humans in the world.

Critics and advocates alike, as these examples demonstrate, are locked into the argot of the IPAT model; their results become the talking points for public policy and international negotiations. Wittingly and unwittingly, they buy into the P of IPAT. An alternative feminist approach would reform IPAT so that key structural factors that have been omitted—the elements of social and environmental justice—are brought into the heart of analysis and ultimately reframe public policy on environment and population.



RETHINKING IPAT

AS the environment and population debate becomes more nuanced, P increasingly refers to the one-fifth of humanity who are absolutely poor and have the highest fertility rates, while A and T are associated with the consumption and technology of the wealthiest and most industrialized fifth of the world's population. A 1991 United Nations study states: "These 'poorest of the poor,' being most in need of the benefits of development, are often responsible for a disproportionate amount of environmental degradation, and feature the highest fertility rates. . . . These 'bottom billion' people may often pose greater environmental injury than the other 3 billion of their fellow [developing country] citizens put together" (United Nations Population Fund 1991, 15, 18–19). In the same vein, the editor of the *Worldwatch Environmental Alert Series* points to "some 2.2 billion people. . . wreaking havoc on the world"—"the one-fifth of the world who have but one goal: surviving the next day," and the other fifth who have set record levels of consumption over the past 40 years and show no signs of abating (Starke 1992, 11–12).

Can the poorest 1.1 billion people compare in environmental impact to that of the technology and consumption of the wealthiest 1.1 billion? Is this 1-to-1 ratio accurate, and is it just? The P of most concern for fertility control—the "poorest of the poor"—are institutionally powerless yet collectively resilient women who have larger numbers of children for complex reasons that range from immediate survival and necessity to lack of

appropriate reproductive health services to coercion by a male partner, patriarchal religion, or state. The T of concern, the highest polluting industrial processes that provide consumer goods for the wealthiest fifth of humanity, belong almost entirely to men in the most powerful, interlocking institutions, including multinational oil and gas corporations, governments, and industrial giants like car makers and chemical and weapons manufacturers whose goal is maximizing economic growth and profit. (2) The A of concern are the 1.1 billion who consume 85 percent of all wood products and 75 percent of all energy and resources; they generate almost 90 percent of ozone-depleting chlorofluorocarbons (CFCs) and two-thirds of carbon dioxide emissions and spend a significant portion of their lives dieting, watching television, and riding in air-conditioned cars.

If the wealthiest 20 percent use at least 16 times more energy and 17 times more wood than the poorest 20 percent, then how can the 1-to-1 ratio of environmental impact hold? It strains credulity to equate the poorest, least politically powerful human beings on earth with the most potent industrial expressions of corporate capitalism and former state socialism, the T of IPAT. It strains arithmetic to equate the lowest consumers of natural resources on earth with the highest consumers, who haven't a clue whether the 85 percent of the world's wood products they purchase and discard was sustainably harvested or comes from the last remaining trees on a denuded mountain slope. The wealthiest one-fifth are the major meat eaters of the world, yet they could not trace the links between, on the one hand, the hamburger they eat and the dog food they buy and, on the other, the patch of Latin American

Some of the 1.1 billion poorest are African women who lost access to land when communal rights were replaced by European title-deed systems that restricted land ownership to men.

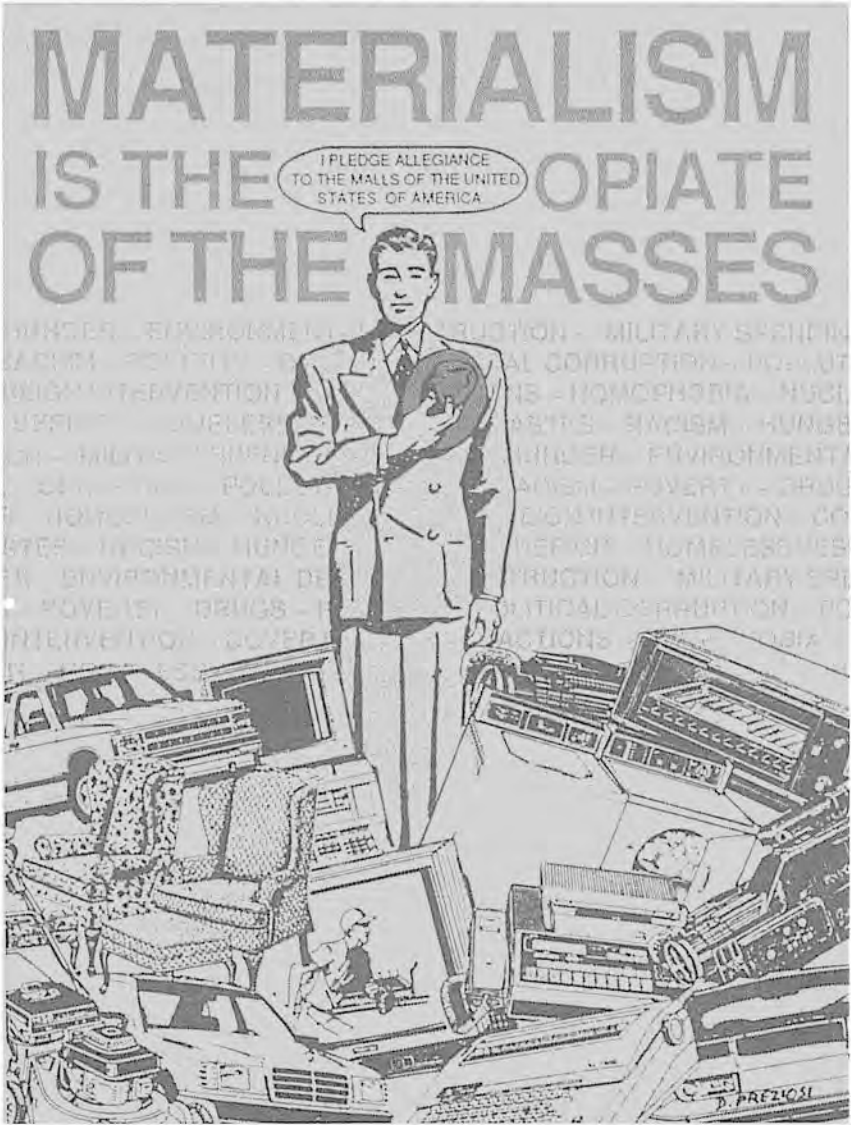
rainforest razed for beef cattle that supply the North American beef and dog food market. (Perhaps the number of domestic pets and the number of animals eaten per year per person should be calculated into the P of IPAT).

If the wealthiest 20 percent of the world harbor 80 percent of nuclear, chemical, and biological weapons (Renner 1991), and none of the poorest 20 percent makes, owns, tests, or uses any weapons of comparable ecological destruction, then how can the one-fifth richest and one-fifth poorest be held equal in environmental impact? (IPAT does not account for this difference in rates of military pollution). If, as Indian environmentalists argue, we apportion the earth's capacity to absorb wastes among the human population equally, then all of the global climate change gases released by the poorest one-fifth of humanity (the "survival emissions" of the poor) are more than assimilated by the earth. Global climate change, by this calculation, is threatened by the "luxury emissions" of the rich, which exceed the earth's assimilative capacity (Agarwal and Narain 1991).

The permutations of IPAT, which conflate the poorest people with the wealthiest, equate thousands of women from Rwanda and Bangladesh in environmental impact to the DuPont Corporation, the US and former USSR military, and thousands of overweight North Americans and Western Europeans. Some of the poorest 1.1 billion people are indigenous people who have been driven from their ancestral lands by governments and multinationals that privatized and exploited the resource base for a market economy. Some of the 1.1 billion poorest are African women who lost access to land when communal rights were replaced by European title-deed systems that restricted land ownership to men. "In Africa, where market organizations of women traders once allowed women political and economic power, and where sister/brother inheritance and kin cooperation patterns allowed women an alternative to dependence on a husband, European patriarchy undermined both" (Dankelman and Davidson

1988, 16). How much imprecision and injustice is built into IPAT when an Indian tribal woman uprooted by state privatization of forests she used for subsistence, or a destitute African woman impoverished by Western “development,” is considered comparable in environmental impact to a corporate or government or military person from the wealthiest one-fifth? Within this model, the chasm in equity between the absolute poor and the extravagantly wealthy is invisible and irrelevant.

Differences of power and decision-making between individuals who own nothing and multinational corporations whose wealth is accrued in part from exploiting the resource base of impoverished countries are set aside in IPAT, a power-blind equation. The responsibility of those few at the pinnacles of government and industry who first colonized and then devised the postcolonial models of development that have altered and restricted inheritance and land ownership for women in Africa—and thus disempowered and impoverished some of the “bottom billion”—is unexamined in IPAT, an agent-less equation. That the majority of the bottom 20 percent of the world’s poor are women of color and their children (the P of concern), and the majority of the top 20 percent of the world’s affluent are white men (the AT of concern) is not noted in IPAT, a gender- and color-blind equation. Finally, the environmental good created by those who reclaim wastelands, restore woodlands, use natural resources wisely, preserve their local ecosystems from industrial exploitation and commodification, and participate in what Finnish economist Hilikka Pietilä calls a “cultivation economy”(3) is not factored into the IPAT model of human impact on the environment—a niggardly and negative equation.



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HUMANISM AND ENVIRONMENTALISM

A first correction to IPAT would split apart the impact made by humans using resources such as land, forests, and water for survival from humans consuming luxury goods and services that generate significant pollution, such as golf courses, speedboats, and private planes.

$$I = (PAT)_S + (PAT)_L$$

where **S** is survival

L is luxury

A humanistic environmental public policy would work first to enhance $A_{SURVIVAL}$ through investment in primary health care and women's health, including the availability of appropriate birth control, education, and opportunities for women equally with men; and through access to credit, land reform, and the reduction of foreign debt. Simultaneously, humanistic public policy would prioritize reducing T_{LUXURY} and $T_{SURVIVAL}$ through investment in appropriate technologies and pollution prevention such as energy efficiency, public transportation, and organic agriculture, as well as streamlining technology transfer. A national and individual commitment to change consumption patterns and to reduce A_{LUXURY} , that is, unnecessary consumption of nonrenewable and endangered resources (e.g., oil and gas, primary

metals, and rainforest timber), is crucial for industrial countries; as yet, there is a vacuum of analysis, information, political will, and public policy on this issue.

This correction to IPAT introduces social justice to environmental protection. We give priority to reducing poverty, redistributing power and wealth, ensuring the equality of women with men, as we simultaneously employ technical fixes such as eliminating ozone-depleting chemicals and making motors and appliances more energy-efficient. Widely celebrated cases, like that of Kerala, India, described below, demonstrate that when a society invests in universal education, primary health care, land reform, and the full participation of women in society, that is, when women have social security and power in their lives, they choose to have fewer children—and that choice is respected. Rather than pursuing a classic trickle-down development model—tax breaks and incentives for private internal and external investment in infrastructure and industry—the progressive government of Kerala applied the majority of its resources and efforts to the redistribution of wealth through land and wage reform as well as the general improvement of all human services. These reforms and the progressive government were the fruit of societywide popular movements, especially vibrant women's, labor, and environmental movements.⁽⁴⁾ Kerala—while poor and densely populated—has universal primary health care, the highest rate of female literacy in India, the lowest infant mortality rate, the longest life expectancy, and a population growth rate that is close to that of Australia.

A humanistic environmental agenda would critically address consumerism, for all industrial countries are living off the land, forests, biota, minerals, and energy base of developing countries and indigenous habitats. Many US environmental organizations have established a population program, yet none has a program exclusively dedicated to overconsumption or consumerism. Not one industrial country or

region has, as a matter of environmental public policy, committed to a reduction in consumption of pollution-intensive, resource-degrading luxury goods. We have no national net consumption reduction rate, no concept of consumption replacement rate, no mainstream nonprofit environmental organizations whose mission is zero economic growth or zero consumption growth. Total global advertising—which reflects and stimulates consumerism—“multiplied nearly sevenfold from 1950 to 1990. . . three times faster than world population” (Brown et al. 1993, 80).

Yet the rhetoric of “population bomb” and “population explosion” has gained currency in environmental organizations while concepts like “consumption bomb” and “consumption explosion” barely have a toehold.

Recently the National Resources Defense Council took a step in the direction of addressing consumption by initiating a program on population and consumption. If, however, environmentalists increasingly believe that the key to lower fertility rates is “empowering women,” as the journal of the National Wildlife Federation proclaimed, then why haven’t environmental organizations renamed their population program “Empowering Women” or “Women’s Rights” or “Reproductive Health”? Why not emulate Conservation International, which has a Gender and Social Policy Program rather than a population program?

Many US environmental organizations have established a population program, yet none has a program exclusively dedicated to overconsumption or consumerism.



MILITARY AND ENVIRONMENT

*T*HE second correction to IPAT would introduce a factor for military pollution, a mammoth pollution impact caused by a very small but politically powerful population. Thus,

$$I = (\text{PAT})_{\text{SURVIVAL}} + (\text{PAT})_{\text{LUXURY}} + \text{MAT}$$

where **M** is military population, particularly those with authority over budget, arms technology, and defense policy.

A is consumption of renewable and nonrenewable resources such as land, oil, metal, and solvents for military hardware, testing, maneuvers, and war.

T is pollution generated by research, weapons manufacture, testing, maneuvers, uranium and metals mining, and waste disposal.

Worldwide, the military is the most secretive, shielded, and privileged of polluters; thus, estimates of *I* for *MAT* are patchy and understated in many cases. Most of the extant data concern the United States, because increasing pressure on the Department of Defense (DOD) and Department of Energy (DOE) by citizens, the Environmental Protection Agency (EPA),

and Congress has forced those agencies to inventory, assess, and disclose the extent of their environmentally hazardous activities. Further, by the mid 1980s, the split in percent global military spending between the developed and developing world was 80-20; and within the developed world, the United States and the former Soviet Union were the dominant military powers. For this cluster of reasons, the analysis of I=MAT will focus mainly on the United States's military activity.(5)

In the United States, some 20,000 military sites, including weapons production plants; chemical and biological warfare research facilities; training and maneuver bases; plane, ship, and tank manufacture and repair facilities; and abandoned disposal pits rank as the most polluted haz-

ardous waste sites. The Pentagon generates a ton of toxic waste per minute, more toxic waste than the five largest US chemical companies together, making it the largest polluter in the United States. This figure does not include DOE's nuclear weapons plants and the Pentagon's civilian

The Pentagon generates a ton of toxic waste per minute, more toxic waste than the five largest US chemical companies together.

contractors. The 100-acre basin at Rocky Mountain Arsenal near Denver, Colorado, which was used to store waste from the production of nerve gas and pesticides from World War II through the Vietnam era, has been called "the earth's most toxic square mile" by the Army Corps of Engineers.

Military testing requires national and international "sacrifice zones," such as Jefferson Proving Grounds in Madison, Indiana, which are 100 square miles of the most contaminated contiguous land in the United States, cordoned off and abandoned because the land is too dangerous to clean up. The US government has tested all of its nuclear weapons in the lands of indigenous peoples; 600 of those tests were within the land of the Shoshone nation. The international sacrifice areas include

parts of the South Pacific and Central Australia, where above-ground nuclear testing was done, and land ravaged by scorched earth policy, such as Vietnam. Twenty-five million gallons of defoliants were sprayed by the US military on forests, mangrove swamps, birds, fish, insects, soil, and coastal and inland waterways in Vietnam; Vietnamese women have the highest rate of spontaneous abortions in the world (Seager 1993). The upper stratosphere is sacrificed, too, in the name of national security: The US military accounts for one-half the national use of halon and CFC-113, both ozone-depleting chemicals. As for the nearly 400 US military installations outside the continental United States, little is known because they are exempt from environmental impact analysis and avoid accountability to the host country.

“In many poor nations, spending on arms and armies more than doubles that of health and education,” a situation in which a small clique of militarized politicians contributes to marginalizing the absolutely poor and leaving them with fewer environmental options (Sánchez 1993, 5). Wars precipitate economic crises and cause a selling off of natural resources, the export of wildlife, ivory, and timber for foreign exchange. Who, then, is ultimately responsible for the irreversible degradation of marginal land and resources: the many poor driven by public neglect into a downward spiral of poverty and survival use of diminishing natural resources, or the smaller-numbered military elite and politicians who control the national spending priorities and siphon off health, education, welfare, and the environment for tanks, guns, and missiles?

The Third World now purchases two-thirds of the global flow of major weapons. What of the responsibility of those in countries with arsenals of nuclear, chemical, and conventional weapons who encourage the traffic in arms in order “to solve their foreign currency problems by secretly selling nuclear and chemical weapons to the Third World” (Sánchez 1993, 5)? Of the 68 conventional arms-exporting countries, the largest are perma-

ment members of the UN Security Council and are thus responsible for reducing and regulating the global flow of major weapons. Who regulates the regulators?

Military bureaucracies have demonstrated a propensity to enlarge command over more of society's resources. For example, military demand for land has increased exponentially—at a rate of growth that has gone unexamined and warrants a new field of study on military demographics—due to larger numbers of standing armed forces and, more so, to changes in technology. “A World War II fighter plane required a maneuvering radius of about 9 kilometers, compared with 75 today and a projected 150–185 kilometers for the next generation of jets” (Renner 1991, 133).

It is estimated that 1 percent of the world's land—an area the size of Indonesia or Turkey—is used in nonwar direct military land use; the figure is 2 percent of US land and was 4 percent in East Germany. Much larger amounts of land are used nonexclusively by the military—10 percent of water, land, and air space in the Netherlands, for example. The United States military was the single largest holder of agricultural land in the Philippines. (Where did the displaced Philippine farmers go? How many of their daughters migrated to the military-supported sex industry to support their displaced families?)

The Pentagon is the largest sole consumer of energy in the United States and, very likely, worldwide. Military energy use can jump from 2–3 percent to 15–20 percent in wartime, estimates that do not include energy demand for weapons manufacture. Altogether the world's military may use as much petroleum products as Japan, the world's second largest economy. The estimated worldwide military use of aluminum, copper, nickel, and platinum surpasses the entire Third World demand for these metals.

Military nuclear reactors generate 97 percent of all high-level nuclear waste and 78 percent of all low-level nuclear waste

in the United States. Some 300,000 citizens—more than half of those who ever worked for the US nuclear weapons complex—are believed to have been harmed by radiation exposure. By 1989, over 3000 sites at 100 nuclear weapons manufacturing facilities were found to have contaminated soil and groundwater. As individual states spurn the siting of permanent subsurface storage facilities for nuclear waste within their boundaries, the federal government is heavily lobbying cash-poor Native American tribes to accept interim storage facilities for nuclear waste: 15 of the 18 federal grants for studies to establish a nuclear waste storage facility went to Indian reservations. Two-thirds of all uranium in the United States lie under Indian reservations. “We have nuclear radiation all over our land but no major environmental group in this country has a uranium campaign,” remarked Winona LaDuke in the *Sierra* Roundtable on Race, Justice and the Environment (“A Place at the Table,” 1993).

Without good data, researchers estimate that the military accounts for 5–10 percent of global air pollution, carbon dioxide, ozone-depletion, smog, and acid rain-forming chemicals. The Research Institute for Peace Policy in Starnberg, Germany estimates that 20 percent of all global environmental degradation is due to military and related activities. One policy analyst at Worldwatch Institute concludes that “the world’s armed forces are quite likely the single largest polluter on earth” (Renner 1991, 132).

Who, then, is the military? The military is an institution invented and peopled by a small number of men that perpetuates masculinism by proliferating and parading about phallic weapons by treating nuclear capability as a signifier of national manhood, and that sustains the morale of soldiers by victimizing women in rape and prostitution camps around military bases in rituals called rest and recreation. A well-glued solidarity between the military, national security advisors, civilian defense contractors, and elites of governments cloaks the degradation of women,

the glorification of male pugnacity, and the extraordinary debt of pollution, destruction of land, and use of nonrenewable resources in the paternalistic mantle of national security. How can any of the 1.1 billion poorest and least intensive resource-using people, who are mainly women and children, be compared in environmental impact to the military population, a numerically small, sheltered male elite who are responsible for as much as 20 percent of all global degradation?

The implications of this analysis for public policy on environmental protection are rich with possibility. Reduce MAT, nationally and worldwide, through reductions in military spending, through better global regulation of arms exports and imports, through aggressive retooling of defense industries into civilian projects, (6) through linking the environmental movement with the peace movement, the feminist movement, and indigenous peoples. The military ought to be subject to the same right-to-know laws, the same environmental legislation as industry and not permitted to police itself with regard to environmental protection. A system of national accounts for military costs to environment, including direct and indirect land, sea, and air use; waste emissions from military and civilian defense contractors; radioactive contamination throughout the life cycle of nuclear weapons production; and environmental losses from war would enable environmentalists to apportion blame and accountability for environmental impact justly.

In a zero sum economy, investment in weapons is public investment taken from literacy projects, infant and maternal care, and condoms, for that matter. "It is immoral," former president of Costa Rica Oscar Arias Sánchez told an audience at MIT, "for the wealthy nations to grow wealthier by selling arms to poor countries for money that they should be spending to feed and house their people, for education and health care and not on weapons designed to kill. Deferring human development programs in poor countries costs us as much misery and death as

would a generalized war among all the nations of the world. This delay is due mainly to a distortion of priorities that places military ends over social investment” (Sánchez 1993, 5). And what of the connection between war and unwanted/inflicted pregnancy? Postwar “baby booms” are common subjects of demographic and economic analysis; yet why haven’t demographers studied the link between military bases, war, prostitution, rape and pregnancy when evidence from World War II to Vietnam and Bosnia abounds?

Any environmental organization that has established a program on population policy ought to rethink an indiscriminate targeting of the population at large that fails to examine the excessive environmental impact that a relatively small population in military and defense industries has. A program on military and the environment would address more structurally, more accurately, and more justly the most damaging human impact on the environment.

Zero Population Growth announces that “it’s time to break the silence on overpopulation”; but the best-guarded secret, the most pervasive silence engulfs the subject of military overpopulation, that is, the growing global traffic in weapons and the intensifying military usurpation of land and natural resources. With a few exceptions, notably Citizens Clearinghouse for Hazardous Wastes, which has helped organize citizens to confront the military over military toxics (*Dealing with Military Toxics*, 1987), environmental organizations have avoided the issue of military and environment. Doing so, they have enabled the military—the global toxics leviathan—to stay the most secretive, shielded, privileged, and largest of polluters, while targeting the poorest one-fifth of human beings for “wreaking havoc on the environment” as they try to survive day to day.



ENVIRONMENTAL GUARDIANS: THE LACUNA IN IPAT

Native communities possess the experience of sustainability, learned from years of observation, careful behavior, and strong community—evidenced in thousands of years of living in the same place, whispering the same prayers, and walking the same paths.

—Winona LaDuke

THE most telling shortcoming of IPAT is its singular view of humans as parasites and predators on the natural environment. I, or the impact of humans on the environment, is fundamentally a negative measure of degradation and destruction of natural resources, calculated in units of pollution. This truncated, culture-bound view of humans in their environment originates from an industrial, urban, consumerist society. People in industrial countries meet their needs and seek happiness by purchasing commodities, nearly all of which use nonrenewable materials and energy and generate waste, a minimum of which is reduced, reused, or recycled. At best most people in industrial countries have recreational knowledge of nature and natural resources, and they often unknowingly leave the world much more degraded than they find it. These are the cultural roots of IPAT, an environmentalism that “comes out of the industrial mind, not the indigenous mind” to borrow from Winona LaDuke.

Indigenous peoples, rural peasants and tribal peoples in developing countries, on the other hand, with their immediate and direct relationship to forests, land, water, and biodiversity, offer many stellar examples of humans knowing firsthand the living resource base from which they subsist, restoring and replenishing their local environment as they use it, and guarding it from maldevelopment projects. The Green Belt Movement, which originated in Kenya and spread to 12 other African countries; the Chipko Movement and wasteland restoration projects in India; agriculture among indigenous farmers of Central America and the American Southwest who preserve biodiversity among food crops—all are accomplished expressions of humans who have direct knowledge of, who love, use wisely, and conserve the environment that is their “home, habitat and workplace” (Rocheleau 1992, 49). This positive human impact on environment—the lacuna of IPAT—is neither imagined nor accounted for in the model conceived within an industrial worldview where “everyone is an atomized individual whose home is wherever their lease or their mortgage is, whose work is wherever there is a job with a paycheck, and whose habitat can be projected into special times and spaces by vacationing in national parks and wilderness areas or just knowing that it exists somewhere” (Rocheleau 1992, 49).

Ethnobotanist Gary Paul Nabhan observed that the success of certain Native American agriculture in conserving wild plants for centuries lies in the integrity of that agriculture with their corresponding human culture. Native American conservationist farming is not merely technique, akin to energy efficiency or recycling or gene banks; it is a human relationship to biodiversity that is “grounded within a community fixed in place”

The most telling short-coming of IPAT is its singular view of humans as parasites and predators on the natural environment.



Indian woman working in Seva Mandir, Rajasthan. Photo by Marty Chen

(Nabhan 1989, 67). He cites ecologist David Ehrenfeld, who has studied overall biotic diversity among small, stable farming communities and argues that “the presence of people may enhance the species richness of the area, rather than exert the negative effect that is more familiar to us” (Nabhan 1989, 40). A placard celebrating the UN Year of Indigenous Peoples sounds the same theme of the integrity of human culture and biodiversity: “There are more than 5 million indigenous people in the Philippines and more than 300 million worldwide. As guardians of their ancestral lands, indigenous peoples nurture much of the remaining biodiversity.” Writing of Amazonia, the curator of archeology at the Field Museum of Natural History in Chicago points to the indigenous peoples as critical (“an insurance policy”) to rainforest survival. “Descended from an ancient tradition, theirs is the way of life most compatible with the survival of the forest and its denizens, and they possess indispensable knowledge of a wide range of sustainable land uses. . . . Making sure the Indians survive in their ancestral territories may be the best contemporary investigators [and environmentalists] can do for their [the rainforests’] survival” (Roosevelt 1992, 28).

The impact of humans on the environment—if that impact is to encompass the significant environmental conservation of some humans and also hold out hope that the rest of humankind can learn from them how to live with a net positive impact—must include a factor for environmental conservation.

$$I = C - [(PAT)_{SURVIVAL} + (PAT)_{LUXURY} + MAT]$$

where **C** is environmentally beneficial work of natural resource management, preservation and restoration; indigenous door-yard gardens, urban forests, gardens and composting, etc.

Within our own backyards in the United States are commu-

nity-based models of people who leave the world better, richer in “natural and human capital,” than they found it. The urban garden and greening movement offers a modest but stellar example from within industrial countries of people engaged in environmental conservation and education while reclaiming urban neighborhoods and the people of those neighborhoods. (7) Many urban conservationists are “people of low income and no income” as Rachel Bagby of Philadelphia Green describes her community. “In 100 years,” forecasts Blaine Bonham, the director of Philadelphia Green, “when the suburbs have destroyed themselves with ugly sprawl and banal strips of malls, the viable parts of our cities where neighborhoods are thriving will be places like Strawberry Mansion and Point Breeze,” two of Philadelphia Green’s low-income neighborhoods with extensive gardens and tree-lined streets. The Greening of Harlem and Philadelphia Green are our native Chipko and Green Belt movements in which “ecociudadanos,” or urban environmentalists, are the key to the greening of US cities.

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Greening of Harlem

Central Harlem alone has 662 vacant, garbage-strewn lots—1 out of every 8 building lots, the equivalent of 112 acres—largely the legacy of disinvestment by absentee landlords, abandonment, and arson. Looking at any one of them, Bernadette Cozart, director of the Greening of Harlem coalition, gets “this land reclamation thing” in her head. She sees vacant lots as sources of jobs, growing vegetables and herbs, going all the way from seed to shelf, and restoring nature absent for more than 100 years.

“Add the beauty of nature to Harlem and you give kids who have only known New York City as concrete and steel the chance to get to know nature.”

The Greening of Harlem coalition members come from key community institutions, such as Harlem Hospital and the Marcus Garvey Park Conservancy, and from local tenant groups, including the Edgecomb Avenue Block Association. There is Dr. Barbara Barlow, chief of Pediatric Surgery and director of the Childhood Injury Prevention Program at Harlem Hospital, who insists that every playground in Harlem that is renovated with safe playground equipment and surface also have a community garden. Lorna Fowler, president of Edgecomb Avenue Block Association, is an eminent manager—of people, of buildings, of budgets, of the large and small scale from street tree pit gardens on Edgecomb Avenue to Jackie Robinson Park. Ethel Bates has a single-minded passion for the “place” of Marcus Garvey Park, with its first-rate urban architecture and unique granite outcropping. She has reclaimed it from a public space colonized by drug dealers and abandoned by police to a greenspace where children can play. Bernadette Cozart envisions no less than a flower and vegetable garden, a horticultural resource center, maybe even a greenhouse and bird and butterfly garden in every school in Harlem as the basis for ecological science in Harlem for adults as well as kids. Since 1989, the Greening of Harlem has helped neighborhood people design, build and tend 17 organic gardens, and rejuvenate 3 key Harlem parks. In 1994 the Goddess Garden and a plant nursery for Harlem will open.

Philadelphia Green

In a 100-block neighborhood of North Philadelphia called Susquehanna, 11 African American retirees, 9 women and 2 men, run the Philadelphia Community Rehabilitation Corporation. The opaque and institutional-sounding name obscures the local social genius at work restoring abandoned buildings, greening va-

cant lots, and rescuing human beings of Susquehanna who have no other safety nets. Executive Director and founder Rachel Bagby explains that “we do *lives* not houses”: mothers back in school, tutoring, infant care, more than 40 units of low-income housing, and the equivalent of 5 acres of trees, and community vegetable and sitting gardens. She points to her teaching aid—a whole, sprouting sweet potato from last year’s garden, kept in a cool place all winter, and then wrapped in newspaper to start it sprouting. This she will cut and plant, with the help of children in the 3-lot Garden of Life. There she will pique the children’s interest with the story of the sweet potato’s life cycle—one that will finish in a sweet potato pie if they are good gardeners and keep the sweet potato patch watered and weeded.

At the children’s garden on 20th Street she had kids paint the 3-story corner building wall with faces like their own, the faces of child gardeners looking, curious and eager, onto the garden and out to the street. “So they could see themselves. . . . It will transform them into human beings. I know it can be done.”

Community Children’s Garden, Philadelphia Green, 1993



Photo by H. Patricia Hynes

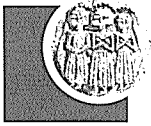
Eighteen blocks away Sister Maureen O'Hara explains why she left teaching to work in the Penn State Urban Gardening Program. "It's one thing to garden; it's another to cultivate the earth." Some city folks, like residents of the largely Puerto Rican neighborhood at Second and Dauphin Streets where she is currently working on a demonstration garden for parents and children, are barely a generation away from cultivating the earth. The memory is fresh and beckoning, but the obstructions are colossal: local cocaine rings on the streets, vandalism, demolition waste, buried garbage and syringes on local lots. Maureen O'Hara recognizes the global pattern of inequity between the industrial countries and developing countries replicated in North Philadelphia, where the urban poor live in the most polluted environment. And she also sees community gardens as a link in the chain of worldwide activism that joins tree planting in Kenya and wasteland restoration in India with organic community gardens and composting in Norris Square, North Philadelphia.

Indigenous and rural peoples teach a lesson that is being replicated in the Greening of Harlem and Philadelphia Green, where a vacant lot becomes a garden that is the gateway for urban youth to nature, ecological literacy, and self-respect. The knowledge and love of hundreds of species of flora and fauna that indigenous people inherit and transmit to next generations is "grounded within a community fixed in place." The *place* for urban gardeners is called Five Star Garden, The Garden of Eatin', Emma's Place, Green Acres, Roses in Roxbury; the community is a handful of fellow gardeners. The gardens, says Bernadette Cozart, "connect them to nature and nature connects them to the universe."

This environmentalism, unlike one that clumps all humans together as ecological parasites and predators and sets up biodiversity preserves without people, is based on the belief that humans can live and learn to live in symbiosis with nature. This environmentalism unites social justice with a profound respect

for nature and elevates environmental protection to the plane of environmental justice.

Kenyan biologist Wangari Maathai, the founder of the Green Belt Movement, has testified to the multiplier effects of tree planting and related income-generating projects for village women with whom she worked. The skills, knowledge, and income they gain bring self-confidence and independence. They readily understand the relationship between numbers of trees and household fuel needs, and, Maathai points out, they keenly grasp the limits of land to support increasing numbers of people. Eco-literacy, learned in rural and urban conservation and restoration projects, is a passageway to enduring ecocitizenship and environmental protection.



AGENCY IN IPAT

Population is the raging monster.

— E. O. Wilson

No goal is more crucial to healing the global environment than stabilizing human population.

— Al Gore

The I=PAT equation is the key to understanding the role of population growth in the environmental crisis.

— Paul and Anne Ehrlich

“*E*NGLISH,” writes linguist Julia Penelope, “allows us to suppress reference to the agents who commit specific acts particularly when the speaker/writer wishes to deny or cover up responsibility. . . . We suppress human agency and sometimes try to imply grander forces at work by doing so, appealing to an unspecified, perhaps illusory, universality or evading the issue of who will be or is responsible for some action” (Penelope 1990, 144). The word “population” is just such an unspecified universal that evades the issue of who among the P of IPAT is responsible for the high fertility of poor women, their lack of access to safe birth control and abortion, and the higher rate of illiteracy and poorer nutrition among girls than boys.

Words like “fertility rates” delete human agency in pregnancy by implying that an abstract factor—fertility—is respon-

sible for environmental degradation, and thus they enable the speaker to avoid discussion of who is responsible for what. Words like “population bomb” and “population explosion” suppress any agent and create the impression that the situation and its consequences are “occurring in a social vacuum. . . disconnected from the cultural, social and historical context in which they arise” (Penelope 1990, 158). Beneath the abstract, agentless word “population” is the substrate of sexual politics—the cross-cutting domain within culture, social relations, history, economy, science, and sexuality in which women become pregnant. Environmental knowledge, no less than any other knowledge, begins by naming the agents within.

Beneath the abstract, agentless word “population” is the substrate of sexual politics.

Agency and P

How often do women *choose* to become pregnant? How free are women to avoid pregnancy? Studies and interviews with women worldwide suggest that more than “125 million couples who want to delay or stop having children have no reliable means of doing so. . . . Moreover, the number of children that Third World women say they want is declining” (Carpenter 1993, 54). Other sources cite an estimated 300 million women without access to safe and affordable family planning and the often-quoted UN survey that found women in Africa, Asia, and Latin America wanting an average of one-third fewer children than they have (Stranahan 1993). Critics have pointed out that these statistics are questionable on the grounds that the studies were conducted to serve the interests of contraceptive manufacturers and population control programs. While the findings and numbers may reflect the bias of the interviewers, the issue that many women do not have access to safe abortion and safe contraception when they want them stands.

Does reproductive choice for women rest fundamentally on technology or on social relationships with men—proximate and remote, intimate and institutional? What are the links between fertility rates and male subordination of girls and women—through rape, unavailability of safe birth control and abortion, refusal to use or allow birth control, feminization of poverty, compulsory heterosexuality, and through penetration as the paradigm of sexuality?

If a country spends twice as much on military armaments than on health and education, who is responsible for high fertility rates in that country if infant and child mortality is high, if contraceptives are not available when people want them, and if girls drop out of school sooner to help with the household work? If the Philippines (and 70 other countries) is suffering a hemorrhage of capital, including human and natural resources, to service their foreign debt, who is responsible for the resulting debt-aggravated environmental degradation—the 41 percent of the Philippine population who live under the poverty level because 50 percent of their country's budget flows out in a reverse foreign aid to Western creditors, or those, within and without, who indemnified that country? Should not the agents of poverty, debt, and militarism, that mix of elite government officials, global economic institutions, and multinationals who engineer the international economic agenda—rather than an agentless and unspecified universal “population”—be named and held accountable for their role in the environmental crisis and the P of IPAT?

Even when reproductive choice is primarily a question of access to birth control technology, the sexual politics of research, family planning program priorities, and reproductive responsibility prevail. The trend in contraceptive technologies is in

the direction of longer-acting, “woman-centered” methods, such as Norplant, that can be monitored and removed only in family planning agencies—in other words contraceptive technologies that give family planning programs more control over women’s fertility and more potential to abuse the rights of poor women. Why are the hormonal and chemically altering birth control technologies that carry risk of cancer, infection, and death developed for use on women while indigenous methods are ignored, and low-tech methods for men are underutilized? Why do so few, including women’s health advocates, “question the joined interests of the population establishment and the pharmaceutical industry that determine the contraceptives that are available” (Women’s Global Network for Reproductive Rights 1993, 5)?

THE BEST REMEDY FOR WHAT AILS THE EARTH.



Hordey

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Only a handful of researchers worldwide (an estimated 5 to 10) are doing research on male fertility control: Why has research on male birth control that is nonhormonal and reversible, and the male pill, been so trivial and dismal? Dr. Mostafa Fahim, director of the Center for Reproductive Science and Technology at the University of Missouri, was forced to abandon research on a promising ultrasound technique, a simple, painless, non-surgical and reversible method of halting sperm formation. Fahim was not granted funding to collaborate with the Chinese on this method, and the university restricted him to testing his method on human subjects with prostate cancer who were to have their testes removed (Lissner 1991). Even where there are breakthroughs, such as vas deferens-based methods and heat methods to reduce sperm production, which are reversible, efficient, and nontoxic, they have not had the global marketing and promulgation that more risk-laden female contraceptives have. Nor do men have a comparable history of contraceptive abuse and human rights violations to that of women's, particularly that of poor women of color, with Norplant, Depo-Provera, the Pill, and the IUD.

One researcher, who analyzed studies reporting on research in male contraceptives, concluded that it was the defeatist attitude and low priority of researchers, funding agencies, and pharmaceutical companies, not the promise of the technology, that account for the retarded state of male contraceptive technologies.

The tone of most of the studies [on male contraception] seems to weigh heavily on the drawbacks and failures instead of trying to take an approach to overcome the obstacles. There is also a definite unwillingness to tolerate even mild side effects like acne or weight gain (some of the symptoms that are common among women on the pill) (Gomez 1993, 9).

Were there a supermarket of choices for men, would men take responsibility for reproduction? “No woman can entirely rely on her partner to avoid a pregnancy,” the *Guardian* editorialized on the 30th anniversary of the birth control pill (“The Pill’s Birthday” 1990, A22). “Many high level personnel of family planning thinktanks, like . . . the Alan Guttmacher Institute and . . . Planned Parenthood Federation of America, reason that men would not be willing to tamper with their bodies let alone alter their body chemistry in the name of controlling fertility” because they aren’t the ones bearing the risk of pregnancy (Gomez 1993, 9). The ripple effect of this fatalistic view results in little investment in male contraceptive research, lackluster engagement of boys and men in family planning, and little protection for women and girls against sexually transmitted diseases. If women bear the risk and do the work of pregnancy, and if women have to undergo abortion for an unwanted pregnancy, then shouldn’t their partners in sex and reproduction at least share the responsibility of birth control? Why don’t men love women enough to use a condom or undergo a vasectomy and collectively demand more research on male birth control methods?

Women and Men and Power

“Empower women and many of the world’s most fundamental social and environmental ills will begin to solve themselves,” *International Wildlife* forecasts (*International Wildlife* 1993, 3). Ills do not solve themselves, people solve them. What the authors imply is that women with economic and political power will have more clout in their relationships with men and can insist on or negotiate having the fewer children they report to want. Further, the authors may be surmising that empowered women will seek an economic and political role in their society and then want to have smaller families. In a similar optimistic spirit, Mostafa Tolba, Director of the United Nations Environmental Program, addressed women in Nairobi in 1985:

If there must be a war, let the weapons be your healing hands, the hands of the world's women in defence of the environment.

If power enables women to heal the earth's ills, why haven't "empowered men" solved fundamental social and environmental ills? Why are the most powerful men in the most powerful governments and institutions also the largest polluters and the most intensive consumers of our environmental resource base? If women and power is the key to environmental protection, what is to be done about countervailing male dominance and male reaction to women's power? If economic and political power in men's hands has given us the base of technology, the expanse of

If women and power is the key to environmental protection, what is to be done about countervailing male dominance and male reaction to women's power?

military, the systematic subordination of women that endanger our planet, then environmental public policy must also address men and their power, and male backlash to women and power.

In response to a male attorney's question on the eve of World War II as to how we are to prevent war, Virginia Woolf replied, "To fight has always been the man's habit, not the woman's. . . . Scarcely a human being in the course of history has fallen to a woman's rifle; the vast majority of birds and beasts have been killed by you, not us. Your question is how to prevent war? Obviously there is some glory, some necessity, some satisfaction in fighting which we never felt or enjoyed" (Woolf 1938, 8-9). Her answer to how we are to prevent war was—to educate women.

Why are educated women the antidote to "educated men"? For it is educated men who have perfected and expanded military weapons and strategy, so much so that often the major-

ity of technically trained men in highly militarized countries work for the defense industry. Clearly, while women are being educated, men must be reeducated—in peace studies; in environmental studies; in health studies that discusses men's role and responsibility in sex, reproduction, and birth control; and in men's studies that analyze the glorification of violence against women, against each other, against the earth.

Agency and A

Although women represent half of the world's population and one-third of the official labor force, they receive only one per cent of the world income and own less than one per cent of the world's property.

— United Nations 1980

A 1982 study of the funding practices of specialized United Nations agencies...estimated that only 0.5 percent of all United Nations allocations to the agricultural sector went to programs for rural women.

— Jodi Jacobson

Do men and women consume differently? Women earn an average of 30 percent less than men in the United States, and UN statistics document the universal feminization of poverty. Women as a class are poorer than men worldwide: They eat less, own less, possess less, are invested in less, earn less, spend less. Income is a surrogate for consumption, and, we can only conclude that women consume less than men proportional to income. Further, many studies of men and women demonstrate that women and men in developed and developing countries spend their money differently—men more on luxury items for themselves, such as business junkets, golf courses, gambling, alcohol, tobacco and sex (A_{LUXURY}) and

women more on necessities for their families and households, such as food, clothing, and health care (A_{SURVIVAL}).

If women and their children are the poorest people of the world, and if women are sharing their lesser income with children on survival items, then certainly many men hold more

Many studies of men and women demonstrate that women and men in developed and developing countries spend their money differently.

responsibility for luxury consumption, the A_{LUXURY} of IPAT. Environmental programs on consumption, to be fair and accurate, need to bring a gender-conscious perspective to a critique of overconsumption by asking what is consumed, how much is consumed, who consumes how much and what, and whose needs and wants are being met. When a husband, for example, buys his wife a Cadillac for her 40th birthday, whose image and whose "needs" does it serve? Both his car and his wife reflect him back to himself at twice his size. And she, someone else's mirror, may futilely seek her self-esteem in cosmetics and clothing purchased in endless shopping

sprees. His and her paths out of consumerism are marked by these differences and inequities in their economic and sexual power.

Environmentalists in the West have endeavored to wrest some control over industrial production and marketing of new products by launching a "green consumer" movement. "Consumers have the power to change the market" was the upbeat salvo sounding forth from Earth Day 1990 events. Most green consumerism, however, is not equivalent to the economic boycott movement and the movement to create economic alternatives, both of which operate in the marketplace and use the power of not purchasing and purchasing differently to change corporations and the context of production. These consumer

movements have historically used a social and political analysis of labor conditions (as did United Farm Workers boycotts), economic exploitation of Third World women (as exemplified by the boycott of Nestlé), racism, and the torture of animals. The economic boycott was integrated into collective action and letter writing campaigns and framed as actions of conscience. The sum of the parts—thousands of individual green consumers—will not be a whole—an organized, environmentally politicized citizenry—unless environmentalists shift from the shallow notion of green consumer to the substantive notion of green citizen.

In Japan a unique consumer's co-op, the Seikatsu Club Consumers Co-operative (SCCC), combines the vision of a people-centered, communitarian economy with sophisticated business skills and a framework of social and ecological principles. The co-op began in 1965 when a Tokyo housewife found that she could not buy pure, fresh, unadulterated milk. She organized 200 women to buy milk as a co-operative directly from dairy farmers. Today Seikatsu has 500,000 members and distributes 500 different minimally packaged products that are fresh and unadulterated. Great emphasis is placed on knowing the producer in order to humanize the market, and consumers regularly visit the producers, especially farmers. SCCC has set up many paid women workers' collectives for the work of the co-operative and other service enterprises, such as recycling, health, education, food preparation, and child care. "The aim [of Seikatsu] is the creation of a new culture, which depends upon minimum consumption and a rich life.' . . . It is no accident," writes Jeremy Seabrook, "that the impulse of Seikatsu came from women, particularly wives of corporation men, women who found their reduced function as shoppers in supermarkets, as well as the indirect servicers of their husbands' employers, both inadequate and diminishing" (Seabrook 1993, 195).

Agency and T

The male monopoly on science is no mere relic to be easily tossed aside.

— David Noble

Women have been systematically barred and discouraged from the physical sciences and engineering. Because of sex discrimination, we have had no role in inventing the technologies that have initiated global climate change, depletion of the ozone layer, acid rain, and nuclear meltdown. US and Canadian undergraduate engineering schools began to recruit women students in the early 1970s (when many had fewer than 1 percent women students), but they have failed to achieve more than 15–20 percent sustained enrollment even with strong intervention programs to attract and retain female students. Studies show that the obstacles range from neglect and early discouragement by parents and teachers, to sexual harassment by boys and male teachers, to the 300-year-old tradition of Western science as a lofty male secular priesthood whose standards women would pollute and lower (AAUW Report 1992; Noble 1992). Further, many girls and women—preferring connected knowing and socially useful activity—are alienated from the reductionistic methods of science and the antihuman and antienvironment impacts of much technology (Bank Street College of Education 1991).

In December 1989, the National Academy of Engineering picked the top 10 engineering accomplishments of the past 25 years:

moon landing, application satellites, microprocessors, computer-aided design, CAT scan, advanced composite materials, the jumbo jet, lasers, fiber optics, genetic engineering.

What could have been developed and selected in the fields of energy, transportation, pollution control, agriculture, and health technology, were the *social usefulness* and *ecological impact* of technology primary considerations? Perhaps:

photovoltaics, wind turbines, high-speed trains, biodegradation of solid and hazardous waste, alternatives to CFCs, widespread use of integrated pest management and organic agriculture, an effective male birth control device.

The dramatic differences in these two sets of technologies lie not in their technical and intellectual challenge but rather in their values, purpose and design relationship. The former showcase human mastery over nature and devices for faster, more extensive manipulation of information. The latter tend to work in partnership with nature, to be extensions of natural resources, to manifest consciousness of social and environmental impact, to link the human and natural world.

These differences resonate with what women and men scientists reported in in-depth interviews that probed why they were attracted to science, how they see technology, and how they problem-solve with technologies. A significant number of women said that what excites them about technology was making it transparent and accessible to others while men more often cited being excited by technical design and function. When asked about technology of the future, women imagined technologies that linked the private and public worlds in collaborative and communication-enhancing ways while men tended to imagine technologies that gave absolute control, extremely high speed, and unlimited knowledge, extending their power over the universe (Bank Street College of Education 1991). The world of science and technology—a “world without women”—has given us the T of IPAT.

Accounting for Agency

In mixed-sex, action-oriented groups, it is hard to ask questions about the relationships between men and women and our environmental crisis. It is not easy to ask about militarism and masculinity, sovereignty and sex, and it's not considered polite to point out that men have been far more implicated in the history of destruction than women. But there's too much at stake to stick to the easy questions and polite conversation.

— Joni Seager

The appeal of an equation like IPAT is its simple, soundbite presentation; the downside is that it shuts out complex, structural causes of environmental destruction. This “fast-food” formula, which has such mind-watering appeal in the land of junk food franchises, could be salvaged with a small but critical emendation: Take the “population” out of IPAT and replace it with “patriarchy.”

I = C - PAT

where **I** is Human impact on environment

C is Natural resource management, conservation, and restoration that link humans with nature.

P is Patriarchy (subordination of women; paradigm of power as economic and military dominance).

A is Consumption of world's resources shaped by colonial relations, debt-induced poverty, resistance to re-distributive policies such as land reform, tax

reform, affirmative action in pay scales; and supported by economic models that encourage human satisfaction through consumerism and commodification.

T is Technology that by scale, inefficiency, use of nonrenewable resources, pollution-generating capacity, destructiveness, and mechanistic control of nature is environmentally injurious.

The new formula does not have the “pat” appeal of the old one. *Patriarchy is not a simple number nor a quantitative concept like population, and thus the equation does not work arithmetically.*

Rather, A and T are functions of P.

That is, there is a relationship between patriarchy and the reduction of nature to natural capital and market commodities, the appeal and growth of militarism, the mechanistic model of nature that underlies industrial technology, the second-class status of women, the “feminization of poverty,” women’s unwanted pregnancies and unsafe abortions, the lack of male contraception, and the lack of male responsibility for contraception. Being a universal phenomenon, patriarchy does not divide neatly between North and South, so the new I=C-PAT doesn’t work so efficiently for international negotiations—unless negotiations were held between women and men.

The new formula does not have the “pat” appeal of the old one. Patriarchy is not a simple number nor a quantitative concept like population.

You can’t do number crunching with the new model: Increase *conservation* by 15 percent; reduce *patriarchy* by 10 percent, *consumption* by 5 percent, and *technology* by 5 percent, for example. There is no sustainable level of patriarchy, no carrying

capacity for it. On the other hand, opportunities arise for population organizations to refocus their mission onto the root cause of poverty and unwanted pregnancies. Zero Population Growth (ZPG) could change its name and mission to Zero Patriarchy Growth, or better yet, Zero Patriarchy. And the former Population Crisis Council now Population Action Council could become the Patriarchy Crisis Council.

Countries have been analyzed and compared as to the status of women versus that of men, using indices such as education, wages, representation in government, reproductive rights, maternal and infant health. Within a women's human rights framework—and within this framework only—does an analysis of fertility belong. The first ecological limit to high fertility is a woman's own body, her health and energy; aware of those limits, women have almost universally reported wanting fewer children. The “population problem,” if women are believed, is a consequence of their having less than full human rights. And this second-sex plight of women is a consequence of patriarchy.



FEMINISTS AND POPULATION: A CAUTIONARY TALE

*T*HUS far, on the rocky “road from Rio to Cairo,” feminists have introduced the language of women’s rights, reproductive health, and women’s empowerment into the environment and population debate. But the power-blind framework of population as a universal pressure equivalent to overconsumption and industrial technology has stayed intact. If anything, population analysis has focused its gender- and race-blind lens more sharply on the “bottom billion,” those mainly African, Asian, and Latin American women and children described as “marginal people on marginal lands” “wreaking havoc on the environment.” En route to Cairo, a women’s rights agenda has become a rhetorical means for a populationist end—a reduction in numbers of the poorest people on Earth—without a structural change in the analysis. Wittingly or unwittingly, many women’s health advocates are buying into the P of IPAT.

**En route to Cairo,
a women’s rights
agenda has become
a rhetorical
means for a
populationist end.**

Many collaborative policy statements on population, which endeavor to include input from international development, population, environmental and women’s organizations, have turned out to be incongruous hybrids. They leave demographic

targets intact as they call for women's rights, and they avoid challenging economic growth and overconsumption in industrial countries while advocating for sustainable development, especially among the poor, in developing countries. A working paper on US policy recommendations to the UN International Conference on Population and Development (ICPD) Secretariat states that "women and girls are the subjects, not the objects, of population policies and have the right to determine whether, when, why, with whom, and how to express their sexuality; they have the right to determine when and whom to marry, they have the right and responsibility to decide whether, how, and when to have children" (Wirth 1993, 4).

The statement "women and girls are the subjects. . . of population policies" is an oxymoron; for, as many have noted, if women and girls had full human rights, fertility rates would be significantly lower. Population policies and programs have historically abused the rights of many women and some men. They are not family planning programs gone wrong only because of poor service at the ground level. Rather, the prevailing agent-less analysis of population policy—as this study has argued—is fundamentally flawed.

The same US policy statement, which calls frequently for reducing and stabilizing population as soon as possible and suggests numerical targets, has only a tepid, passing mention of consumption associated with environmental degradation. While the statement contains strong recommendations for gender equality and male sexual and reproductive responsibility, and speaks against coercion and intimidation in family planning programs, an ideological framework of population prevails, and the silence on overconsumption and the role of industrial technology is deafening. Further, calling for demographic targets as the statement does ("age-specific birth rates") sets the stage for coercion and abusive incentives in future family planning and reproductive health programs. Overall, the policy, although improved by

women's rights advocates, comes off as reform populationism.

What of policy statements initiated by women's health advocates that have the express purpose of "reshaping the population agenda to better ensure reproductive health and rights" (*Women's Declaration on Population Policies* 1993, 1)? In September 1992 women's health advocates from around the world met to discuss how to make women's voices heard during preparations for the 1994 International Conference on Population and Development. A statement on population policies was drafted and over 100 women's organizations reviewed, modified, and finalized the *Women's Declaration on Population Policies*. It has been subsequently circulated and endorsed widely.

The *Women's Declaration* contains strong statements, ethical principles, and recommendations on women's human rights; on the elimination of sexual, social, and economic inequalities; and on male personal and social responsibility for sexuality and reproduction. However, women's reproductive health and rights is placed within a population policy and programs framework. Population policies and programs, as the declaration puts it, should be "framed and implemented within broader development strategies" that redress the inequities between countries, racial and ethnic groups, and men and women (*Women's Declaration* 1993, 3). Nested like a series of Chinese boxes, women's health and reproductive rights—the smallest box—is lodged within population policy and programs that are framed by broader equitable development policy. What happens to women's health and reproductive rights in this trickle-down model if development policy is not so-called woman-controlled, if it comes with a package of demographic targets? And why subsume a women's rights agenda within population policy?

The first ethical principle of the declaration states, "Women must be subjects, not objects, of any development policy, and especially of population policies" (*Women's Declaration* 1993, 4). This statement, adapted and used in the US policy recom-

mentations to the ICPD Secretariat, illustrates a complexity about language. The best-intentioned, politically correct language (“women must be subjects, not objects”), removed from the crucible of sexual politics, is rhetoric, not reality. Like oil and water, population policy and “women as subjects” are immiscible even if they can be linguistically hybridized within a policy statement.

Addressing the same point, the Women’s Global Network for Reproductive Rights comments:

The Women’s Declaration is based on the acceptance of population policies which is at best confusing and at worst dangerous. It adds to a growing general consensus among established organizations and increasingly among women’s groups, that population policies are unavoidable to solve major problems like poverty and environmental degradation, whereby the underlying causes are once more neglected (1993, 4).

Why can’t the framework of women’s human rights be a big enough, bold enough, and sufficient structure from which to lobby the world for women’s reproductive health and rights?(8)



IMPLICATIONS FOR PUBLIC POLICY

To make women's human rights an end in itself and to place environmental justice at the core of "environment-population-development" programs, we recommend the following strategies.

For Women's Health and Environmental Organizations

1. Replace population framework with feminist framework. Make women's health, reproductive self-determination, and equality independent ends in themselves and not means to population goals, or idealistic slogans for environmental programs that target population reduction. Environmental organizations can change the title and mission of population programs into ones that support "gender and social change," "reproductive rights and responsibilities," and "women's empowerment." This will demonstrate that women's equality is a goal in itself and not merely a means to population reduction.

Do not advocate for women's equality and self-determination within a framework that is defined by population analysis; otherwise women's health networks and organizations risk trading off inclusion for co-optation.⁽⁹⁾ "Continue," as the Women's Global Network for Reproductive Rights recommends,

“to position this struggle for women’s reproductive rights within the larger feminist struggle and movement” (1993, 5).

Campaign against family planning and population policies that advocate demographic, fertility, or birth-rate targets. Demographically driven programs have consistently resulted in persuading and forcing poor people, especially women of color, to have fewer children whether or not their conditions of poverty have changed. (10)

Develop international networks and coalitions to monitor and act against population and family planning abuse including sterilization abuse; lack of information on contraceptive risks and side effects; insufficient medical screening and follow-up care; and lack of barrier protection, male contraceptive technology, and safe abortion services.

Support the ratification and enforcement of the UN Convention on the Elimination of All Forms of Discrimination Against Women and the Convention on the Elimination of All Forms of Sexual Exploitation proposed by the Coalition Against Trafficking in Women in conjunction with UNESCO.

2. Introduce agency. Replace the universal, agentless concepts of population and demographic targets with more fine-grained, causal and agent-identifying concepts, such as: military; international debt and poverty; and patriarchy. Distinguish between symptoms, consequences, proximate causes, and ultimate causes of our global environmental crises, and establish environmental programs that target the ultimate causes.

3. Educate women and men. Support the education of women and girls and also the education of men and boys in such areas as peace studies, the ethics of hunting for sport (the key organizational priority of mainstream US environmental organizations is fish and wildlife management for sport/recreation), violence against women, and responsibility for sexuality and reproduction.

4. Redirect contraceptive technology and research.

Call for research on appropriate male contraceptive technology together with sex education programs for men and women. Unite the goals of birth control with barrier protection against sexually transmitted diseases in advocating for contraceptive availability. Take public stands supporting women's right to abortion. Borrow from the criteria of appropriate technology (democratic, low technology, low cost, participatory, reversible, nontoxic, local and de-linked from multinational interests, integrative) for the evaluation of contraceptive technology.

For Environmental Organizations

1. Teach ecological literacy. Distinguish between environmental science and ecological literacy, and then apply that difference in thinking to the "population" issue. "Real ecological literacy is radicalizing in that it forces us to reckon with the roots of our ailments, not just with their symptoms" (Orr 1992, 88). It involves a sense of wonder and kinship with life, the capacity to make connections between seemingly distinct events, and knowledge "that changes the way people live, not just how they talk" (Orr 1992, 91). The Green Belt Movement of Kenya has taught ecological literacy to women and children who participate in it, including the connection between people's use of land, the finite limits of the land's resources, and the carrying capacity of that land.

2. Examine consumption. Hold societywide forums for discussing and educating on issues such as:

- Human satisfaction and consumerism.
- The role of advertising and media in creating consumer demand.

- The masculine values of self-interest, detachment, and individualism implicit in *Homo economicus* of neoclassical economics.
- The connections between consumption, jobs, gross national product (GNP), and the imperative of economic growth.
- The obstacles to making overconsumption a substantive environmental and political issue.
- The differences between green consumerism of the '90s and older economic cooperative and consumer movements organized to protect health, to improve labor conditions, to make products affordable, and to humanize the market.
- The distinctions between the cultivation economy and extractive economy, between economic growth and economic development.
- The difference between survival consumption and luxury consumption.
- The gap between women's and men's poverty and wealth across cultures, between their earning, access to resources, spending, and reasons for spending.

Environmental organizations could begin by applying the unremitting arithmetic of population growth to consumer advertising and consumption growth rates in order to hold consumption rates and patterns fully accountable for their role in environmental degradation. (11)

3. Support grassroots and urban environmentalism.

Search out, learn from, and support (but do not colonize) the ecological contributions and knowledge of women, when developing global biodiversity strategies and green cities projects. Field researchers in the United States and developing countries have documented that community-based and grassroots environmental preservation is done primarily by women, financed by low budgets, subsistence labor, and sweat equity. Yet, the value of this work is generally not counted in the economy, nor recorded in environmental history or on resource management maps, nor documented by environmental media. Further, it is often the more valuable, though invisible, local ecological work: The cultivation and preservation of the widest range of biodiversity in the Brazilian Amazon, in rural Kenya and India, and in many communities throughout the world is done by women at the local and household level where the surrounding land is "at once home, habitat and workplace" (See Agarwal, Rocheleau, and Hecht in Borkenhagen and Abramovitz 1991).

Endnotes

1. The IPAT formula was first published in Paul Ehrlich and John Holdren. (1974). Impact of population growth. *Science*. Volume 171, pp. 1212–17. In 1977 the two co-authored *Ecoscience* with Anne Ehrlich, in which they propounded the same formulaic approach to population. See also Paul Ehrlich and Anne Ehrlich. (1990). *The Population Explosion*. New York: Simon and Schuster.
2. “The decision-making echelons of major corporations are almost entirely male,” writes Joni Seager. In 1987, 3 of the US Fortune 1000 companies had a woman as chief executive; 2 of the 3 were replacing deceased husbands. “White males still hold 95 percent of the top [US] management jobs. . . . The situation is remarkably similar around the world: women hold only 2 percent of senior executive posts in most West European countries, and9 percent in Japan.” Seager argues that analyses of profit motive and the imperatives of capitalism are insufficient to explain the international environmental degradation for which corporations and corporate bureaucracies are responsible. The culture of the international economic order is masculinist. “Attributes for success in the corporate world—a privileging of emotional neutrality, of rationality, of personal distancing, loyalty to impersonal authority, team playing, scientific rationality, and militarized paradigms—reflect characteristics that define ‘manliness’ in our culture” (Seager 1993, p. 82).
3. Pietilä distinguishes between the cultivation economy and the extractive economy. The former is based primarily on living resources (“agriculture, forestry, animal husbandry, fishing and all indigenous livelihoods”), the latter on nonrenewable natural resources, minerals, and fossils, which are dead materials extracted from the earth. She characterizes the cultivation economy as renewable, partially monetized, with important inputs of sun, air and water; limited mechanization; good longevity; poor competitiveness; and limited increase of efficiency and productivity. The extractive economy is fully monetized and mechanized, with good competitiveness but poor longevity, and ongoing increase of efficiency and productivity (Pietilä 1991).
4. There is extensive literature on Kerala analyzing the many positive effects of a human welfare-oriented government and a politically engaged society. See Richard W. Franke and Barbara H. Chasin. (1989). *Kerala: Radical Reform as Development in an Indian State*. San Francisco: The Institute for Food and Development Policy; and Maria Helena Moreira Alves et al. (1991, January). Four comments on Kerala. *Monthly Review*. pp. 24–39.
5. Much of the data for this section rely on Michael Renner. Assessing the Military’s War on the Environment. in Brown, Lester et al. (1991). *State of the World 1991*. New York: W.W. Norton. Also see Seth Shulman. (1992). *The Threat at Home: Confronting the Toxic Legacy of the U.S. Military*. Boston: Beacon.
6. In what it titles a “job-oriented defense,” the *New York Times* reports that the Pentagon spending plan for the next 5 years has as much to do with protecting American defense industry and jobs as national security. The article cites orders for a new nuclear submarine and aircraft carrier that are not necessary for “national security” but will sustain a particular industry until new

orders are needed (Schmitt, 1993). This entitlement program for the weapons industry reinforces the moral vacuum in which weapons manufactured and sold on the international market are treated as an economic good like food, cotton, or rubber.

7. All of the quotations of this section are from conversations that I had with the individuals quoted while I was researching a forthcoming book on community gardens in United States inner cities.

8. The Committee on Women, Population and the Environment has circulated a statement that identifies the structural roots of environmental crises in economic systems, pollution-intensive technology, overconsumption, and militarism and locates women's freedom and development, including reproductive health and rights, within a context of democracy, social justice, and human rights. The committee is an alliance of women activists, community organizers, health practitioners, and scholars of diverse races, cultures, and countries of origin. A copy of the statement may be obtained from Population and Development Program, Social Sciences, Hampshire College, Amherst, MA 01002, USA.

9. See Janice Raymond. (1993). *Women as Wombs: Reproductive Technologies and the Battle over Women's Freedom*. San Francisco: HarperSanFrancisco and Melbourne: Spinifex Press, pp. 19–21. Raymond addresses the disturbing trend in alliances between various women's health organizations and population control groups that often result in the justification of drugs such as Norplant that are risky and dehumanizing for women. In the United States, these alliances between women's health groups and population groups have also expanded to include pharmaceutical companies and medical and family planning groups, all of which have coalesced to stage a legislative and media blitz to promote RU 486/PG, the new chemical abortifacient. See Janice G. Raymond, Renate Klein, and Lynette J. Dumble. (1991). *RU 486: Misconceptions, Myths and Morals*. Amherst, MA: Institute on Women and Technology and Melbourne: Spinifex Press, especially the Introduction and Conclusion.

10. For an excellent historical analysis of the shift from noncoercive family planning to population control in India, see Sumati Nair. (1992). Population policies and the ideology of population control in India. *Issues in Reproductive and Genetic Engineering*. Volume 5, Number 3, pp. 237–252. The author documents the central role of aid donors, including the United States, the World Bank and the International Monetary Fund, in pressuring India into fertility targets and coercive population programs. Also see Betsy Hartmann. (1987). *Reproductive Rights and Wrongs*. New York: Harper and Row. for a thorough critique of the narrow birth rate reduction goals of international family planning programs. She demonstrates how these programs have abused women's reproductive rights and continue to ignore barrier methods while promoting long-lasting hormonal methods for women.

11. Some thoughtful initiatives on consumption, consumerism, and the role of the economy in environmental degradation are emerging from diverse pockets of US society, including groups in the Northwest committed to voluntary simplicity and the Frontiers Thinking in Economics project, directed by Dr. Neva Goodwin at Tufts University in Medford, MA 02155, USA.

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