# The Ecological Rights of Humans

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[Author's note: This essay was originally published in 2000 in *Peace, Justice and Freedom: Human Rights Challenges in the New Millenium*, G.S. Bhatia, J.S. O'Neill, G.L. Gall and P.D. Bendin (eds.). University of Alberta Press, Edmonton, Alberta, pp. 119-126. The article it cites by Mata et al. (1994) has since been formally published in Ethics in Science and Environmental Politics 12:15-20 (2012). Further explanation of the demotechnic index is found in the 1978 article by J.R. Vallentyne in this issue of *The Social Contract*. Several minor editorial changes have been made in this version of my article, and two references added. In retrospect, it is depressing to see how little has changed since I wrote this over a decade ago. There are more up-to-date references, but they convey much the same message, so I have not updated most of them. A significant change is that Wackernagel and Rees's "Our Ecological Footprint" (1996) has become more popular than Vallentyne's "demotechnic index." Although its message is much the same, that we are using an unsustainable proportion of the world's resources, the Ecological Footprint considers other factors in addition to energy consumption. It is noteworthy that since I wrote this, the population of Canada has increased by over 10 million people, largely as the result of immigration, and there are political pressures to increase immigration still more. Little has been done to accommodate the needs of Canada's indigenous peoples, and industrial and urban development continue to erode their traditional lifestyles. The result has been an ongoing countrywide protest, the Idle No More Movement, which has been marked by hunger strikes, flash round dances in public places, and blockades of railways and roads. Many ecologists view the widespread social upheaval that prevails in the world to mark the end of the era of "luxury growth" by humans, and perhaps a signal of nearing the end of civilization as we know it (Ehrlich and Ehrlich 2013). Will this knowledge result in an about-face by humans, reducing our populations and resource demands before we damage our planet enough to cause a population collapse, or are we so "hard wired" biologically that we are incapable of escaping the same fate as a population of water fleas or fruit flies? Another decade should tell the tale. D.W. Schindler 28 January 2013]

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## Demotechnic dilemmas

No one will argue that the basic rights of humans must include freedom from personal or cultural oppression, clean water, uncontaminated and adequate food, and a pleasant, healthy, and productive environment in which to live a happy and fruitful life. We have made great strides in the first of these. While dictators and racists still exist, none are safe from global scrutiny and most are ousted before very long. Similarly, overt cultural oppression is widely censored, and rebellions are overturning dictatorships in many areas.

But we are clearly losing the battle for water, adequate and clean food, and pleasant and productive environments. In some cases, cultures are being oppressed unwittingly, most notably those small cultures that require large pristine areas to exploit for food or for cultural context, such as indigenous peoples. If we allow the deterioration in these environmental elements to continue, there will be great human suffering and social strife to a degree that will make us forget all but the most inhumane dictators of the past. To prevent this from happening we must begin now, making some decisions that will be unpleasant and controversial but not so unpalatable as the disasters that we can prevent.

## Water, food and ecosystem preservation

Most ecologists are very concerned about the global state of water (Naiman et al. 1998). In some areas it is already impossible to ensure that drinking water is sufficient in quantity, safe, and palatable (Gleick 1998), let alone to consider needs for agriculture or to maintain the biodiversity of the ecosystems which have been a fundamental part

of human cultural development. If global populations continue to grow, we will not be able to feed them. If agricultural advances do not limit us first, the amount of water and its distribution on the planet will do so within the next quarter century. We simply will not have enough water to grow sufficient food. The situation is nicely summarized by Postel (1998). Most water-impoverished countries already must import much of their food, because they simply don't have enough water to grow it (Table 1). Postel estimates that even if global distribution problems are ignored, we would have to double the amount of irrigation to keep pace with demand. There is not enough available water to do this easily. Unless we take action to prevent it, there will be increasing human conflict over water supplies.

The green revolution is also in question. Global grain production, which increased two to two-and-a-half percent per year from 1950–1990 as the result of the "green revolution," declined to about one per cent per year in the 1990s (Brown 1997; Daily et al. 1998). Economic conditions in Asia will probably aggravate the decline. Perhaps the green revolution has peaked. It would be unrealistic to expect it to continue forever, but the turning point is difficult to predict with accuracy. The big increases in crop production have been in developed countries, using methods that are very expensive, both in energy and in currency. Contamination of watercourses with nitrogen and pesticides has resulted (Vitousek et al. 1997; Pimentel 1978). As we have seen with relief efforts in several famine-stricken countries in the past decade, distribution of large quantities of food to sites half-way around the world remains a problem. Even the most modern transportation systems are not up to the task, regardless of funds and energy available.

Ecologists, who deal with populations of animals and plants on a day-to-day basis, have long viewed the exploding human population with concern. The number of people on the planet is triple the number that lived here when I was born. All of us believe that growth must halt. The debate is about when and how. I am sure that other presentations at this conference will emphasize that educating women will bring down the birth rate, that there are humane methods of contraception, and other discussions that are widely acceptable in the global society. All of this is wonderful, but it is my view that change will not be fast enough to prevent severe ecosystem degradation, shortage of food and water and resulting conflict.

A second dilemma is that much of the world is striving to obtain a lifestyle similar to that of western Europe and North America. This cannot happen because we simply do not have the global resources. As Vitousek et al. (1986) have demonstrated, we already use a high percentage of the photosynthetic energy reaching the earth's surface each year. Several scientists have calculated the distribution of resource use. I will use the demotechnic index (Mata et al. 1994) to make my point.

**Table 1. Grain import dependence of African, Asian and Middle Eastern countries with per capita runoff of less than 1700m³/yra. From Postel (1998).**

| Country | Internal runoff per capita, 1995 ($m^3/y$)[b] | Net grain imports as share of consumption (%)[c] |
|---|---|---|
| Kuwait | 0 | 100 |
| United Arab Emirates | 158 | 100 |
| Singapore | 200 | 100 |
| Djibouti | 500 | 100 |
| Oman | 909 | 100 |
| Lebanon | 1,297 | 95 |
| Jordan | 249 | 91 |
| Israel | 309 | 87 |
| Libya | 115 | 85 |
| South Korea | 1,473 | 77 |
| Algeria | 489 | 70 |
| Yemen | 189 | 66 |
| Armenia | 1,673 | 60 |
| Mauritania | 174 | 58 |
| Cape Verde | 750 | 55 |
| Tunisia | 393 | 55 |
| Saudi Arabia | 119 | 50 |
| Uzbekistan | 418 | 42 |
| Egypt | 29 | 40 |
| Azerbaijan | 1,066 | 34 |
| Turkmenistan | 251 | 27 |
| Morocco | 1,027 | 26 |
| Somalia | 645 | 26 |
| Rwanda | 808 | 20 |
| Iraq | 1,650 | 19 |
| Kenya | 714 | 15 |
| Sudan | 1,246 | 4 |
| Burkina Faso | 1,683 | 2 |
| Burundi | 563 | 2 |
| Zimbabwe | 1,248 | 2 |
| Niger | 380 | 1 |
| South Africa | 1,030 | -3 |
| Syria | 517 | -4 |
| Eritrea | 800 | Not available |

[a]From WRI (1994), FAO (1995), and USDA (1997a).
[b]Runoff figures do not include river inflow from other countries, in part to avoid double-counting. Only Armenia, Azerbaijan, Djibouti, Iraq, Mauritania, Sudan, Turkmenistan and Uzbekistan would have more than1,700m³ per capita in 1995 and 2025 if current inflow from other countries were included.
[c]Ratio of annual net grain imports to grain consumption averaged over the period 1994-1996.

The demotechnic index (D-index) is simply the ratio of technological energy consumption, in gigajoules per capita year, to the energy required for physiological subsistence alone, which is estimated to be 3.57 gigajoules per capita year. Canadians and Americans have huge demotechnic indices, 118 and 91 respectively (Table 2), meaning that each North American uses about one hundred times more energy than required for subsistence alone. European countries tend to have indices between twenty-five and seventy-five. Most other countries are much lower. In some cases values are four or less. If we multiply populations by these indices to get consumption-adjusted populations (Mata et al. op. cit.), the numbers are enormous. We are already supporting the subsistence equivalent of 104 billion people. The richest twenty-nine countries account for eighty-six per cent of this energy use. Obviously, if we double the population and allow energy consumption of all countries to reach North American values, several additional planets will be required. We must have more realistic expectations.

There are three things that we can do to prevent our demotechnic demands from exceeding global supplies. We can act more rapidly to decrease populations. This needs to be done most urgently in countries that already greatly exceed local food supplies because their costs of transporting food add to the demotechnic dilemma. It should be the goal of each country to reduce its population to levels where energy requirements can be met locally. We can still trade with each other to obtain variety, but we will be secure in knowing that if all else fails we can control our own basic needs and protect our local environments.

How to reduce population rapidly and humanely is an enormous question. Science can estimate only how far and how fast we must move. Executing the necessary changes requires changes in ethics, religions, politics, and medical practices. All these sectors must participate and be prepared to bend somewhat if global disaster is to be prevented. We can also reduce our demotechnic demands. What sort of energy consumption is required for humans to live healthy, happy lives? It is certainly not one hundred, perhaps not even twenty-five. I suspect that it could be much lower.

**Table 2. Populations and demotechnic indices for selected countries. For a complete listing see Mata et al. (1994).**

| Country | D-index | Populations (000) | Consumption Adjusted Population |
|---|---|---|---|
| Canada | 118.11 | 26,521 | 3,158,916 |
| German Dem Rep | 64.5 | 16,249 | 1,064,310 |
| India | 3.58 | 853,094 | 3,907,171 |
| Japan | 37.75 | 123,460 | 4,784,075 |
| Kenya | 5.25 | 24,031 | 150,194 |
| Mexico | 15.25 | 88,598 | 1,439,718 |
| Spain | 24.36 | 39,187 | 993,782 |
| Sweden | 78.55 | 8,444 | 671,720 |
| United Kingdom | 44.36 | 57,237 | 2,596,270 |
| United States | 91.26 | 249,224 | 22,993,406 |
| U.S.S.R. | 57.31 | 288,595 | 16,827,974 |

I have lived through much of the demotechnic revolution. When I was a child we still heated with wood. It was cut by hand or with simple mechanical saws. We had one small tractor but much of our fieldwork was still done by horses. We had a car but anything over thirty kilometres was regarded as a long trip. We had oil lamps, a few books, a radio, and a wind-up phonograph. We raised a big garden, canned our own vegetables for winter use, raised and ate our own chickens, hogs, and cows. Water was pumped from a well. We did not have indoor plumbing. I can well remember trips to the outhouse on frosty winter nights. My guess is that our demotechnic demands were around ten. All of that changed rapidly after the end of World War II. Within a few years we had electricity and electrical appliances, several tractors, cars, and trucks. We first had an oil stove, then a furnace with an electric blower. But it has always struck me as curious that these energy-consuming devices brought us no additional happiness. So perhaps there is a demotechnic level that will ensure that humans have what they need to live comfortable and productive lives without extravagant wastes of energy.

We should agree on some acceptable global ranges for national demotechnic demands. Some countries would have to decrease their energy consumption to meet their objectives and to allow others to increase. Individual countries could choose to have small populations with larger demotechnic indices or larger populations with lower energy demands. I estimate that, with its current demotechnic index, a human population in Canada that would allow us to sustain energy, food, water, and native species of animals and plants for the indefinite future is probably less than ten million people. Much of our abundant water is in the north, while the land suitable for agriculture and comfortable for most people is a narrow band in the south. Make no mistake, these will be hard choices. But they are choices that we must make if we do not want to precipitate one of the greatest convulsions in the history of our fauna and flora.

## The special problem of small cultures

As national and world populations grow, small groups suffer. It is a very simple problem. Democracy is regarded as one vote per human. When a decision involves conflict between a larger and a smaller cultural group, the smaller loses even if it is not overtly oppressed—for the smaller group simply has fewer votes. Larger, richer societies also are better able to invade, if not with armies then by radio, television, and movies. The result is homogenization of cultures. Small cultures get deeply buried by the mainstream.

An example is that of northern native people in this

country (Canada). Even today, most of them live much as I lived as a child, not sharing in much of the country's lavish energy consumption. Many still burn wood and rely on country food to a large degree. Snowmobiles and outboard motors provide transportation but satellites have allowed American culture to invade the north. Fortunately, we have ceased forcing our religions and educational systems on northern people. These caused tragedies which were not realized at the time.

There are other, less visible problems. The bodies of aboriginal northerners have been found to contain peculiarly large concentrations of PCBs, mercury and other contaminants (Jensen et al. 1997; AMAP 1998; Table 3). Scientists have discovered that these contaminants are carried in the atmosphere from distant sources, some on the other side of the earth. They have entered ecosystems and been biomagnified as they are passed up the food chain. The biomagnification can be thousands or millions of times, as the ratio of the concentration in organisms to that in the water which pollutants first contaminate shows. This ratio is known as a bioaccumulation factor or BAF. The U.S. Environmental Protection Agency (EPA)'s BAF for mercury at the fourth step in an aquatic food chain is 6.8 million!

There is an ongoing debate as to whether indigenous people should limit their consumption of contaminated foods. In general it is believed that the health benefits outweigh the risks from pollutants. But many native people are mistrustful of these recommendations. Who can blame them after the history of mission schools and the story that Cindy Kenny Gilday relates in this volume? Some regard their traditional foods as contaminated and do not eat them any longer.

**Table 3. Mean concentration of various organochlorines in milk fat from Inuit women of northern Quebec and Caucasian women from southern Quebec (ng/g lipids). From Ayotte et al. (1995).**

| Organochlorine compound | Inuit women (N=107) | | Caucasian women (N=50) | |
|---|---|---|---|---|
| | n[b] | Mean[c] ± C.I. | n[b] | Mean[c] ± C.I. |
| DDE | 107 | 1212 ± 170 | 50 | 336 ± 18 |
| Hexachlorobenzene | 107 | 136 ± 19 | 48 | 28 ± 3 |
| Dieldrin | 102 | 37 ± 5 | 46 | 11 ± 1 |
| Mirex | 90 | 16 ± 4 | 3 | 1.6 ± 0.3 |
| Heptachlor epoxide | 45 | 13 ± 2 | 29 | 8 ± 1 |
| trans-Chlordane | 18 | 3.7 ± 0.4 | 0 | < 6 |
| Endrin | 1 | < 8 | 0 | < 6 |

[b]n, number of milk samples with concentration above the detection limit.
[c]Arithmetic mean and ninety-five per cent confidence interval.

For these people it is not simply a matter of switching grocery stores. Alternative foods of equivalent nutrition are expensive because they must be flown in from the south. There is a tendency to substitute southern junk food which is of doubtful nutritional benefit. Obesity, diabetes, and other southern ailments are increasing. But hunting, fishing, and gathering of food are more than subsistence to native people. These activities are part of the cultural and spiritual fabric of their society. Contaminating their food will rend this social fabric just as surely as sending their children to mission schools did in past decades.

There are some real dilemmas here. Some of the pesticides probably originate in tropical countries where they are important in controlling the insects that carry malaria and other serious human diseases. Must we poison northern natives to protect tropical peoples from disease? Should the decision be based only on numbers of deaths or population sizes? Again, this is no longer the realm of science except for the possibility of producing pesticides that are less persistent and less amenable to long-range transport in the atmosphere.

In some cases the answer to these questions is clear and heavily based on science. We know that demotechnic activities have released mercury to the atmosphere, causing increased mercury deposition in northern regions by from two- to several-fold. We know that the increase in mercury is reflected as methyl mercury in food chains so that it biomagnifies. We know that it is a powerful neurotoxin that produces abnormalities in the neurological functioning of fetuses and newborns at very low doses. Medical and ecological scientists agree that mercury emissions to the atmosphere must be reduced. We know the major sources.

All who value human rights should be asking their regulators and politicians why the control of mercury emissions to the atmosphere has been delayed for so long. This problem can be addressed today. Here we can see the sorts of cultural biases that I argue above. The costs of controlling mercury release are resisted by a large, powerful society because the dangerous effects are predominantly focused on a small, poor one. Just as surely as ecology must protect ecosystems to ensure the survival of species, we must protect cultures that depend on sparse populations and large land areas from being oppressed by those who refuse to curb their reproduction or lavish energy use. In summary, in order for all people to have the prospect of enjoying human rights, there are some urgent, complicated, and important decisions that must be made. The decisions must engage all sectors of society because they go well beyond the realm of science. I cannot predict where the debates will take us, but they must begin now. ■

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