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## Betting on the Planet

BY John Tierney; John Tierney is a reporter for The New York Times. He is writing a book on environmental crises.

In 1980 an ecologist and an economist chose a refreshingly unacademic way to resolve their differences. They bet \$1,000. Specifically, the bet was over the future price of five metals, but at stake was much more -- a view of the planet's ultimate limits, a vision of humanity's destiny. It was a bet between the Cassandra and the Dr. Pangloss of our era.

They lead two intellectual schools -- sometimes called the Malthusians and the Cornucopians, sometimes simply the doomsters and the boomsters -- that use the latest in computer-generated graphs and foundation-generated funds to debate whether the world is getting better or going to the dogs. The argument has generally been as fruitless as it is old, since the two sides never seem to be looking at the same part of the world at the same time. Dr. Pangloss sees farm silos brimming with record harvests; Cassandra sees topsoil eroding and pesticide seeping into ground water. Dr. Pangloss sees people living longer; Cassandra sees rain forests being decimated. But in 1980 these opponents managed to agree on one way to chart and test the global future. They promised to abide by the results exactly 10 years later -- in October 1990 -- and to pay up out of their own pockets.

The bettors, who have never met in all the years they have been excoriating each other, are both 58-year-old professors who grew up in the Newark suburbs. The ecologist, Paul R. Ehrlich, has been one of the world's better-known scientists since publishing "The Population Bomb" in 1968. More than three million copies were sold, and he became perhaps the only author ever interviewed for an hour on "The Tonight Show." When he is not teaching at Stanford University or studying butterflies in the Rockies, Ehrlich can generally be found on a plane on his way to give a lecture, collect an award or appear in an occasional spot on the "Today" show. This summer he won a five-year MacArthur Foundation grant for \$345,000, and in September he went to Stockholm to share half of the \$240,000 Crafoord Prize, the ecologist's version of the Nobel. His many personal successes haven't changed his position in the debate over humanity's fate. He is the pessimist.

The economist, Julian L. Simon of the University of Maryland, often speaks of himself as an outcast, which isn't quite true. His books carry jacket blurbs from Nobel laureate economists, and his views have helped shape policy in Washington for the past decade. But Simon has certainly never enjoyed

Ehrlich's academic success or popular appeal. On the first Earth Day in 1970, while Ehrlich was in the national news helping to launch the environmental movement, Simon sat in a college auditorium listening as a zoologist, to great applause, denounced him as a reactionary whose work "lacks scholarship or substance." Simon took revenge, first by throwing a drink in his critic's face at a faculty party and then by becoming the scourge of the environmental movement. When he unveiled his happy vision of beneficent technology and human progress in *Science* magazine in 1980, it attracted one of the largest batches of angry letters in the journal's history.

In some ways, Simon goes beyond Dr. Pangloss, the tutor in "Candide" who insists that "All is for the best in this best of possible worlds." Simon believes that today's world is merely the best so far. Tomorrow's will be better still, because it will have more people producing more bright ideas. He argues that population growth constitutes not a crisis but, in the long run, a boon that will ultimately mean a cleaner environment, a healthier humanity and more abundant supplies of food and raw materials for everyone. And this progress can go on indefinitely because -- "incredible as it may seem at first," he wrote in his 1980 article -- the planet's resources are actually not finite. Simon also found room in the article to criticize, among others, Ehrlich, Barry Commoner, *Newsweek*, the National Wildlife Federation and the secretary general of the United Nations. It was titled "Resources, Population, Environment: An Oversupply of False Bad News."

An irate Ehrlich wondered how the article had passed peer review at America's leading scientific journal. "Could the editors have found someone to review Simon's manuscript who had to take off his shoes to count to 20?" Ehrlich asked in a rebuttal written with his wife, Anne, also an ecologist at Stanford. They provided the simple arithmetic: the planet's resources had to be divided among a population that was then growing at the unprecedented rate of 75 million people a year. The Ehrlichs called Simon the leader of a "space-age cargo cult" of economists convinced that new resources would miraculously fall from the heavens. For years the Ehrlichs had been trying to explain the ecological concept of "carrying capacity" to these economists. They had been warning that population growth was outstripping the earth's supplies of food, fresh water and minerals. But they couldn't get the economists to listen.

"To explain to one of them the inevitability of no growth in the material sector, or . . . that commodities must become expensive," the Ehrlichs wrote, "would be like attempting to explain odd-day-even-day gas distribution to a cranberry."

Ehrlich decided to put his money where his mouth was by responding to an open challenge issued by Simon to all Malthusians. Simon offered to let anyone pick any natural resource -- grain, oil, coal, timber, metals -- and any future date. If the resource really were to become scarcer as the world's population grew, then its price should rise. Simon wanted to bet that the price would instead decline by the appointed date. Ehrlich derisively announced that he would "accept Simon's astonishing offer before other greedy people jump in." He then formed a consortium with John Harte and John P.

Holdren, colleagues at the University of California at Berkeley specializing in energy and resource questions.

In October 1980 the Ehrlich group bet \$1,000 on five metals -- chrome, copper, nickel, tin and tungsten -- in quantities that each cost \$200 in the current market. A futures contract was drawn up obligating Simon to sell Ehrlich, Harte and Holdren these same quantities of the metals 10 years later, but at 1980 prices. If the 1990 combined prices turned out to be higher than \$1,000, Simon would pay them the difference in cash. If prices fell, they would pay him. The contract was signed, and Ehrlich and Simon went on attacking each other throughout the 1980's. During that decade the world's population grew by more than 800 million, the greatest increase in history, and the store of metals buried in the earth's crust did not get any larger. Population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio. -- Thomas Robert Malthus, 1798. Population Outgrows Food, Scientists Warn the World -- Front-page headline in The New York Times, Sept. 15, 1948, over an article about the "dark outlook for the human race" due to "overpopulation and the dwindling of natural resources." No Room in the Lifeboats -- Headline in The New York Times Magazine, April 16, 1978, over an article warning that "the cost of natural resources is going up" as increasing population ushers in the "Age of Scarcity." The earth has limited resources, and if we don't recycle them we use them up. -- Meredith Baxter-Birney, who played the mother on the "Family Ties" television show, in a recent Greenpeace public-service message showing the family sorting garbage in the living room. IT IS SUCH AN OBVIOUS proposition in a finite world: things run out. It must have occurred to Homo habilis while searching for rocks to make the first tools 2.5 million years ago. Aristotle and Plato shared the same concerns as the "Family Ties" cast. The American Indians put it nicely in a proverb that has been adopted as a slogan by today's environmentalists: "We do not inherit the earth from our parents. We borrow it from our children." The idea shapes our personal actions when we bundle newspapers to avoid running out of wood for paper and land for garbage dumps. It affects our national policies when we send soldiers into the Persian Gulf to prevent Saddam Hussein from getting a "stranglehold" on the dwindling supplies of oil. It is the fear Paul Ehrlich raised in 1974: "What will we do when the pumps run dry?"

The counterargument is not nearly as intuitively convincing. It has generally consisted of a simple question: Why haven't things run out yet? The ones asking this question now tend to be economists, which is a switch, since their predecessors were the ones who initiated the modern preoccupation with resource scarcity. Economics was first called "the dismal science" in the last century because of Malthus's predictions of mass starvation. He had many successors, the most eloquent of whom perhaps was a British economist named William Stanley Jevons.

In 1865 Jevons published "The Coal Question: An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of Our Coal Mines." In most ways, it was quite similar to the books that appeared during the energy crisis of the 1970's. There were graphs showing parabolic curves of

population and coal consumption shooting upwards, and charts showing estimates of woefully inadequate coal reserves. "The conclusion is inevitable," Jevons wrote, "that our present happy progressive condition is a thing of limited duration."

Unlike the prophets a century later, though, Jevons was not sure that the answer was mandatory conservation. At first glance, he wrote, there seemed to be a clear case for the Government's limiting industry's profligate energy use. "To disperse so lavishly the cream of our mineral wealth is to be spendthrifts of our capital -- to part with that which will never come back." He warned that this might lead to the sudden collapse of British civilization. Yet he noted that much of that civilization, such as "our rich literature and philosophy," might never have existed without "the lavish expenditure of our material energy" that "redeemed us from dullness and degradation a century ago." To reduce coal consumption might only bring back stagnation, he cautioned, and he ended his book with a sentence in italics: " We have to make the momentous choice between brief greatness and longer continued mediocrity ."

There were many other sightings of the end of the lode. An energy crisis arose in the middle of the 19th century, when the dwindling supply of whales drove up the cost of lighting homes with oil lamps and tallow candles. In 1905 President Theodore Roosevelt warned of an American "timber famine," a concern that prompted a proposal to ban Christmas trees. In 1926 the Federal Oil Conservation Board announced that the United States had a seven-year supply of petroleum left.

Naturalists gradually replaced economists as the chief doomsayers. They dominated the conservation movement early this century, and in 1948 two of them -- Fairfield Osborn, the president of the New York Zoological Society, and an ornithologist named William Vogt -- started a national debate by publishing popular books: "Our Plundered Planet" and "Road to Survival" respectively. Both men warned of overpopulation, dwindling resources and future famines. Vogt's book lamented the loss of "such irreplaceable capital goods as soils and minerals." Vogt was especially worried about one of the metals that turned up decades later in the Ehrlich-Simon bet, warning that "we might go to war to ensure access to tin sources." The world's supply of agricultural land, he wrote, was "shrinking fast" and "every year producing less food." America's recent bumper crops were "accidents of favorable weather." Since the United States was already overpopulated, "a fall in living standards is unavoidable." And if humanity did not follow Vogt's "Road to Survival" -- conservation and population control -- there was the alternate route presented in the book's last sentence: "Like Gadarene swine, we shall rush down a war-torn slope to a barbarian existence in the blackened rubble."

Both books made an impression on the teen-age Paul Ehrlich. He was already a naturalist himself, thanks to a mentor at the American Museum of Natural History in New York who encouraged him to study butterflies and publish papers while he was still a high-school student in New Jersey. Ehrlich went on to study zoology at the University of Pennsylvania. He married Anne in 1954 while in graduate school at the University of Kansas, and they put their Malthusian principles into practice by limiting

themselves to one child. Ehrlich had a vasectomy in 1963, shortly after getting tenure at Stanford.

In the mid-60's, Ehrlich started giving public lectures about the population problem. One caught the attention of David Brower, then executive director of the Sierra Club, who led him to Ballantine Books. Rushing to publish his message in time for the 1968 Presidential election, Ehrlich produced what may be the all-time ecological best seller, "The Population Bomb."

It was "The Tonight Show" that made him and his book famous. As Ehrlich remembers it, Joan Rivers went on first, telling jokes about her honeymoon night ("I said, 'Turn off the lights . . . turn off the lights . . . shut the car door.' "). Then there was a starlet whose one-word answers made things so awkward that Ehrlich was rushed on early to rescue Johnny Carson.

"I went on and did basically a monologue," Ehrlich recalls. "I'd talk until the commercial, and during the break I'd feed Johnny a question, and then I'd answer it until the next commercial. I got the highest compliment after the show, when I was walking behind Johnny and Ed McMahon up the stairs, and I heard Johnny say, 'Boy, Paul really saved the show.' "

"The Tonight Show" got more than 5,000 letters about Ehrlich's appearance, the first of many on the program. Ehrlich has been deluged ever since with requests for lectures, interviews and opinions. He is a rare hybrid: the academic who keeps his professional reputation intact while pleasing the masses. Scientists praise his papers on butterflies and textbooks on ecology; talk-show hosts tout his popular books and love his affably blunt style. He has never been one to mince words or hedge predictions.

"The Population Bomb" began: "The battle to feed all of humanity is over. In the 1970's the world will undergo famines -- hundreds of millions of people are going to starve to death." Ehrlich wrote that "nothing can prevent a substantial increase in the world death rate" and that America's "vast agricultural surpluses are gone."

Six years later, in a book he wrote with his wife, "The End of Affluence," he raised the death toll. The book told of a "nutritional disaster that seems likely to overtake humanity in the 1970's (or, at the latest, the 1980's). Due to a combination of ignorance, greed and callousness, a situation has been created that could lead to a billion or more people starving to death." The book predicted that "before 1985 mankind will enter a genuine age of scarcity" in which "the accessible supplies of many key minerals will be nearing depletion." Shortages would be felt in America as well as the rest of the world. "One general prediction can be made with confidence: the cost of feeding yourself and your family will continue to increase. There may be minor fluctuations in food prices, but the overall trend will be up."

Ehrlich was right about one thing: the world's population did grow. It is now 5.3 billion, 1.8 billion larger than when he published "The Population Bomb." Yet somehow the average person is healthier, wealthier and better fed than in 1968. The predicted rise in the world death rate has yet to materialize - - infant mortality has declined and life expectancy has increased, most dramatically in the third world.

There have been famines in countries afflicted by war, drought and disastrous agricultural policies, but the number of people affected by famines has been declining steadily during the past three decades. In fact, the number is much lower than it was during the same decades of the last century, even though the world's population is much larger. Experts argue about how much hunger remains in the world, but they generally agree that the average person in the third world is better nourished today than in 1968. Food production has increased faster than population since the publication of "The Population Bomb," just as it has since the books of Vogt, Osborn and Malthus.

Perhaps the best way to see what has happened to food prices -- and to get a glimpse of the Malthusian mind-set -- is to consider a graph from Lester R. Brown, another widely quoted doomster. Brown has long been the chief source for Ehrlich and other ecologists on trends in agriculture -- "the best person in the country on the subject" in Ehrlich's words. Brown is the president of the Worldwatch Institute in Washington, which makes news each year with what it calls the world's most widely used public-policy document, its "State of the World" report. This year's report includes a graph, below, of grain prices that is interesting for a couple of reasons: [ GRAPH: "World Wheat and Rice Prices, 1950-89 ] Consider, first of all, how it compares with Brown's predictions of a decade ago. He was pessimistic then for the same reasons that Ehrlich, Vogt and Osborn had been: rising population, vanishing topsoil, the growing dependence on "non-sustainable" uses of irrigation, fertilizer, pesticides. "The period of global food security is over," Brown wrote in 1981. "As the demand for food continues to press against the supply, inevitably real food prices will rise. The question no longer seems to be whether they will rise but how much." But as the graph shows, grain prices promptly fell and reached historic lows during the 1980's, continuing a long-term decline that dates back to the days of Vogt and Osborn (and Malthus, too, if you extended the graph).

Now consider how Brown analyzes this data. In a chapter titled "The Illusion of Progress" in this year's report, he focuses not on the long-term trend but on the blips in the graph in 1988 and 1989 -- when prices rose because of factors like drought and a United States Government program that took farmland out of production. Looking ahead to the 1990's, Brown writes, "The first concrete economic indication of broad-based environmental deterioration now seems likely to be rising grain prices."

We are barely into the 1990's, but so far Brown's poor track record is intact. Grain prices have plummeted since he published his prediction at the start of the year. The blips in the late 1980's caused farmers to do what they always do when prices rise: plant more crops. The price of wheat has fallen by more than 40 percent in the past year, and if you plotted it on that graph, it would be at yet another all-time low. Once again Malthus's day of reckoning will have to be rescheduled. JULIAN SIMON REMEMBERS his first glimpse of Paul Ehrlich as being one of the more frustrating moments of his life. It was during the Earth Day furor two decades ago. Simon was sitting at home in Urbana, Ill., Ehrlich was on "The Tonight Show" and Johnny Carson was enthralled.

"Carson, the most unimpressable of people, had this look of stupefied admiration," Simon recalls.

"He'd throw out a question about population growth and Ehrlich would start out by saying, 'Well, it's really very simple, Johnny.' Now the one thing I knew in those days about population was that nothing about it is simple. But what could I do? Go talk to five people? Here was a guy reaching a vast audience, leading this juggernaut of environmentalist hysteria, and I felt utterly helpless."

At this point, Simon was still in the early stages of Cornucopianism. He had started out as a Malthusian. After studying psychology at Harvard University and receiving a doctorate in business economics from the University of Chicago, he joined the faculty at the University of Illinois in 1963. He was an expert in mail-order marketing -- his book on the topic sold 200,000 copies, more than any he has written since -- and was looking for something else to do when he heard the grim predictions about overpopulation. In the late 1960's he began publishing papers on using marketing tools and economic incentives to persuade women to have fewer babies. But then he came across work by economists showing that countries with rapid population growth were not suffering more than other countries. In fact, many were doing better. He also came across a book, "Scarcity and Growth," published in 1963 with the help of Resources for the Future, a conservation group dominated by economists.

The book was a revelation to him: it provided the empirical foundations of Cornucopianism. The authors, Harold J. Barnett and Chandler Morse, tracked the price of natural resources back to 1870 and found that the price of virtually everything had fallen. The average worker today could buy more coal with an hour's pay than he could when "The Coal Question" was published in the last century, just as he could buy more metals and more food. Things were actually getting less scarce as population grew.

The evidence inspired the boomster view of history, which was then refined by Simon and others, like Charles Maurice and Charles W. Smithson. These economists, then at Texas A & M University, looked back at 10,000 years of resource crises and saw a pattern: things did sometimes become scarce, but people responded with innovations. They found new supplies or practiced conservation. They managed to recycle without the benefit of government policies or moral exhortations from Greenpeace. Stone Age tribes in areas short of flint learned to resharpen their tools instead of discarding them as tribes did in flint-rich areas.

Often the temporary scarcity led to a much better substitute. The Greeks' great transition from the Bronze Age to the Iron Age 3,000 years ago, according to Maurice and Smithson, was inspired by a disruption of trade due to wars in the eastern Mediterranean. The disruption produced a shortage of the tin needed to make bronze, and the Greeks responded to the bronze crisis by starting to use iron. Similarly, timber shortages in 16th-century Britain ushered in the age of coal; the scarcity of whale oil around 1850 led to the first oil well in 1859. Temporary shortages do occur, but Cornucopians argue that as long as government doesn't interfere -- by mandating conservation or setting the sort of price controls that produced America's gas lines of the 1970's -- people will find alternatives that turn out to

be better.

"Natural resources are not finite. Yes, you read correctly," Simon wrote in his 1981 manifesto, "The Ultimate Resource." The title referred to human ingenuity, which Simon believed could go on indefinitely expanding the planet's carrying capacity. This idea marked the crucial difference between Simon and Ehrlich, and between economists and ecologists: the view of the world not as an closed ecosystem but as an flexible marketplace. The concept of carrying capacity might make sense in discussing Ehrlich's butterflies or Vogt's "Gadarene swine," but Simon rejected animal analogies. He liked to quote the 19th-century economist Henry George: "Both the jayhawk and the man eat chickens, but the more jayhawks, the fewer chickens, while the more men, the more chickens."

Of course, men can also produce more pollution than jayhawks, and Simon conceded that the marketplace did need some regulation. But he insisted that environmental crises were being exaggerated. He and another leading boomster, Herman Kahn, edited a book in 1984, "The Resourceful Earth," rebutting the gloomy forecasts of the Government's "Global 2000 Report" prepared under President Carter. Their book was replete with graphs showing that, by most measures, America's air and water had been getting cleaner for decades, thanks partly to greater affluence (richer societies can afford to pay for pollution controls like sewage treatment) and partly to the progress of technology (the pollution from cars today in New York City is nothing compared to the soot from coal-burning furnaces and the solid waste from horses at the turn of the century). Simon asserted that innovations would take care of new forms of pollution, and he set about disputing the various alarming estimates of tropical deforestation, species extinction, eroding topsoil, paved-over farmland and declining fisheries.

"As soon as one predicted disaster doesn't occur, the doomsayers skip to another," Simon complains. "There's nothing wrong with worrying about new problems -- we need problems so we can come up with solutions that leave us better off than if they'd never come up in the first place. But why don't the doomsayers see that, in the aggregate, things are getting better? Why do they always think we're at a turning point -- or at the end of the road? They deny our creative powers for solutions. It's only because we used those powers so well in the past that we can afford to worry about things like losing species and wetlands. Until we got so rich and healthy and productive at agriculture, a wetland was a swamp with malarial mosquitoes that you had to drain so you could have cropland to feed your family."

Simon's fiercest battle has been against Paul Ehrlich's idea that the world has too many people. The two have never debated directly -- Ehrlich has always refused, saying that Simon is a "fringe character" -- but they have lambasted each other in scholarly journal articles with titles like "An Economist in Wonderland" and "Paul Ehrlich Saying It Is So Doesn't Make It So." Simon acknowledges that rising population causes short-term problems, because it means more children to feed and raise. But he maintains that there are long-term benefits when those children become productive, resourceful

adults. He has supported making abortion and family-planning services available to women to give them more freedom, but he has vehemently opposed programs that tell people how many children to have. He attacked Ehrlich for suggesting that governments should consider using coercion to limit family size and for endorsing the startling idea that the United States should consider cutting off food aid to countries that refuse to control population growth.

Among academics, Simon seems to be gaining in the debate. Many scientists are still uncomfortable with his sweeping optimism about the future -- there is no guarantee, after all, that past trends will continue -- and most population experts are not sure that the current rate of population growth in the third world is going to bring the long-term benefits predicted by Simon. But the consensus has been shifting against Ehrlich's idea of population growth as the great evil. Simon's work helped prompt the National Academy of Sciences to prepare a 1986 report, which noted that there was no clear evidence that population growth makes countries poorer. It concluded that slower population growth would probably benefit third world countries, but argued that other factors, like a country's economic structure and political institutions, were much more important to social well-being. The report opposed the notion of using government coercion to control family size. It noted that most experts expected the world food situation to continue improving, and it concluded that, for the foreseeable future, "the scarcity of exhaustible resources is at most a minor constraint on economic growth."

But Simon is still far behind when it comes to winning over the general public. This past Earth Day he did not fare much better than he did in 1970. Ehrlich was still the one all over national television. In the weeks leading up to Earth Day in April, Ehrlich did spots for the "Today" show and appeared on other programs promoting his new book, "The Population Explosion," which declares that "the population bomb has detonated." At the big Earth Day rally in Washington, Ehrlich was one of the many Malthusians warning that this was humanity's last chance to save the planet. It was a scene to make Cornucopians wonder if the ancient Greeks who described Cassandra's curse -- fated to be always right but never heeded -- had gotten it precisely backward. The crowd of more than 200,000 applauded heartily after Ehrlich told them that population growth could produce a world in which their grandchildren would endure food riots in the streets of America.

Ehrlich did not mention Simon by name, although he did refer to him at another event that Earth Day weekend, a symposium of ecologists inside the domed auditorium of the Smithsonian's National Museum of Natural History. The symposium was devoted to the question of natural resources -- "Population and Scarcity: The Forgotten Dimensions" -- and Ehrlich talked about humanity squandering irreplaceable capital. He praised a colleague who had advocated the idea of governments' stopping economic growth by setting quotas on the amount of resources that could be used each year. Ehrlich criticized the shortsightedness of economists, and he got a laugh when he alluded to Simon's book: "The ultimate resource -- the one thing we'll never run out of is imbeciles."

That same day Simon spoke only a block away in a small, low-ceilinged conference room at another

Earth Day symposium. It was sponsored by the Competitive Enterprise Institute, a group that explores free-market solutions to environmental problems. In an intense, quiet voice, Simon declared that the Malthusians "must either turn a blind eye to the scientific evidence or be blatantly dishonest intellectually." He spoke of population growth representing "a victory over death," because it was due to the doubling of life expectancy since the Industrial Revolution. "This is an incredible gain. Human history has never shown any achievement to hold a candle to that. You'd expect lovers of human life to be jumping with joy at this incredible success. Instead, across the street we've got them lamenting that there are so many people alive."

He seemed a little disappointed that there were only 16 people in the audience to celebrate his message. "Well, there may be more of them over there," Simon said, gesturing toward the place where Ehrlich was speaking, "but we're happier." The bet was settled this fall without ceremony. Ehrlich did not even bother to write a letter. He simply mailed Simon a sheet of calculations about metal prices -- along with a check for \$576.07. Simon wrote back a thank-you note, adding that he would be willing to raise the wager to as much as \$20,000, pinned to any other resources and to any other year in the future.

Each of the five metals chosen by Ehrlich's group, when adjusted for inflation since 1980, had declined in price. The drop was so sharp, in fact, that Simon would have come out slightly ahead overall even without the inflation adjustment called for in the bet. Prices fell for the same Cornucopian reasons they had fallen in previous decades -- entrepreneurship and continuing technological improvements. Prospectors found new lodes, such as the nickel mines around the world that ended a Canadian company's near monopoly of the market. Thanks to computers, new machines and new chemical processes, there were more efficient ways to extract and refine the ores for chrome and the other metals.

For many uses, the metals were replaced by cheaper materials, notably plastics, which became less expensive as the price of oil declined (even during this year's crisis in the Persian Gulf, the real cost of oil remained lower than in 1980). Telephone calls went through satellites and fiber-optic lines instead of copper wires. Ceramics replaced tungsten in cutting tools. Cans were made of aluminum instead of tin, and Vogt's fears about America going to war over tin remained unrealized. The most newsworthy event in the 1980's concerning that metal was the collapse of the international tin cartel, which gave up trying to set prices in 1985 when the market became inundated with excess supplies.

Is there a lesson here for the future?

"Absolutely not," said Ehrlich in an interview. Nevertheless, he has no plans to take up Simon's new offer: "The bet doesn't mean anything. Julian Simon is like the guy who jumps off the Empire State Building and says how great things are going so far as he passes the 10th floor. I still think the price of those metals will go up eventually, but that's a minor point. The resource that worries me the most is

the declining capacity of our planet to buffer itself against human impacts. Look at the new problems that have come up: the ozone hole, acid rain, global warming. It's true that we've kept up food production -- I underestimated how badly we'd keep on depleting our topsoil and ground water -- but I have no doubt that sometime in the next century food will be scarce enough that prices are really going to be high even in the United States. If we get climate change and let the ecological systems keep running downhill, we could have a gigantic population crash."

Simon was not surprised to hear about Ehrlich's reaction. "Paul Ehrlich has never been able to learn from past experience," he said, then launched into the Cornucopian line on the greenhouse crisis -- how, even in the unlikely event that doomsayers are right about global warming, humanity will find some way to avert climate change or adapt, and everyone will emerge the better for it. But Simon did not get far into his argument before another cheery thought occurred to him. He stopped and smiled.

"So Ehrlich is talking about a population crash," he said. "That sounds like an even better way to make money. I'll give him heavy odds on that one."

Photos: Ecologist Paul Ehrlich, left, and economist Julian Simon, above, went beyond their war of words and put their money where their mouths were. Simon is surrounded by everyday examples of the metals covered in the bet: a copper coil, two stacks of nickels, a tin can, the tungsten innards of a light bulb and a chrome ball. (Ed Kashi/Dan Borris/Outline for The New York Times); a sheet of calculations and, most important, a check from Ehrlich to Simon. (Dan Borris/Outline for the New York Times) Graphic: "Five Easy Pieces" lists 1980 vs. 1990 price copper, chrome, nickel, tin and tungsten (Source: Metal Week)