

**No PAT Answers:
The Roots and Fruits of Environmentalism**

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Sometime early in the nineteenth century B.C., the Hebrew patriarch Abram and his nephew Lot dwelt as semi-nomadic shepherds in the region of Bethel and Ai in Palestine. "Abram had become very wealthy in livestock and in silver and gold" (Genesis 13:2), and Lot

... also had flocks and herds and tents. But the land could not support them while they stayed together, for their possessions were so great that they were not able to stay together. And quarreling arose between Abram's herdsmen and the herdsmen of Lot. . . .

So Abram said to Lot, "Let's not have any quarreling between you and me, or between your herdsmen and mine, for we are brothers. Is not the whole land before you? Let's part company. If you go to the left, I'll go to the right; if you go to the right, I'll go to the left."

Lot looked up and saw that the whole plain of the Jordan was well watered, like the garden of the LORD, like the land of Egypt, toward Zoar. . . . So Lot chose for himself the whole plain of the Jordan and set out toward the east. The two men parted company: Abram lived in the land of Canaan, while Lot lived among the cities of the plain and pitched his tents near Sodom. [Genesis 13:5-12]

This is the earliest instance recorded in the Bible of the impression that a local human population had outstripped the ability of the land to support it.

Tucked away in this passage is a fascinating lesson for those who will see it: Lot chose for himself what appeared to be the most fertile land. In contrast, Abram, father of the faithful and of many nations (Romans 4:11, 16-17), accepted whatever land God, in His providence, gave him through Lot's choice. Lot's eyes focused on material circumstances, Abram's on the ability of God to bless His servant regardless of circumstances. Lot's decision was driven by his thoughts about the capacity of the land; Abram's by his faith in God.

After Lot had chosen the richer, more fertile land, Yahweh said to Abram, "Lift up your eyes from where you are and look north and south, east and west. All the land that you see I will give to you and your offspring forever. I will make your offspring like the dust of the earth, so that if anyone could count the dust, then your offspring could be counted. Go, walk through the length and breadth of the land, for I am giving it to you" (Genesis 13:14-17).

Now, there is something ironic in this promise. Abram and Lot had separated precisely because they thought the land could not support their households and livestock. From their perspective, the last thing either would consider a blessing would be a new expansion of population. But that is precisely what God promised Abram: "I will make your offspring like the dust of the earth. . . ." Would not the fulfillment of that promise mean repeating the very dilemma that had caused strife between Abram and his nephew in the first place? Yet before long God repeated the promise as a blessing of the covenant, and "Abram believed the LORD, and he credited it to him as righteousness" (Genesis 15:4-6). And then God did indeed multiply Abram's offspring, so much that by the time of the exodus some 400 years later they numbered some 600,000 adult males, plus women and children, i.e., probably between 2 and 5 million.

If I were to point to one thing that most saddens me about the propensity among many today—including many devout and honest Christians—to fear population growth and its impact on resources

and the environment, it would be that in this fear they think more like Lot than like Abram. They focus on the material world rather than on the infinite faithfulness and goodness of God, and their choices—like Lot's—reflect their belief that the present state of the world sets the boundaries of human expectations. In this fear they do not, like Abram, focus on the promises of God and His perfect faithfulness and power to fulfill them. To them I would say with Paul—recognizing that he used the language in a different context—"Set your minds on things above, not on earthly things" (Colossians 3:2).

The Environmentalist Vision of Population Growth

This fear, as we have just seen, has ancient roots, and it has persisted through the millennia. Some 2,100 years after Abram and Lot separated lest they overburden the land of Palestine, the Church Father Tertullian wrote with alarm:

Everything has been visited, everything known, everything exploited. Now pleasant estates obliterate the famous wilderness areas of the past. Plowed fields have replaced forests, domesticated animals have dispersed wild life. Beaches are plowed, mountains smoothed and swamps drained. There are as many cities as, in former years, there were dwellings. Islands do not frighten, nor cliffs deter. Everywhere there are buildings, everywhere people, everywhere communities, everywhere life. . . . Proof [of this crowding] is the density of human beings. We weigh upon the world; *its resources hardly suffice to support us*. As our needs grow larger, so do our protests, that already *nature does not sustain us*. In truth, plague, famine, wars and earthquakes must be regarded as a blessing to civilization, since they prune away the luxuriant growth of the human race.

From our vantage point in history, it seems ludicrous that Tertullian, writing in Carthage around A.D. 200, could have thought his world overpopulated when the whole world's population probably fell short of 500 million—about a tenth of what it is today. But people do say ludicrous things sometimes—like the couple who, unwittingly reflecting Tertullian's complaint that we "weigh upon the world," wrote a letter to the editor of a northwest Arkansas newspaper claiming that human beings are "crushing our planet under the weight of our own population." Consider this for a moment. The roughly 5 billion people in the world have a combined weight of about 375,000,000 tons, or about 1/67 billionth the weight of the earth's crust alone, which weighs about 25 quintillion tons and constitutes only a fraction of the whole earth. To put this into perspective, it's about like saying that something weighing 1/82 billionth of an ounce would crush an adult human being.

Such irrational fears, however, usually arise from more understandable concerns. Tertullian's alarm arose from his conviction that the world's "resources hardly suffice to support us," that "nature does not sustain us." It was not that he looked around him and saw people crammed together like sardines in a can, but that he thought there were insufficient resources in the world to support the people in it—whatever their mathematical/geographical density.

That concern and another closely related to it appear to lie at the root of today's fears about population growth. As Susan Power Bratton points out in *Six Billion & More: Human Population Regulation and Christian Ethics*, environmentalists ". . . agree that if a human population gets too large, it will exceed its environmental carrying capacity." In the words of Laurie Ann Mazur, "At the heart of the environmentalists' perspective on population growth is the concept of 'carrying capacity.' The planet's carrying capacity is, in essence, its ability to sustain life." And the "ability to sustain life," in turn, consists of two components: the ability to **provide the resources** man needs to consume in order to live, and the ability to **absorb the pollution** man generates in his productive activities without the earth's biospheric systems' being overwhelmed. This dual concern is aptly expressed in the subtitle of the book Mazur edited: *Beyond the Numbers: A Reader on Population, Consumption, and the Environment*. It also finds expression in the words of Riane Eisler, a feminist environmentalist:

The population crisis . . . lies at the heart of the seemingly insoluble complex of problems futurists call the *world problematique*. For behind soil erosion, desertification, air and water pollution, and all the other ecological, social, and political stresses of our time lies the pressure of more and more people on finite land and other resources, of increasing numbers of factories, cars, trucks, and other sources of pollution required to provide all these people with goods, and the worsening tensions that their needs and aspirations fuel.

In short, the two principal concerns of those who fear continued population growth are (1) that in their effort to meet their needs and wants people are using up the earth's resources, and (2) that in the process they are polluting the earth to such an extent that its ability to continue to sustain life, or at least the abundant variety of life that it presently sustains, is catastrophically, perhaps irreversibly, threatened. The vision of mankind that underlies these two concerns is of two parts also: mankind is principally a consumer and a polluter.

This vision has been given technical, formulaic statement in Paul Ehrlich's famous equation, $I = PAT$. (**Overhead: $I = PAT$**) Here I represents environmental impact, P population, A affluence, and T technology. It is essential from the start that we understand that when environmentalists like Ehrlich talk about environmental impact, they mean *destruction*. As Barry Commoner put it in the third of his "Four Laws of Ecology," "Any major man-made change in a natural system is likely to be *detrimental* to that system." From my reading of dozens of environmentalists' books and hundreds of their articles, I can testify that this assumption is universal among them. They find it almost impossible to imagine that human action could ever improve the natural environment—unless it is to undo, in part, damage already done. Ehrlich's formula tells us that negative impact varies directly with population (P), affluence (A), and technology (T). Thus, any increase in population, affluence, or technology must cause an increase in negative environmental impact—and of course increases in two or all three of those variables must multiply environmental degradation. This vision explains the significance of Paul and Anne Ehrlich's 1990 book, *The Population Explosion: From Global Warming to Rain Forest Destruction, Famine, and Air and Water Pollution—Why Overpopulation is Our #1 Environmental Problem*.

I believe the Bible gives us a very different vision of mankind, that on the grounds of that Biblical vision we ought to take a very different attitude toward population growth from that common among environmentalists, and that sound science and economics—both theoretical and empirical—confirm the Biblical vision and the attitude suggested by it. Let us begin with some empirical tests of Ehrlich's formula. Recall that growing human population, affluence, and technology are feared for two reasons: because they deplete resources and increase pollution.

Are We Running Out of Resources?

First, then, let us investigate whether we are running out of resources. The claim that we are is common, but is it true? There are three ways of testing this hypothesis. While the results of all three point in the same direction—and not the direction anticipated by Ehrlich's formula—the first suffers serious logical weaknesses and may be misleading in important ways and the second is only marginally better. The third, I shall argue, is the most reliable and least misleading.

The first way may seem the most obvious and sensible: inventory total resources and divide the inventories by annual use to arrive at years remaining until we run out. It is of course difficult to make the inventories, but not impossible—so long as we are satisfied with gross approximations rather than precise counts. Estimating annual consumption is a little easier because records of sales exist. Rough estimates of the total amounts of our ten most commonly used metals in the top 4 percent of the earth's crust have been made and compared with worldwide annual consumption in 1986, and as you can see here (**Overhead: Millions of years to complete depletion. . .**) the results are fairly reassuring. In the worst instance—copper—we might expect depletion in a little over eight hundred thousand years; in the best instance—gold—in a little over two billion years.

But as I said, this method may mislead. On the one hand, it may exaggerate apparent time to depletion by assuming that all of a given metal in the earth's crust may be extracted and refined

profitably and that annual consumption does not rise. On the other hand, it may understate time to depletion by neglecting that substitution and economization may reduce or even eliminate consumption.

Adjusting for these flaws is possible but not very satisfactory. It leads to the second method of testing whether we are running out of resources: dividing proven reserves by actual past and anticipated future annual consumption. Since exploration continues and consequently new proven reserves must be taken into account, this method, to be of real service, must look at changes in this ratio of proven reserves to consumption over a period of time if it is to tell us whether resources are becoming more or less scarce. Thus, for example (**Overhead: Proven petroleum reserves, decadal cumulative production. . .**), if we compare proven world reserves of petroleum with the previous decade's consumption from 1943 to 1989 (excluding the USA), we find three things: first, that proven reserves grew by 4,800 percent; second, that decadal consumption grew by 1,975 percent (if we annualize consumption over the last six years and multiply it by ten to calculate decadal consumption); and that the number of years for which proven reserves might be expected to last grew by 195 percent. If we were simply running out of oil, we should instead have expected both proven reserves and years to depletion to diminish. Again (**Overhead: Percent change in proven reserves of various minerals, 1950-1990**), if we look at changes in proven reserves of eleven commonly used minerals from 1950 to 1990, we find that reserves were greater after forty years of consumption than before in all cases but one. (And I would venture to guess that tin reserves shrank essentially not because we're bumping up against absolute limits of tin but because, with demand for tin falling as many of its uses are taken over by substitutes like plastic and aluminum, there simply has been little incentive for exploration.)

Although, like the first method of estimating whether we are running out of resources, this second method certainly points in the opposite direction from environmentalism's predictions, nonetheless it, too, is flawed and may mislead because it cannot be made to account well for changes in demand driven by substitution and economization. We simply do not continue either using the same resources or using them with the same efficiencies over time. Consider two illustrations. First, a century ago, because of differences in mining and refining technologies, copper ore had to be ten times as pure as it needs to be today for profitable refining; the difference makes thousands of times as much copper ore profitably recoverable. Furthermore, copper once was the primary component in telephone cables; today the primary component is glass, made from silicon in sand, and a single optic fiber can carry thousands of messages simultaneously while a copper wire could carry only about sixteen. Consequently we need far less copper for communications than we once did. Second, in the mid-nineteenth century, people consumed a great deal of whale oil as fuel for lamps. Some made dire predictions that the world would run out of whales and whale oil, and it would be only a few decades before the lights went out. But then Thomas Edison got to work, and the predictions fell flat. We stopped hunting whales to get light and started damming rivers and drilling holes and building wind turbines and splitting atoms and putting up solar panels instead. Each of these changes upset the apple cart of predictions about the depletion of some resource used to obtain light. What is needed is a more reliable way of estimating whether we are running out of resources and, if so, how fast.

Such a method exists. The third way is to apply one of the fundamental principles of economics to resource supply questions. (**Overhead: The Law of Supply. . .**) The law of supply tells us that as the supply of a good rises relative to demand, its price falls; as supply falls relative to demand, price rises. Consequently, *rising prices* are evidence of *falling supplies*, while *falling prices* are evidence of *rising supplies* relative to demand. Therefore, if we are *running out* of resources, resource *prices must be rising*. But if resources are *becoming more abundant*, resource *prices must be falling*. To put things the other way around: rising prices mean diminishing resources; falling prices mean increasing resources. Price is the best measure we have of scarcity—which, we must carefully note, is a relative, not an absolute, measure. It measures not the absolute amount of something, which may be irrelevant for all practical purposes, but the supply of something relative to the demand for it, which is what we really need to know.

The best indicator of whether we are running out of resources, then, is long-term price trends.

And here the implications of the data are strong and overwhelmingly contrary to environmentalists' expectations. Consider just a couple of illustrative examples—and these are truly representative. (For many others, see the data in *The State of Humanity*, edited by Julian L. Simon.) We extract two basic kinds of resources from the earth: agricultural and mineral. The long-term price trend for agricultural resources is strongly downward. **(Overhead: Wheat prices indexed by consumer price index . . . and by wages. . . .)** Our example is wheat, for which the inflation-adjusted price fell in the United States over approximately the last two centuries by about two-thirds. More important, the price divided by wages—which is an inverse measure of affordability—fell by about 99 percent, meaning that wheat was nearly a hundred times more affordable in 1990 than in 1800. What is really of practical importance is not how much of something is "out there" somewhere but how much of it we can afford in meeting our needs. Such price trends answer that question clearly: we can afford far more food now than we could two centuries ago. Likewise, the long-term price trend of mineral resources is strongly downward. **(Overhead: Copper price indexes. . . .)** Here our example is copper. Its inflation-adjusted price fell by about two-thirds in two centuries, and its price divided by wages fell by about 90 percent. Notice, too, that with both wheat and copper sometimes severe short-term increases in prices—for example, for wheat around the Civil War and the two World Wars—were offset many times over by the long-term downward trends. This illustrates how important it is, in thinking of such things, to observe long-term rather than short-term trends, lest the latter mislead us.

What we learn from long-term price trends, then, is that there really is only one resource that is becoming more scarce, not less, over time. That is people. The long-term trend in the price of labor is upward—which is why resource prices fell so much more sharply when indexed by wages than when indexed by inflation. That means, surprisingly when compared with the environmentalists' intuitions, that far from having a growing supply of people and a shrinking supply of other resources, we have a shrinking supply of people and a growing supply of other resources. The explanation for this surprising fact lies in our understanding of the nature of man, to which we shall turn later.

If Ehrlich's formula, $I = PAT$, were true regarding resource depletion as an environmental impact, we should have seen dwindling reserves and rising prices of resources. Instead we have seen the opposite.

Are We Polluting Ourselves to Death?

Frankly, the basic thrust of what I have just argued about resource supplies is increasingly admitted now even by well-informed environmentalists. But they remain convinced that growing population, affluence, and technology still spell the doom of the planet because, in producing and using all those resources, we are polluting the planet to death. Is that true? The answer is an unequivocal *No*, qualified by a nuanced and temporary *Yes*, leading to a final *No*. Let me explain.

Over the long term, in advanced economies, pollution is falling, not rising. For example **(Overhead: Index of national ambient air pollutant concentrations. . . .)**—and this truly is representative of trends in other advanced countries—in the United States from 1976 through 1994 the ambient concentrations of the five most significant air pollutants fell significantly—by 97 percent for lead (the most dangerous) and by 27 percent for ozone. The picture is similar for water pollution **(Overhead: Estimated phosphorous loadings. . . .)**, as illustrated by trends in phosphorous and DDT levels in the Great Lakes.

If Ehrlich's formula were correct—if environmental degradation were directly correlated with population, affluence, and technology, we should expect roughly parallel trend lines between pollution on the one hand and population, affluence, and technology—taken separately and together—on the other hand. However, that is not what we find in advanced countries like the United States. Instead **(Overhead: Inverse correlation of population and U.S. air pollution. . . .)**, while population grew by 19 percent from 1976-1994, the index of air pollution fell by 53 percent. During the same time, **(Overhead: Inverse correlation of GNP per capita and U.S. air pollution. . . .)**, affluence, measured by GNP per capita in constant dollars, tripled, and **(Overhead: Inverse correlation of technology and U.S. air pollution. . . .)** technology—measured very roughly as sales of home

computers during only the last nine years of the period—more quadrupled. If we prepare a combined index (**Overhead: Inverse correlation of population, affluence, and technology with air pollution. . . .**) for population, affluence, and technology, we find that it rises by 156 percent during the very time that pollution falls by 53 percent. This is precisely the opposite of what Ehrlich's formula would predict.

However, pollution does tend to rise during early stages of economic development. Consequently, less-developed countries today are experiencing similar increases in pollution to those experienced by the more advanced countries fifty, one hundred, and two hundred years ago. But the pollution histories of the more-developed countries are a pointer to where the less-developed countries are headed. (**Overhead: Pollution emission transitions. . . .**) Like the now advanced countries before them, the less-developed economies are going through what some environmental economists call the *pollution transition*, a period in which pollution first rises with industrialization and then falls with increasing affluence and the adoption of cleaner, more efficient production technologies. That the less-developed countries started into the pollution transition later makes their *present situation* look bleak by comparison with the *present situation* of the advanced economies, but it actually bodes well for them, for it is almost certain that they will go through the transition more rapidly than the more advanced countries did, since they can import pollution abatement technologies at much lower cost than the more advanced countries incurred in pioneering them.

This should be no surprise. A clean environment, like other costly goods, becomes increasingly affordable as people become wealthier. Thus, for example (**Overhead: Correlation of income to access to safe drinking water, low-income countries**), there is a strong correlation between affluence and access to safe drinking water. In low-income countries, while GNP per capita rose by 185 percent from 1970 to 1991, access to safe drinking water rose by 88 percent. As economic development continues, such very basic needs as safe drinking water become, for all practical purposes, universally met, as we see (**Overhead: Correlation of income to access to safe drinking water, high-income countries**) in looking at the data for high-income countries. Similarly, environmental economist Indur Goklany has shown (**Overhead: Affluence and the Environment**) that as per capita income rises, various measures of environmental quality improve, though.

As people become increasingly confident that such basic needs as safe drinking water, adequate food, clothing, and shelter, plus such added goods as education, health care, transportation, and communication will be met, and as their growing affluence provides them surplus income to spend on other things, they begin spending more on pollution abatement. Let's face it, you can live a long time breathing smog, but only a few days without water or a few weeks without food. Until people's income rises enough to make them confident of the latter, they are likely to spend little to combat the former.

What can we conclude, then, from a careful analysis of historical statistics and the application of some economic insights? That the environmentalist vision of population's impact on the environment is almost precisely opposite from the truth. Ehrlich's famous formula, $I = PAT$, is demonstrably false.

Thus, ironically, economic and technological growth, contrary to the expectations of environmentalists, are not threats to environmental quality but the means of securing it. Environmentalists' opposition to economic growth is actually self-defeating.

Why Environmentalism Got It Backward

How can environmentalists have gotten things so nearly backward? Several factors contribute to their confusion. First, they have tended to look at short-term rather than long-term trends. Second, they have neglected insights from economics regarding human incentives and the meaning of scarcity. Third, some of them, having observed the simultaneity of high population growth and great poverty in Third World countries like India and China in the 1950s and 1960s and sub-Saharan Africa in the 1970s and 1980s, have mistakenly thought the population growth caused the poverty when in reality it was both an effect of very early economic growth, which caused declining death rates through better nutrition, sanitation, and health care, and a cause of additional economic growth spurred by increased consumer demand and the improvements in productivity made possible by a larger labor

pool. Had these same people observed Europe and North America in the late eighteenth and early nineteenth centuries, they might have predicted for them the same great disasters—famine and plague—they have predicted over and over again for today's developing world. They would have been wrong two centuries ago, just as they have been wrong again and again in the last several decades.

Each of these mistakes is worth considerable discussion in itself. But I would like to focus on a fourth because I think it is most fundamental. It is the root of environmentalist thought, and its fruit has been not only intellectual confusion but also counterproductive policy that slows environmental improvement and causes untold suffering and premature death for people trapped in prolonged poverty. It is that environmentalists like Ehrlich have a fundamentally anti-Biblical view of human beings.

Consider for a moment the low view of people evident in much environmentalist language. People are the "population bomb." And what do bombs do? They explode, of course. So we are the "population explosion." Or we are "people pollution," a "cancer" or a "plague" on the earth. All of these images are destructive. And as we have seen, they are quite inconsistent with the empirical picture we get from looking at people's actual long-term impact on the environment.

But there is a very different way of understanding people, a way offered by Biblical Christianity, a way that is much more consistent with the long-term empirical picture. We first encounter it in the first chapter of Genesis, where we read, "God said, 'Let us make man in Our image, according to Our likeness; let them have dominion over the fish of the sea, over the birds of the air, and over the cattle, over all the earth and over every creeping thing that creeps on the earth.' So God created man in His [own] image; in the image of God He created him; male and female He created them. Then God blessed them, and God said to them, 'Be fruitful and multiply; fill the earth and subdue it; have dominion over the fish of the sea, over the birds of the air, and over every living thing that moves on the earth'" (Genesis 1:26-28).

What would a novice reader think was meant by the image of God here, if he were to attend carefully to the immediate context? What would he already know about God that would help him to understand the meaning of the phrase "in Our image"? He would know what he had read in Genesis 1:1-25. "In the beginning God *created* the heavens and the earth." The image of God in man at the very least includes tremendous creativity. And that is the first great distinction between the environmentalist and Biblical views of man and his relationship to the world. Environmentalism—in non-Christian circles at least, but all too often even among evangelicals—starts off on the wrong foot, denigrating mankind, denying the *imago Dei*. It sees man chiefly as consumer, not producer. And because it does, it concludes that he is exhausting the resources of the earth.

Scripture has a different vision. It does not say, "Then God *cursed* them and said to them, 'Be fruitful and increase in number,'" but "Then God *blessed* them and said to them, 'Be fruitful and increase in number; fill the earth . . .'" (Genesis 1:28). The human race is not the population explosion but the population blossom; not the population boom but the population bloom; not people pollution but the people solution; not cancer but an answer.

This different vision begets a different prediction: that people, because God made them in His image to be creative and productive, because He gave them *creative minds* like His, can bring order out of chaos, and higher order out of lower order, actually *making* more resources than we consume. So the Biblical view of man and the universe predicts that, as we apply our minds to raw materials, *scarcity of resources will decline*—in other words, the supply of resources will *increase* relative to the demand for them, causing *falling* labor-capital costs of resource production and *falling* inflation-adjusted resource prices. And that, as we have just seen, is precisely what we find when we look at history.

But I risk running ahead of myself. Let us back up a little and consider more carefully what we have in mind by the *imago Dei* in mankind and, related to that, God's design for mankind on the earth. Scripture indicates three principal elements in the image of God in man. In Ephesians 4:24, Paul tells believers to "put on the new self, created to be like God in true righteousness and holiness." There is, then, a moral element to the image of God. In Colossians 3:10, Paul writes of this "new self" as

"being renewed in knowledge in the image of its Creator." So rationality is another element of the image of God in man. And the context of Genesis 1:26 implies that creativity is a third element of the *imago Dei*.

These three characteristics—holiness, knowledge, and creativity—ought all to be employed by man in fulfilling the vocation God gave us: to rule over the earth (Genesis 1:26). For while "The earth is the LORD's, and everything in it, . . . for he founded it . . . and established it . . ." (Psalm 24:1-2), God has entrusted the rule of the earth to mankind, for "The highest heavens belong to the LORD, but the earth he has given to man" (Psalm 115:16).

Man and woman, therefore—God's image bearers—were initially called to labor wisely, righteously, and creatively in loving fellowship to subdue and rule the earth, to cultivate and guard the garden God initially planted, and to spread that garden, at first confined to a single location, over all the globe. But Scripture tells us that, rather than acting as a responsible, accountable steward, mankind rebelled against God's rule, hoping thereby to become supreme himself, "like God, knowing [i.e., defining] good and evil" (Genesis 3:1-7). Every aspect of the image of God in man was corrupted by the fall. What had been a sound mind became unsound and darkened by falsehood (Romans 1:21). What had been a clear conscience, untainted by sin, became fouled with guilt and fear (Titus 1:15). He who had been alive in righteousness and holiness became "dead in trespasses and sins" (Ephesians 2:1). His once fertile and creative brilliance collapsed into "fruitless deeds of darkness" (Ephesians 5:11).

The consequences were disastrous for people, other living creatures, and the earth itself. The corruption of our knowledge, holiness, and creativity affected not only our own inward nature but also our dominion, cultivation, and guarding of the garden and, ultimately, our stewardship of the whole earth. We were cast out of the garden and barred from returning to it in our fallen condition. Since we refused to submit to God, we were no longer worthy of the earth's unreserved submission; hence God said, "Because you have . . . eaten from the tree about which I commanded you saying, 'You shall not eat from it'; *cursed is the ground* because of you; in toil you shall eat of it all the days of your life. Both thorns and thistles it shall grow for you; and you shall eat the plants of the field; by the sweat of your face you shall eat bread, till you return to the ground, because from it you were taken; for you are dust, and to dust you shall return" (Genesis 3:17-19).

Because of the fall, with the breaking of fellowship with God (Genesis 3:24), human fellowship was broken (Genesis 3:7), with strife beginning between husband and wife (Genesis 3:16) and continuing between brother and brother (Genesis 4:1-8). Human fertility (Genesis 3:16) and creativity and dominion (Genesis 3:17-19) all were frustrated. By His curse on the ground (Genesis 3:17), God subjected the creation to futility (Romans 8:20), so that "the whole creation has been groaning as in the pains of childbirth right up to the present time" (Romans 8:22).

Man's wickedness increased through the generations following Adam and Eve, until at last "every inclination of the thoughts of his heart was only evil all the time," and "The LORD was grieved that he had made man on the earth, and his heart was filled with pain. So the LORD said, 'I will wipe mankind, whom I have created, from the face of the earth—men and animals, and creatures that move along the ground, and birds of the air—for I am grieved that I have made them'" (Genesis 6:5-7). But there "was a righteous man, blameless among the people of his time, and he walked with God" (Genesis 6:9). Through Noah, God saved the human race and all the rest of life on earth.

What happened through Noah was but a foretaste, a mere glimmer, of what God would later achieve through His Son. In His life, He exercised a wise (Colossians 2:3), righteous (1 John 2:2), and life-giving (1 Corinthians 15:45) dominion over the earth itself (calming a storm, Mark 4:37-39), over plant and animal life (multiplying loaves and fishes, Matthew 14:13-21), and over human life (healing the sick, Mark 5:25-34; raising the dead, Mark 5:21-24, 35-43). "While we were still sinners, Christ died for us" (Romans 5:8), and by His death saved us from God's wrath, reconciled us to God, gave us the gift of righteousness (Romans 5:9-11), and restored us to life (Romans 5:19, 21), so that now those who are His are being restored in knowledge (Ephesians 4:24), righteousness, and holiness (Colossians 3:10). Having died for us, He rose again from the dead, so that for all who have died with Him, "just as Christ was raised from the dead through the glory of the Father, we too may live a new

life" (Romans 6:4), set free from slavery to sin and made again the servants of righteousness and of God Himself (Romans 6:5-22). Having risen from the dead, Christ now sits at God's right hand, from whence "he must reign until he has put all his enemies under his feet," including death, "the last enemy" (1 Corinthians 15:25-26). "Then the end will come, when he hands over the kingdom to God the Father after he has destroyed all dominion, authority, and power" (1 Corinthians 15:24).

The effects of the atoning death, victorious resurrection, and triumphant ascension of Christ, then, sweep over all of creation, including human beings, animals, plants, and even the ground itself. They include the restoration of the image of God in the redeemed and through them—and derivatively even through many who are not redeemed—the restoration of knowledge, holiness, and creativity in working out the cultural mandate, including human multiplication, subduing and ruling the earth, transforming the wilderness by cultivation into a garden, and guarding that garden against harm.

As the evangelical authors of *Earthkeeping in the Nineties* put it, "redeemed men and women are to be 'fellow heirs' with Christ—Christ, the sustaining *logos* of the world, in whom all things consist. The idea that humanity—redeemed humanity—is to share in that 'creatorly' task is clearly the implication of Romans 8:19. . . ." Because of what Christ has accomplished, "The creation waits in eager expectation for the sons of God to be revealed. For the creation was subjected to frustration, not by its own choice, but by the will of the one who subjected it in hope that the creation itself will be liberated from its bondage to decay and brought into the glorious freedom of the children of God" (Romans 8:19-21).

Such, then, is a Biblical vision of man, made in the image of God, fallen into sin and death, and now, in and by the last Adam, being restored to righteousness and life. This creature, "a little lower than God," "crowned with glory and honor," is what we have in mind when we talk about population growth and its effect on resources and the environment. While environmentalists fear that human population growth will strip the earth of its resources and strangle it with pollution, Biblical Christians—particularly those who are aware of the continuing growth of Christian faith around the world, with the positive transformation of culture that it can bring—can have confidence that, by the grace of God through the death, resurrection, and ascension of Christ and His present reign over all things, continued population growth will result not in the depletion but in the increased abundance of resources, and not in increased pollution of the earth but in its increased cleansing and transformation from wilderness to garden, "from its bondage to decay . . . into the glorious freedom of the children of God" (Romans 8:21).

Instead of viewing people as fundamentally consumers and polluters, as environmentalists do, Christians should view them as fundamentally producers and restorers. Thus Christians, in contrast with pagan environmentalists, have a firm worldview basis on which to predict and explain the empirical trends discussed earlier.