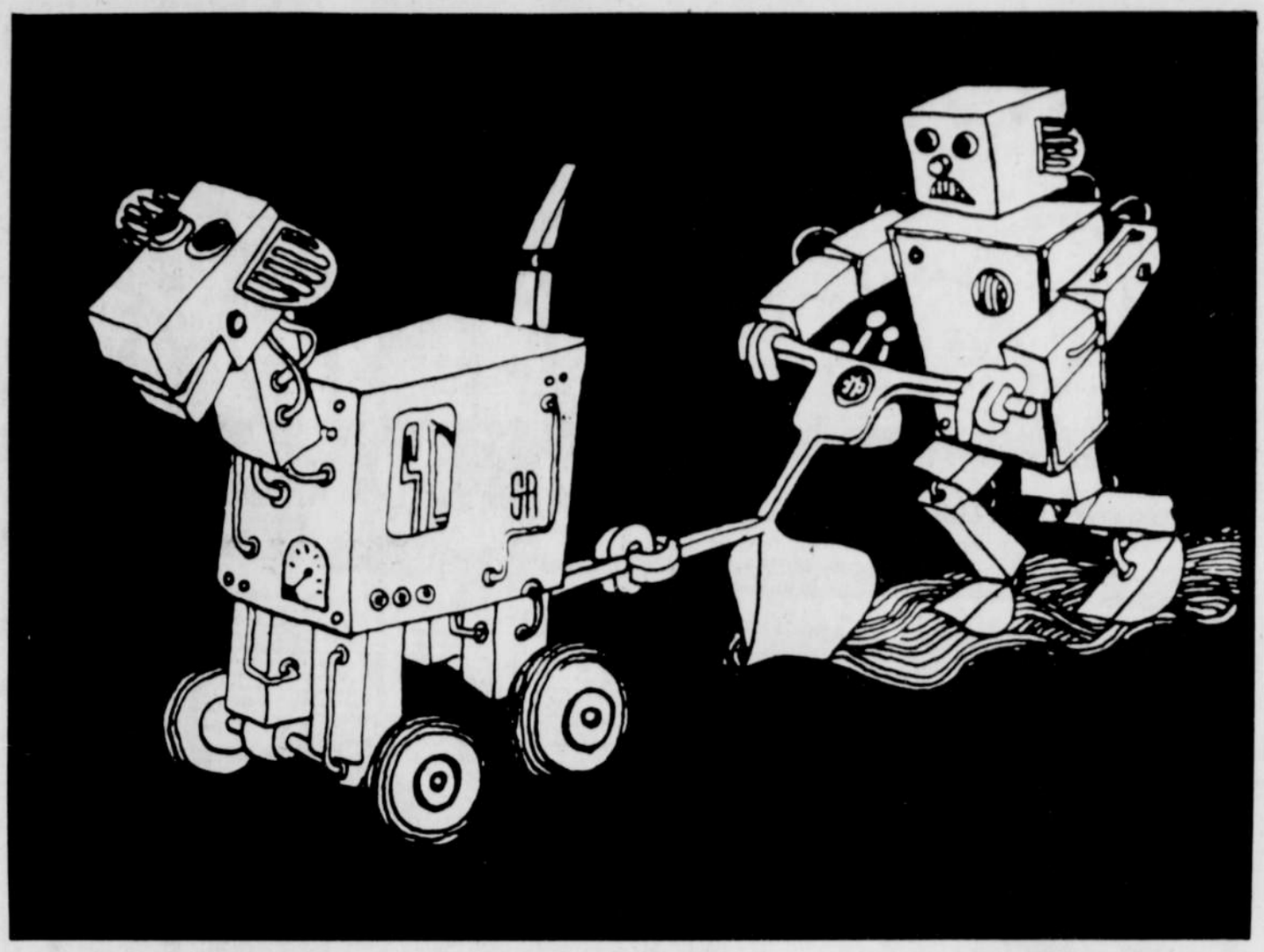

SNARSKIS

Though variations in atmospheric temperature are difficult to assess over the period of time records have been kept, and are subject to many factors that are not entirely understood, the long-term effect of industrialized society and its petrochemical use has been to raise the temperature of Earth's biosphere.

"The 11 warmest years since record keeping began in 1866 have all occurred since 1979. In fact, the three warmest years took place during the 1990s, with 1995 topping the list," (Lester Brown wrote in *State of the World 1997*. "The warmth of the current decade is particularly remarkable because it has occurred in conjunction with several short-term natural and human-made cooling effects. These include the century's largest volcanic event, the 1991 eruption of Mount Pinatubo, the solar energy cycle, which has been at a minimum during the 1990s, and atmospheric depletion of the ozone, now at record levels." (Lester Brown, Christopher Flavin, Hal Kane, *Vital Signs 1996*)

Recent data shows that the average global temperature has risen half a degree Celsius since 1950, and a full degree since 1900. Though this might be insignificant in terms of human comfort levels, it is not in terms of global weather dynamics nor biological rhythms.

The climates of Earth evolve at glacial rates. They sustain through a dynamic stasis with rhythms in the ten thousands of years. Weather patterns present a more dynamic equilibrium, with daily global rotation, seasonal changes and yearly variations. The rhythms of the weather and the climatic zones enmesh in further patterns and secondary rhythms. Together they form a reasonably stable, though highly changeable, periodicity of temperatures around the globe. The system of the sun, the moon, the oceans, the desert landmasses, the forest landmasses and the polar ice caps determine the large-scale dynamics of the atmosphere and the temperature of the Earth as a whole.

Like a bowl of soup being stirred by a day-dreaming cook, the atmosphere turns in and over itself, a fluid in a complexity of motions that are ever unique in detail but reasonably predictable in general. Adding the human factor of global industrialization to this system is significant. To diminish the cooling and air cleansing forests, to increase the heating of the deserts with miles and miles of asphalt, to change the heat collecting nature of the atmospheric screen, to literally affect the temperature of the oceans and cause the shrinkage of the polar ice caps, we risk throwing the weather patterns into disarray.

A case in point is the periodic appearance of the warm water current from the southern Pacific ocean as *El Niño*. The 1997-98 version has been larger and longer lasting than any other on record. Its effects all around the Pacific from southern Asia to the coast of California have been devastating.

While the media has been full of stories on *El Niño*'s fury, there has been little or no mention of its relation to the overall situation of global warming. In 1957, when Roger Revelle and Hans Suess, then of California's Scripps Institute of Oceanography, first issued real concern about the prospect of global warming in a paper published in the scientific journal *Tellus*, the central issue was the part played by the ocean and its exchange with the atmosphere. The critical discovery then was that "the upper layer of the oceans, where air and sea meet and transact business, would absorb very little of the excess carbon dioxide produced by man." In the instance of the exchange of energy, however, this is not the case. The ocean surface absorbs a great deal of the atmosphere's heat energy. The Equatorial Pacific, where *El Niño* originates, is the largest mass of water in the world, occupying one of the world's warmest regions. There is no greater heat pump than these warm equatorial waters.

El Niño has always been an important factor in the Earth's mechanism of heat transfer, and it has always had stirring effects on large portions of the world's weather. But it has never been front-page news day after day as it has been this winter. Regardless of the media silence and even denial on the part of some scientists, it is naïve to imagine the largest "heat machine" in global weather dynamics — *El Niño* — would not be greatly affected by increased heat in the atmosphere. There should be little doubt *El Niño*'s new strength is related to increasing ocean water temperatures and the process of global warming in general.

While overall climate changes are difficult to discern in the short-term as long as we pump heat (entropy) into the system, we are dangerously decreasing the natural climate order. As noted in the quote opening this essay, increased atmospheric temperatures speed up the hydrological cycle and increase water content in the air. Though temperatures may only increase in a range of degrees, the frequency of extreme weather conditions will disproportionately rise — with the capacity to do vast damage to precious crops at a moment's notice. As Lester Brown observed in *The Agricultural Link* (1997), "Three times in the last nine years, the U.S. grain harvest has been reduced by 17% or more by weather. When the grain yield per hectare was lowered in 1988 by 22% from the year before grain production dropped below consumption." Isolated weather conditions, whether of short-term catastrophic nature or dwelling spells of heat or rain, have tremendous influence on our crop harvests.

While there could be some net agricultural gains in the relatively narrow temperate zones on either side of the equator due to higher temperatures and higher carbon densities in the air,[4] other effects caused by minimal temperature changes are just as likely to diminish these gains. In addition to the already mentioned problem of isolated weather events, tropical diseases and insects would migrate northward and southward from the equator. Melting polar ice caps would lift sea levels and proportionately decrease their capacity to cool the Earth, causing more melting and further reduction of world land mass, critically cutting into already endangered wet lands and flooding some of the most highly populated areas in the world. Bill McKibbon wrote in *The End of Nature* (1989) that compounding this, thawing of the Arctic permafrost would free "an enormous amount of methane ...locked up as hydrates in the tundra and muds of the continental shelves...locked up as hydrates in the tundra and mud of the continental shelves...Some estimates of the potential methane release run as high as .6 billion tons a year, an amount that could more than double the present atmospheric concentration. This (in addition to the melting icecaps) would be a nasty feedback loop, with altered atmosphere causing further alterations."

Little changes in temperature mean a lot. Warmer oceans lead to changes in sea life relationships, particularly the deterioration of coral reefs, "the richest ecosystems in the oceans and second richest on the Earth, after tropical forests." (Chris Bright, "Tracking the Ecology of Climate Change", *Vital Signs 1997*) The patterns of migratory birds, based on sensitivities to temperature, would also be changed. Breeding periods of insects would similarly adjust. If, for example, a particular species of bird's migration was necessary to reduce the success of a particular insect's reproduction, even a few days delay could mean a huge multiplier in that insect's population. The same is true with various microbes that exist in fresh and saltwater. The presence of these microbes is highly reliant on temperature.The breeding of certain species of fish rely on these microbes being present at the right time and in the correct proportion to ensure their reproduction. And none of these factors, bird migrations, insect breeding, microbe populations or other species' biological clocks responds in the same way.

A fine fabric of interconnective tissue, climatic to microbial, fuses all life from human to bacterial in a diverse and interdependent web of life. To throw one rhythm off is to throw all variety of species, plant and animal, into dissonance.

In the case of a world population delicately dependent on the harvest of large geographically concentrated areas of monocultured crops, temperature and/or weather changes, insect rhythms, the migrations of pollinating birds and bees, could, with little or no warning, do enormous damage to yield. In a situation where our food sources are already nearing a critical cusp, the inclusion of the devastation factor of nature, by weather or an uncontrolled insect population means we edge closer and closer to the precipice of hunger and famine.

We gamble dangerously with crisis when we don't seriously consider this impact of industrial forces or, at least, provide ourselves with a larger more diverse base of food production. Stockpiles of grain have long been our margin of error. Tomorrow it will be our excess of human population.

The Web of Life:

Two things happen to a planet in the long run. First it loses its atmosphere, then it dries up. As this happened to Mars, it will happen to Earth no matter what we humans do. It's just that on one course the time factor is in the billions of years. On the other course the time factor is the thousands or hundreds of years — if not in the foreseeable future.

Present data coming in from scientific studies of Antarctica show rising temperatures (3 to 4 degrees Centigrade), ice mass calving, the seasonal appearance of a huge ozone hole and steady changes in ecological relationship between Antarctic animal and plant species. In Antarctica we are seeing the types of changes that will present themselves to the rest of the globe in coming years. Too little is known to accurately predict what these types of global changes will mean. Because smaller life forms like insects, viruses and bacteria with their short reproductive periods adjust much faster than do larger life forms like trees, mammals or fish, it does not take much imagination to envision the victor in a human generated climate change.

The larger operative is the community of living things as an interconnected whole. We as humans are implicate, not separate. We cannot live on this planet for long without paramount respect for every feature in this web of life. We cannot expect to feed an increasing human population through intensified farming techniques or pump pollutants into the atmosphere without further injury to this web. The ugly potentials scream at us silently from future unborn generations.

Criticism of population control is rightly based on the fear of losing human birthrights. As the press of environmental strain and food needs increase, however, our efforts to feed the growing populations will clearly amass further unpayable deficits — which in turn will only result in greater loss of human rights later on.

We are not planning for the future, we are borrowing dangerously against it. How far must we go before we eliminate it altogether? Some may argue that technology will find a way to accommodate capital growth for all nations. It may be. But the real question is what is our goal? Maximizing the human population of Earth at the cost of freedom? Or maximizing the quality of living conditions for a managed population?

This is the way the Club of Rome authors of *The Limits to Growth* summed up the situation in 1972:

There may be much disagreement with the statement that population and capital growth must stop soon. But virtually no one will argue that material growth on this planet can go on forever. At this point in man's history (26 years ago) *...man can still choose his limits and stop when he pleases by weakening some of the strong pressures that cause capital and population growth,or by instituting counterpressures,or both. Such counterpressures will probably not be wholly pleasant.They will certainly involve profound changes in social and economic structures that have been deeply impressed into human culture by centuries of growth. The alternative is to wait until the price of technology becomes more than society can pay, or until problems arise that have no technical solutions. At any one of those points the choice of limits will be gone.Growth will be stopped by pressures that are not of human choosing, and that, as the world model suggests, may be very much worse than those which society might choose for itself.*

The point to all this is not to generate fear with scenarios for an upcoming millennial doomsday (a caprice of our calendar making). No, the point is to establish the validity of concern. The problem of global warming is real, and its effects are much more complex than the scope of this piece will allow. Be certain, however, its repercussions will not be isolated to food shortages in the Third World. Though presently the strongest force at work to control carbon dioxide emissions is the lobbying of the insurance industry merely protecting its own backside, the American voting public is in a position to help. If they are properly informed, they can influence the United States position at International conferences like the one that took place in Kyoto last December. The democratic process is often criticized for its inability to respond in a timely fashion. But make no mistake — because of the tremendous economic and political clout of the United States, one hundred million voters in one country of the world can provide critical direction in the management of a global society of six billion.

Notes:

1: *Doubling time is a good measure of what population growth rates really mean. At 0.1%, populations double approximately every 700 years. At 0.5%, populations double every 140 years. At 1.0% that drops to 70 years; 2.0% becomes 35 years; and 3.0% is 23 years. In situations of exponential growth, small changes make big differences.*

2: *"Of 40,000 cubic kilometers per year of rain, 28,000 runs off in flood, 12,000 can be contained but only 7,000 of that is accessible to where humans live."* (Dennis Meadows, *Beyond the Limits*, 1992) *"Globally water is in great excess, but because of operational limits and pollution, it can in fact support at most one more doubling of demand, which will occur in 20–30 years."* (FAO, *World Summit Technical Papers*, 1996)

3: *Not to mention, 13 of the world's 15 largest ocean fisheries are on the decline. That is, they are being depleted faster than the fish can reproduce. (State of the World 1998,* Worldwatch Institute)

4: *"Climate strongly affects crop yields. A CO_2 concentration of 550 ppm is likely to increase crop yields in some areas by as much as 30% to 40%, but it will decrease yields in other places by similar amounts, even for the same crops. A warmer climate would reduce flexibility in crop distribution and increase irrigation demands. Expansion of the range of pests could also increase vulnerability and result in greater use of pesticides. Despite these effects, total global food production is not expected to be altered substantially by climate change, but there are expected to be negative regional impacts." (Climate Change: State of Knowledge 1997,* U.S.Office of Science & Technology Policy)

Dan Armstrong recently moved back to Eugene from Astoria. He wrote in a recent letter following his move:

"The last truck load of paint and drop cloths and other miscellany has found its spot here on Videra Drive, and so I am here in Eugene pretty much completely. I've got a job or two in Portland to prod myself into doing, but after that, it's a winter at the keyboard and who knows what the hell will fall from these fingertips. Hopefully an article or two for you — even one about Eugene (if I can think of something non-globally) to help stimulate the circulation (of the *Times Eagle*) in this little hotbed of resurrection....Of course, I am not gone from Astoria forever. I'll be back whenever you need a pony to deliver the express. But things have changed. And that particular sentence I completed in Astoria is done. I loved Astoria, but life cut pretty close to the bone there for me.Good, bad or indifferent, it was time to leave."

He has been a regular contributor to this newspaper the past few years, and a very good friend.