earth witness
for all living beings

Creation Encountered

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Adapted from a 1989 address
to the Coalition
for Appalachian Ministry

Introduction

Different times do call for different messages.

At the time this essay was originally composed, as an address to a "mainline" (liberal) Christian gathering, environmental issues were poorly understood in the churches, and even more poorly prioritized. And the idea of a specifically religious environmentalism was still new and hard for most people to make sense of.

So I focused the first half of this address on an exploration of one of the very biggest — and least well understood — issues, with an emphasis on stories of how it had manifested in the lives of people very like ourselves, at earlier times in our civilization's history.

And in the second half of the address, I concentrated on offering a good, solid basis for a passionate *Christian* environmentalism.

Today, I think it would be tough to give this sort of talk to a similar audience. For there is now a substantial minority in the churches that has heard all it can stand of the environmental plight of our world, and that already sees the good sense of a committed religious environmentalism.

Those good folks would get impatient if I spent a whole hour telling them what they already knew! What they want is workable solutions and empowerment.

For them, I am now giving speeches and essays that are more oriented toward the parts of the solution that, really, only our faith communities can provide.

But things were different then in other ways, too. Ozone layer depletion was still a major issue, because China and India were resisting pleas that they reduce their CFC emissions. Lynn White, Jr.'s argument that Judæo-Christianity is inherently anti-nature was still a hot topic in the theological world.

I addressed both ozone depletion and the Lynn White brouhaha in my original speech. In this revised 2006 edition, I have deleted nearly all of what I said about ozone layer depletion, as being outdated. But I've kept the material touching on White's thesis, because it takes a tack that I still, today, have never seen anyone else take, and I think some readers might find it illuminating.

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The main environmental issue I focused on in this speech — humanity's desertization of its farm and pasture lands — was *not* a hot topic back then, and if anything, is even less of one today. But it still, today, is one of the most important concerns in the whole environmental arena: it took down whole civilizations in the past, and it poses a real threat to ours. And it's not being well addressed by our society, nor even widely talked about. It definitely needs the sort of publicity I've tried to give it here!

And likewise, the basic theological insights presented in these pages remain as pertinent today as ever. They speak to questions that Christian seekers still want answered — and will always want answered, as long as there is Christianity at all.

Republishing this material on the Web is a gamble. But if doing so will put this information in the hands of people who can put it to good use, I'll be very glad. (Whoever you may be who is reading this now, I thank you for giving it a chance!)

Finally, I simply could not let this opportunity go by without saying what an enormous debt I owe to Betty Morton, of Hazard, Kentucky, who persuaded the Coalition for Appalachian Ministry (CAM) to invite me to give this talk. I am likewise indebted to Dick Hettrick at CAM, and the able team he led, for the wonderful job they did of planning the program where this talk was given. Without them, this essay — one of the best I've ever written — would never have been composed.

— Marshall Massey
Omaha, September 2006

Creation Encountered

Creation enslaved; Creation freed:

Our theme[1] invokes Exodus — but when our conference planners selected it, instead of referencing Exodus, they quoted Paul's Epistle to the Romans:

> *It is not a spirit of slavery [we] have received ... but a Spirit that makes us God's children....*[2]

This, I think, was an interesting decision on their part. For listen to the way this passage from Romans continues:

> *...The Creation waits in eagerness for the children of God to appear. For Creation has suffered subjection to human vanity ... [but] one day it too shall be freed from bondage to the forces of destruction, and enter into freedom with the children of God.*[3]

We've been told the environmental crisis is a matter of technical difficulties with technical solutions. Everything we've heard — from the media, politicians, citizen groups, corporate giants — portrays it as a secular matter.

But in this passage, Paul identifies environmental degradation as a symptom of a spiritual problem: vanity, *mataiotes* in Greek, a word signifying activities that are pointless.

And it fits, does it not?[4]

At the least, we can hear in this term a clear Christian imperative. It gives us a way of saying environmental degradation is wrong.

But beyond that, what do we make of this concept? Is it merely a theological angle, a way for the Church to butt into the debate? Or is it a clue to something of critical importance — something we have overlooked?

In this address, I'm going to plead the case for the latter. And I want to do this appropriately.

So, in light of our invocation of Exodus, let us begin at the hour when the Israelites arrived at the edge of Canaan, ready to it seize it for themselves and their God.

Perhaps you recall the passage in Deuteronomy where the Israelites learn of the land they're coming to:

> *For the LORD ... is bringing you into a good land, a land of brooks of water ... fountains and springs, flowing forth in valleys and hills, a land of wheat and barley, of vines and fig trees and pomegranates ... olive trees and honey, a land in which you will eat bread without scarcity, in which you will lack nothing....*[5]

Now, if you've seen the Holy Land, I suspect your own impression of the place is very different. Palestine today is a barren land — some portions of which have been made to bloom by the determined application of high-tech.[6]

Yet the Biblical description was accurate in its time. It really was "a land of milk and honey".[7] The fact is confirmed by other testimony. Here's Josephus, writing in the first century A.D.:

> *The Galilees are excellent for crops or cattle ... rich in forests.... Every inch is cultivated .... thanks to the natural abundance, the villages [are] innumerable ... [and] populous....*
>
> *Samaria and Judæa ... have trees in abundance, both wild and cultivated, rich in fruit ... the soil is nowhere barren ... the rain is generally ample. ...Lush grass is so plentiful that the milk-yield of their cows is exceptionally heavy. The final proof of their productivity is the swarming population....*[8]

What happened? It's not that the rains have ceased. Israel's coast and mountains get more rain than San Francisco's. But we can see with our own eyes that, compared to the San Francisco area, this land is desolated. The Biblical brooks and fountains and springs are mostly gone. The trees are anything but "abundant".

Unfortunately, the natives of Palestine failed to record what happened to their land. To explain the change, we need to look to the history of other nearby lands.

"Where the foliage is meager...."

Greece is such a land. Both ancient historians and modern paleobotany confirm that it, too, was once wooded and lush. But archæology shows that when humans came, they cleared the woods, their herds cropped the grasses, and the soil was laid bare. Then the rains washed the soil off to sea.

Plato himself worked this out, in a brilliant bit of sleuthing, and recorded his conclusions:

> *...What now remains ... is like a sick man's skeleton, all the fat and soft earth having wasted away, and only the bare frame of the land being left.*
>
> *[Formerly, Greece's] mountains ... had great forests ... there are mountains which now produce only food for bees ... that had trees not long ago, and the rafter-trees taken from them to roof the largest buildings are still sound.*
>
> *...The rains ... were not lost, as now, by running off the bare land to the sea; but the soil was deep, and stored the water up in retentive loam; and ... this water ... was the source of abundant springs and flowing streams in all districts.*
>
> *...The now abandoned shrines, at spots where fountains formerly existed, bear witness to the truth of this account...*[9]

Imagine it as a peeling of layers: trees; grasses; soil. At length you're down to sand and rock — and you have a desert.[10]

North Africa is a similar case. In Biblical times it was a major grain-growing region, exporting thousands of tons each year. An Arab historian recorded that:

> *...The whole country from Tripoli to Tangiers was nothing but one shaded grove, one continuous series of villages.*

That fertility supported 235 Roman cities and towns, and 250 bishoprics.[11] But North Africa's topography was more level than Greece's, more

heavily farmed, closer to the Sahara winds. So it was more vulnerable.

The farmers' plows and herds exposed the soil; the wind and rain stripped the soil away; the land died; the farmers went away. By 700 A.D., most of North Africa's cities lay in ruins.

Some of those cities, in an eerie parallel to Oklahoma, were buried by dust blown from the ruined fields. Thamugadi, Algeria, is an example. When archæologists began exploring its remains, only three columns and an arch still showed above the drifted dust.[12]

Other cities died in other ways. Above Utica, a great seaport on the Tunisian coast, the rains washed the soil into the river that ran into the city. Utica's streets were buried under thirty feet of silt.[13]

The dead, eroded hills where once the farmers plowed; the dust and silt covering the cities — like Plato's rafters and shrines, these are the smoking gun, physical proof that this land was destroyed by human acts.[14]

North across the Mediterranean, in the third century B.C., Theophrastus described Rome as a rich, fertile land:

> *The plains ... bear laurel, myrtle and remarkable beech trees. Trunks are found that singly suffice for the keel beams of great ... ships. Fir and pine grow on the hills. The Circæan promontory is thickly overgrown with oak, laurel and myrtle....*[15]

Two centuries later, Varro described the same region as a desolation,

> *...Where the foliage is meager, the vines look starved ... the scant straw never stools, nor the fig tree blooms, and trees and parched meadows are largely covered with moss.*[16]

In the first years of the Roman republic, the soil was so fertile that seven jugera — just four and one-half acres — were ample to support a farming family.[17] This was the size of the allotments after the expulsion of the Tarquins, and the allotments in Manius Curius' colonies. Curius declared:

> *The man must be regarded as a dangerous citizen for whom seven jugera of land are not enough.*[18]

Yet as the Romans and their subjects exhausted their soils, the minimum farm size had to grow. Three centuries after Curius, we find Tiberius Gracchus proposing that homeless soldiers be given allotments of not seven but thirty jugera each. A century later even thirty weren't enough; Julius Caesar granted allotments of sixty-six jugera and a third.[19]

Another hundred years, to the time of the Book of Acts, and Columella tells us the farmers were harvesting only two or three bushels of grain per bushel of seed.[20] Such yields were economic suicide; so the land was demoted to pasturage[21] — or to crops such as grapes and olives, whose roots can draw nutrients from far below a ruined surface.

But under such uses, land can't support as many people. Here too, the farmers began abandoning their land.

In fact, whole provinces emptied out.[22] The historian Livy — who knew little of farming — fell to wondering, about this time, how provinces that were now almost totally deserted could in former days have sent forth legion after legion of warriors. Odd, said he, but it seems these districts may have once been thickly settled![23]

On the Borders of the Map

Judæa (Palestine) lies on the extreme eastern edge of the lands that suffered Mediterranean-style degradation in ancient times. Agriculturally it is closer to Greece, North Africa, Italy, and southeast Spain than to such physical neighbors as Egypt and Jordan. And this fact played a part in shaping history.

Egypt was the one region in the ancient world that did *not* agriculturally degrade. Its soils were abused as badly as its neighbors', but the Nile floods replaced what was lost. In time, as other soils declined, this made Egypt the bread basket of the Mediterranean. Even mighty Rome became dependent on Egypt's bounty, as Tacitus tells us:

> *...[Caesar] Augustus established ... a policy that Egypt should be considered forbidden ground, which neither the senators nor the knights ... [could] tread on without the express permission of the prince. This was ... a wise precaution. It was seen that whoever made himself master of Alexandria, with the strongholds which by sea and land were the keys to the province, might with a small force ... block up the grain country [and] reduce all Italy to famine.*[a]

Had Judæa been like Egypt, it would have been equally precious to Rome, and the Romans would have held it with equal determination. Christ might not have encountered Pilate, for the Romans would have governed Judæa with their best. Indeed, Christ's trial might have been judged by the Emperor.

Southeast of Judæa, in central and southern Jordan and the lands around the Gulf of Aqaba, we find a very different world. In Christ's time this was Nabatæa, a highly civilized state. It flourished for more than five centuries as a regional power; and its capital, Petra, was a famous trading center.

This is a very dry, steep land; to live in it, the Nabatæans built an elaborate land and water conservation system. Their dams, cisterns and canals made use of every drop of rain; their farmers terraced virtually every hillside.

In the end, though, it was terracing that caused Nabatæa's ruin. In the centuries after Roman conquest, the terrace walls were allowed to collapse, permitting the soils — which terracing destabilized — to erode down to bedrock. What remained was not enough to feed a civilization.

Today Nabatæa has a single spot of prosperity: the Israeli port of Elath, which derives its income from trade. The rest is desolate; its inhabitants scrabble for their living.[b]

Highly conservation-oriented cultures tend to be tightly structured socially as well (e.g., China, Java, Inca Peru, medieval Europe). A Nabatæan Judæa would have had a different sort of peasantry, and might have prompted Christ to preach a different social witness.

Notes:

a. Tacitus, ***Annales***, ii, 59.

b. J. H. Stallings, ***Soil Conservation*** (Prentice-Hall, 1957) p. 5; John L. McKenzie, ***Dictionary of the Bible*** (Bruce, 1965), p. 601.

Of milk and honey

Well, I think you get the picture. The degradation we're looking at was very widespread in the ancient world.[24]

But let us now return to the Holy Land.

Antioch, at the north of Palestine, was the third largest city in the Roman Empire and one of the great cities of the ancient world. Its main avenue was paved with granite for four and one-half miles, and flanked with covered colonnades to shelter pedestrians from sun and rain. It had a spectacular street lighting system, and most of its homes had running water. The Apostle Paul began his ministry there.

In the second century A.D. Antioch had 500,000 inhabitants. By the fifteenth century it no longer existed. It fell to the same dynamics that ruined North Africa.[25] Archaeologists had to dig through twenty-eight feet of silt washed from the farms upstream in order to get at some of its ruins.

Above Antioch, where the silt came from, are the ruins of ninety-odd Roman farm towns and villages. Only seven towns are still inhabited today.[26] The doorsills of some abandoned homes are now three to six feet above ground level — which shows us how much soil has been lost. Nearly all the former farmlands have devolved to waste.[27]

In Judæa itself, archaeologists studied the Wadi Musrara watershed. Up in the highlands they found 124 villages abandoned over the last fifteen centuries; on the plain below, just four abandoned villages. The rate of village abandonment was 77% in the highlands, where erosion was greatest; but just 11% in the bottom lands, which were enriched by highland silt.[28] It's the same pattern as around Antioch — and the same one Plato described.

Thus have decent religious folk — Jewish, Christian and Muslim — cared for a land that in their own understanding was specifically sanctified by God.

Modern Israelis take pride in having reclaimed the land from the desert. Yet the area they've restored is only about half what was previously ruined, and most of what they have not reclaimed is so eroded as to be unreclaimable.[29] Nor can they be certain of sustaining their present agricultural production even for another sixty years — for the petroleum and phosphate their technology relies on are due to run out well before that time.

"That care is left to the ruler"

The problems we face are more complex than those that blighted the Mediterranean. Comparisons are tricky. But the story I've told does bear lessons for our time. And the first lesson is that environmental errors really can cause a civilization's collapse.[30]

Around the Mediterranean, it began with the wholesale farm abandonments in the highlands. The soil from those farms washed down to choke the rivers, converting the farms on the fertile bottom land to untillable marshes.

Then mosquitos came to the marshes — malaria vectors.[31] Malaria took a serious toll of life in the latter years of the Roman empire, and malarial weakness added greatly to the death toll

from other diseases.[32] Fear of malaria led to the abandonment of many more regions.[33]

Rome's economy suffered terribly. The gold supply literally vanished.[34] And as the economy slid and the death rate rose, the birth rate dropped. People didn't want children in bad times.[35]

The empire's population took a nose dive. In fact, it fell about one-third in the third century A.D. alone.[36]

And the remaining population redistributed itself. From a world of small, prosperous family farms, the Mediterranean became a world of aged cities surrounded by great swaths of ruined, depopulated country, with a far-away periphery of good farm land precariously controlled by the legions.[37]

Such a situation posed terrible logistical problems. The Emperor Tiberius spoke of them:

> *Does no one consider how much Italy stands in need of foreign supplies, and how the commonwealth is every day at the mercy of the winds and waves? The produce of colonies is imported to feed [us].... Should these resources fail, will our [own] groves and villas support us?*
>
> *That care is left to the ruler. Should he neglect it, the commonwealth would be lost.*[38]

And here in a nutshell Tiberius has summed up the forces that caused Rome to fall.

The fruitful periphery was essential to the cities' survival. But as desertization advanced, the periphery moved further away; and as the population dropped and the economy dried up, the cities grew weaker, less able to afford the task of holding the periphery under their control.

Ultimately, the logistics grew impossible. Central rule collapsed; the empire fragmented. Then the barbarians moved in, and darkness fell.

But here's the shocker: in Tiberius' time, the long decline had not yet begun — yet the Romans already knew bad farming was destroying their world.

And they already knew the solution. Columella even wrote it down.[39]

It was simple: manuring, plus attentive care to the soil.[40] That would have halted nearly all the degradation, and bought the Romans time enough to learn how to halt the rest of it.[41]

But the Romans failed to do it! They didn't act on what they knew! The Emperor Tiberius' words ring out:

> *Does no one consider how much Italy stands in need of foreign supplies? ... That care is left to the ruler.*

There is the voice of a man who felt alone in his concern for stewardship.

Yes, conservation is work. But the bottom line remains that, because Rome declined to act on what it knew, it was gutted by waste, laid open to invasion, pillaged, decimated, and burned.

Seen in this light, Rome's fall is revealed as an example of what Barbara Tuchman called "The March of Folly" — the ability of humans, singly or in groups, to "march steadily into disaster fully equipped with the facts".[42] It's comparable to Hitler's invasion of Russia, or the U.S. government's habit of deficit spending.

Authority On the Fall

Many people still think barbarian invasions caused the fall of Rome, but most modern historians don't. Historian Trevor-Roper offers a revised understanding:

> *...Mere political and military threats seldom cause fundamental crises in society; more often they only reveal them. The crisis of the empire ... was not ...on the frontiers....*
>
> *... [A] half-century of ... anarchy from A.D. 250 to 300, combined with depopulation, pestilence, and the failure of gold-supplies ... fatally weakened the old, urban economy.... ...[Rome's] need was to feed its armies, and if wealth from commerce failed, direct contributions from the land became more and more necessary. So ... the terms shifted between country and town. ....The [new] direct dependence on the country strengthened the great landlords [who became feudal lords]. ...*
>
> *All this, it is clear, has little to do with ... [the] barbarians ... who are so often credited with the ruin of Rome. In fact, it is clear, they did not ruin it.... They filled the gaps in its population and became its defenders.*[a]

NOTE:

a.Hugh Trevor-Roper, ***The Rise of Christian Europe*** (Harcourt, Brace and World, 1965), pp. 54,66-7.

Tuchman herself sees modern environmental degradation as yet another "march of folly".[43] There's a parallel here — but how much does it mean?

Things turned out very badly for the Romans. Not because of fate, or chance, or luck; but because the Romans heard wisdom, shrugged their shoulders, and went on marching into the abyss.

How many of us are going to do the same thing: listen to the problems, shrug, and walk on by? Can we face the answer to that question squarely?

Paul was right: it's not just a matter of technical difficulties, something simple to fix with new filters or new laws. There's something psychological — *spiritual* — deluding us into doing these things. And as long as that spiritual root goes unaddressed, not all the technical fixes in the world will be enough to get us to reform.

And what is that spiritual root? That's an important question. We'll get to it.

Intolerances

But let's first consider some of the problems we moderns are being foolish about.

The U.S. Soil and Conservation Service map on the next page shows how much of our nation's topsoil had already been lost as of 1934, the date of the survey on which it is based.[44] The darkest areas had lost *at least 75%*; the more gently shaded areas, at least 25%. You can see for yourselves where you live.

The survey that generated this map found 282 million acres that were already so ruined they were worthless for crops or grazing. That's 15% of our farm land gone as of 1934.[45]

And of course, things haven't stood still since then. A nationwide survey found erosion was proceeding 25% faster in 1975 than in the Dust Bowl decade of the Thirties — despite the fact that the amount of land being cultivated had decreased.[46]

In 1985 Congress passed laws to retire some of the worst-eroding land from cultivation; but this didn't address the real problem.[47]

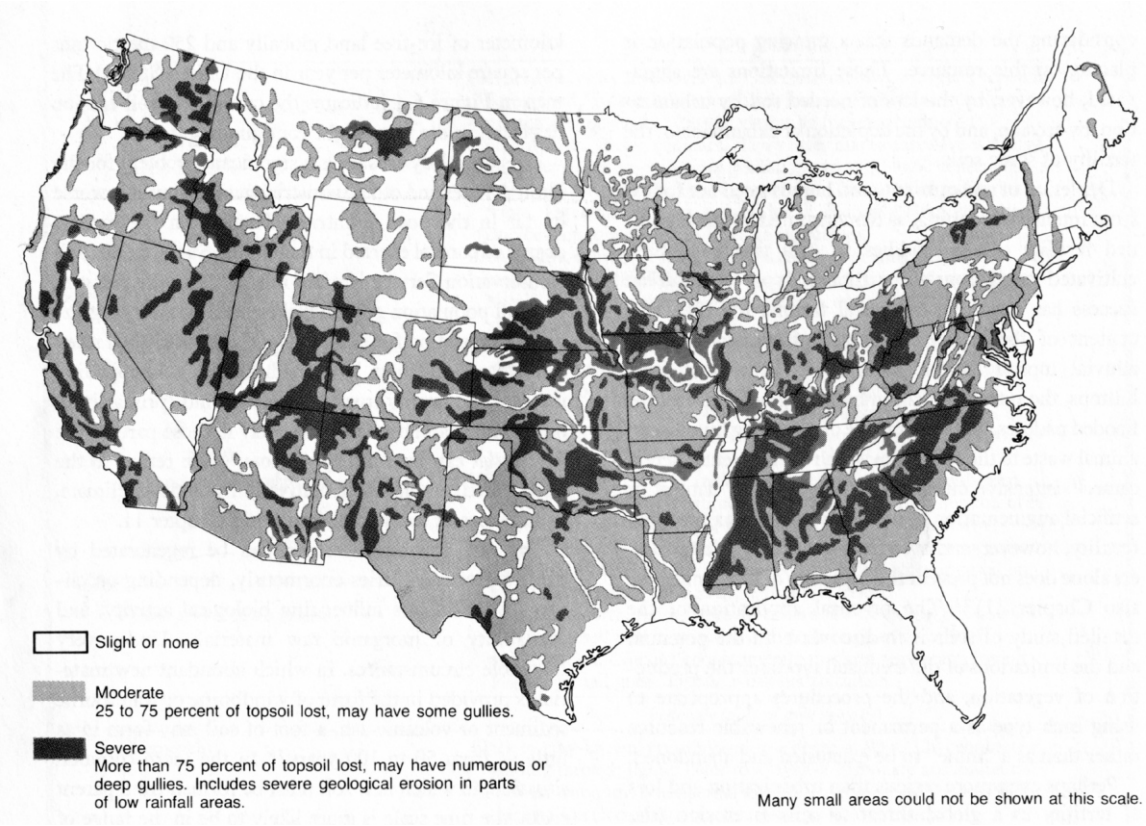
Here's the real problem: Our government sets a maximum "tolerable" rate of erosion for each and every acre of crop land in the country. And on the average, this "tolerable" rate, known as "T", is five times the rate at which new soil is created.[48]

Common sense will tell us that if soil erodes even 1% faster than it's created, we'll eventually run out of soil. If we have any love for our children and grandchildren — any sense of the preciousness of life and the purpose behind the slow advance of human consciousness — I think we can agree that erosion at five times the soil creation rate is unconscionable.

At this "tolerable" level, our entire green, fruitful nation would be reduced to desert twice as fast as North Africa.[49]

It's folly: our own march of folly. But setting "T" this high makes erosion control less expensive, and that's why we do it.

Even that is not the end of the story. Government figures show erosion is proceeding, on the average, 40% *faster* than "T".[50]



That means our nation's crop lands are losing one inch of topsoil every 29 years.[51]

And the true erosion rate is probably higher. When I took a closer look at the data last year, I found that the real long-term erosion rate in Colorado is nearly twice the official figure.[52] I've heard similar estimates from soil scientists in Nebraska.

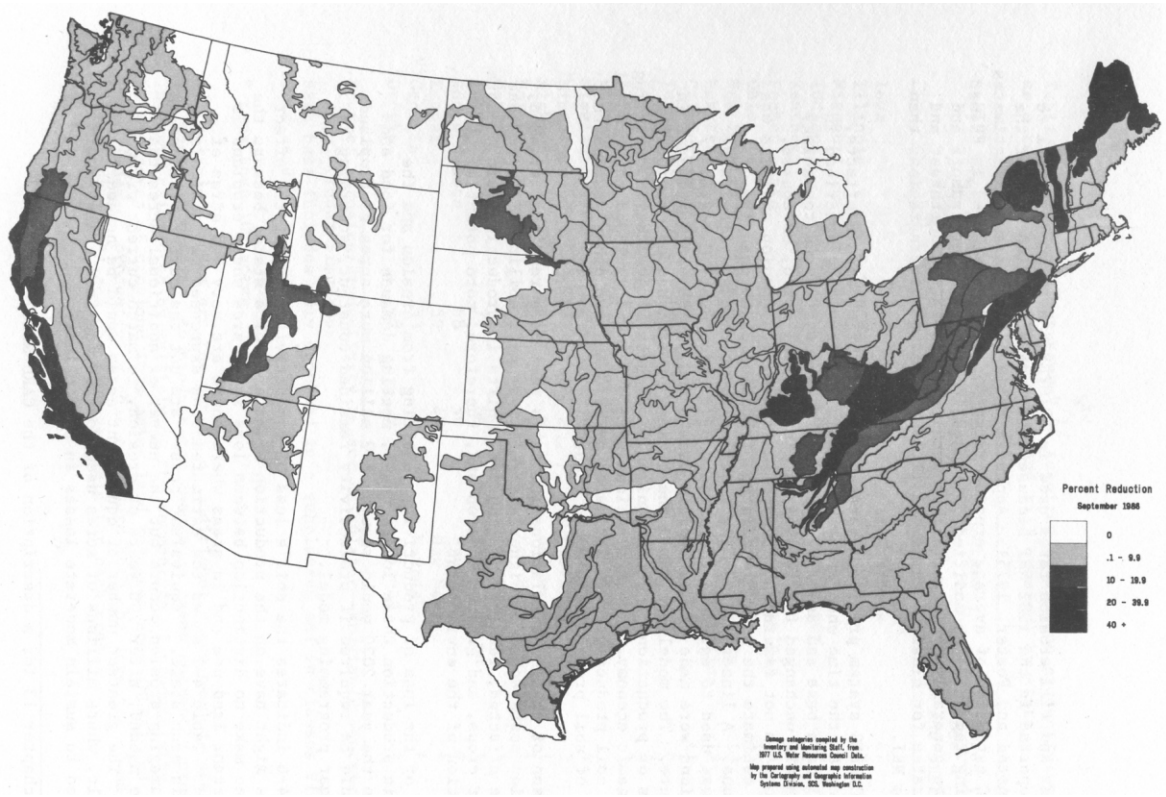
Then there's the fact that erosion's selective: it takes organics first, and leaves the sand for later. An inch of topsoil loss is likely to be accompanied by another inch of lost fertility.[53]

Below is another map, this time based on 1982 data, showing the amount of soil fertility that could be lost in various parts of the U.S. due solely to water running over the surface of crop and pasture lands in the course of the next century, if no conservation practices prevent it.[54]

(Potential losses of fertility due to *wind* erosion, which is a very serious problem in the Great Plains, are not shown on this map.)

Notice that there are a lot of areas that are shown in this second map as vulnerable to serious fertility loss, that were not shown in the older map as having lost a great deal of topsoil. The conservation struggles of the future will not necessarily take place in the lands that were ruined in the past.

Studies show a loss of any six of the final eight inches of topsoil will typically bring a 30-to-50% decline in the natural fruitfulness of the land.[55] We've been covering up this decline with lavish applications of cheap fertilizer. But the natural gas we rely on for the nitrate in that fertilizer will skyrocket in price in forty years or so. The price of the tractor fuel we use to spread the fertilizer around will skyrocket, too.[56]



It seems to me a moment of truth is on its way — and will arrive while people I love are still alive.

At more or less the same time

Erosion is the chief way in which we degrade the land.[57] But there are other forms degradation can take: acid rain, deforestation, water pollution, ground water depletion — each one making the others worse.

And degradation of the land is actually just one of three environmental processes through which we destroy our future. For perspective's sake, we should take a quick look at the other two.

The second process is one of extinctions and gene pool destruction. The danger lies in the fact that every living species — our own included —depends on other species for survival. A single plant species may be critical to dozens of animal species.[58] Bees are essential to the survival of innumerable plants.

So if you wipe out the wrong species, you trigger an avalanche of extinctions. If you wipe out enough key species, you can trigger ecological collapse. The experts now predict that 10 to 20% of all species worldwide will perish in the next ten years.[59] This is a perilous trend.

Humanity's survival depends on three species in particular — rice, corn and wheat. These three account for half the calories and nearly half the protein our species eats.[60] Just thirty species account for 95% of humanity's food supply.[61]

As many of you know, the seed corporations have been inbreeding these crops — creating hybrids that produce more food per acre, but lack all genetic diversity. This is a vanity that could kill us, for inbred crops are highly vulnerable to disease. In fact, that's how the Irish Potato Famine happened.[62]

We have "seed banks" that are supposed to preserve the diversity we don't plant. But these banks are so poorly funded and designed, they're virtually worthless.[63]

The ultimate risk we face is that, when our food sources become too inbred, disease will wipe them out altogether. That would very likely be the end of human history.

The third process by which we destroy our future is through damage to the physical buffers that make our planet habitable. Ozone depletion and the greenhouse effect are examples.

There's a growing hope we humans may mend our ways in this department. Since the development of the Montreal Protocol, the world seems to be holding fairly faithfully to its agreement to cut way back on the use of ozone-layer-depleting chemicals.[64]

But as for global warming, our species is still generating more and more of the problem greenhouse gases every year. And changes are already visible — summers coming earlier and staying longer; polar ice melting at an accelerating rate; the inner parts of the North American continent getting drier and drier.

What's it going to come to?[65]

As of this writing (2006), the scientific community is generally agreed that the planet will heat somewhere between four and eleven degrees Fahrenheit in the course of this present century, and even more in the centuries after that.[66]

The interiors of all the continents will continue to dry out, and storm tracks will shift, reducing some regions, including much of our U.S. grain belt, to desert, and walloping others with catastrophic storms. Much of this may happen even before 2035 A.D. — that is, within the expected lifetime of most of us alive today.

The Greenland and Antarctic ice sheets will disintegrate; it is conceivable that they may do so even before 2075. By the time they have finished melting and sliding into the ocean, many regions that are now heavily populated will be under sea level, including much of Bangladesh, the Netherlands, Louisiana and Florida, Manhattan, and southeast Washington, D.C.

The greenhouse effect, then, will create a world of refugees, even as — by submerging coastal cities, and reducing farmlands to desert — it destroys the world's ability to care for them.

And all these things are coming to pass at more or less the same time.

Trial at the altar

We *cannot* afford to repeat the tragedy of the Romans, who knew their salvation and yet let it slip from their grasp. We need a way to turn civilization around. So I want to tell you about peoples who faced serious environmental tests, tests as difficult as the one we face — and rose to the challenge, *passed the test*, and saved the world God had entrusted to them.

One such case occurred here in America, ninety centuries ago. When humans began arriving in large numbers, they found our continent inhabited by an amazing variety of animals: mastodons, mammoths, colossal bison with six-foot horn spreads, giant ground sloths, stag-moose, camels, and beavers the size of full-grown bears.[67]

It took just one kill to feed a whole tribe for a week. So how could the immigrants resist?

Over two thousand years of hunting, they wiped the giants out.[68]

Now it would have been easy to go on and wipe out other targets — the bison, say. *But at this point the immigrants stopped themselves.* And by Columbus' arrival, they were doing almost no damage at all.

Other success stories occurred in the Pacific.

There were many islands where the first humans to arrive wiped out most or all of the large native animals.[69] In two cases, the settlers caused a total eco-collapse.[70]

But in three cases — Hawaii, Tikopia, and New Zealand's North Island — though the colonists came close to catastrophe (the evidence of disastrous deforestation and erosion is plain), they, too, managed to stop in time.[71] And by the time Europeans arrived, they'd worked out sophisticated *sustainable* ways of life.[72]

Now, how did these peoples manage to stop themselves halfway through their "marches of folly"? If we knew, we might be able to do the same ourselves.

Unfortunately, they wrote no histories. But they did leave a clue in the way they restructured their societies. For when we look at their societies, we find a remarkable constant: *each one protected the environment by hedging it about with religious prohibitions.*

In fact, this is true not only of peoples who had close brushes with disaster, but also of those who developed sustainable economies without skirting catastrophe on the way. Each one invoked the Divine to protect Creation from abuse.[73]

This shouldn't surprise us. We *know* one of the functions of religion is to declare morality for the world!

In our country, over one hundred million adults are members of churches. And we need only consider why they bring their kids to Sunday school to see that most of them look to religion to define right-and-wrong.

That's why, when it came time to abolish slavery, the churches took the lead.[74] When it came time to challenge drunkenness, the churches took the lead. When it came time to seek equal rights for minorities, the churches took the lead.

Nuclear disarmament, Sanctuary, the anti-abortion crusade: each one is going through the churches *right now*. Animal rights advocates quote Ecclesiastes, Proverbs and Isaiah; the furriers reply with Genesis.[75]

Why? One way to put it might be to say that we all know, deep inside ourselves, that moral propositions will have no power over us *unless we hear in them the cosmic dimensions of righteousness* — unless they remind us of our status before God.

Or it might be put more gently. It could be said that we hunger to please God, as children hunger for a parent's praise. And so we lay our moral hunches before the altar, as a child might bring a crayon drawing, and ask: *Do You like this?*

And if the Presence in our hearts answers, *Yes: and how wonderful that you thought of it!* — why, the sun shines brighter; our lives feel cleaner — and our actions thenceforth are transformed.

Either way, that's how societies learn to play within rules.

Is Christianity capable?

Of course, this brings us to a hurdle. There's an idea floating around, held both by Christians and non-Christians, that our religion cannot serve to establish a religious environmentalism because it is "anti-Nature".

Part of this is the old misconception that reverence for Nature is "close to idolatry".

Well, who was it that always went to the wilderness to be with God? Who but Christ?[76] Who held up lilies and birds as examples of Godliness? Would anyone say this proves *Christ* came "close to idolatry"?

And yet that's all that most of us mean when we speak of reverence for Nature. We go to the woods and mountains, like Christ; like Him, we feel the nearness of God; our hearts sing; and we rediscover reverence. And while that reverence links us to God, it includes Nature as *the place God's presence has sanctified* . And our sense of its sanctification is confirmed by the simplicity with which its creatures — lilies and birds — depend on God's kindness.

Moses, Elijah, and John the Baptist all went to the wilderness to be with God. Suppose one of them had found bulldozers tearing it up: do you think he would have been apathetic?

Why should we be different from them?

But there's also another dimension to the Christianity-is-anti-nature idea. I refer, of course, to the arguments of the historian Lynn White, Jr.[77]

It's a fact that most of the technologies responsible for our present environmental difficulties were invented in the Judæo-Christian West. White says the reason is that such inventions were inspired by Genesis — where God gives humanity "dominion" over all living things, and tells it to "subdue" the Earth.[78]

The problem here is that those words — "dominion" and "subdue" — aren't even in our scriptures to begin with! The actual Book of Genesis is in Hebrew, and embodies the Hebrew vision. "Dominion" and "subdue", on the other hand, are words derived from Latin: they express the vision of imperial Rome.[79]

We *know* the Hebrews weren't dedicated to conquest the way the Romans were. Around the Mediterranean, the word "Rome" conjured images of legions; "Judæa" conjured images of God-mad nuts.

But there was a time in the Middle Ages when Europeans read the Bible in Latin, and the Church flirted with imperialist thinking. So when we see Latin, Roman words in a "power" context like this, we might reasonably ask if that period might not have influenced the translation.[80]

Correcting translations

Let's have a look at the Hebrew concept that gets translated as "dominion".

Genesis tells us that God made the sun to "rule" the day, and the moon to "rule" the night.[81] The Hebrew root here is *mâshal* — the same one used in Psalm 8 to declare humanity's "dominion" over Creation.

Now, it's obvious that the "dominion" of the sun and moon has nothing to do with conquest, control or exploitation. The sun and moon can't seize the resources of their "domains". They cannot even change their course across the sky. They have no control over their own actions.

But they do have central rôles on their stages. They *define* day and night.

— And there we have the true nature of their "dominion".

If we turn to the description of the ideal king in Deuteronomy 17, and to stories of actual kings of Israel and Judah — to Biblical discussions of *human* "dominion" — we find these kings bore a heavy responsibility to nurture and protect according to God's will.

What God says in Deuteronomy is that the grant of "dominion" expressly precludes any right to loot or exploit: the king may not multiply his chariots, his gold or his women. Indeed, quite to the contrary, the king is to be the sort of leader who does not lift himself above his brethren — he is to remain a fellow human being, a simple neighbor to those he rules, albeit the first among them.

Furthermore, the king is to study Torah, thereby learning how God wants the kingdom

defined, and rule accordingly. By his humility, his study of the Law, his form of leadership, he is to himself be an ideal Hebrew, and thereby attract those around him to live the ideal as he does.[82]

Much of this thinking is embodied in the story of David's early kingship.[83] The negative part, the forbidding of exploitation of any sort, is embodied in such stories as that of David and Bathsheba, and that of Naboth's vineyard.[84]

Israel's kings weren't supposed to "dominate" in the Roman sense. As the Deuteronomic material illustrates, they were supposed to hold Israel to the definition God had given it — in much the same way that the Sun holds the day to *its* definition. And that is what the Hebrew *mâshal* means.[85]

Our "dominion" is a similar affair. As the Sun shines on the day, making it what it is, and drawing the daylike world to be as bright as itself, so must we with the creatures.[86]

Like Israel's kings, we're obliged to nurture and protect, not to lift ourselves up but to make ourselves an attractive first among equals, *and thus hold Creation to its definition* — that is, to the way that God meant for the Creation to be.

The verb used in the verses Lynn White, Jr., focuses on — Genesis 1:26 and 1:28 — is actually not *mâshal* but *râdâh*, a partial synonym of *mâshal* which was used nine times in the Bible with the explicit, undeniable meaning of "to tread down, subjugate".[87]

A number of distinguished environmental theologians have assumed that *râdâh* must also be read as "to tread down, subjugate" in Genesis 1:26,28, and have endeavored to refute White's charges while hewing to that translation.[88] But I think that approach fails to catch what's really going on there.

Yes, *râdâh* can only mean "to tread down"or "to subjugate" in the verses I've mentioned. But in Psalm 68:27, we have a use of *râdâh* which is very different. It makes no sense at all when read as "to tread down", "to subjugate", or even "to have dominion". It makes sense only when read as "to define by leadership" — the meaning of rulership embodied in Deuteronomy 17:14ff.

And there are nine other instances of *râdâh* in the Bible that make sense by *either* definition, but become fully meaningful only when given both definitions simultaneously.[89]

Evidently the meaning of *râdâh* varies with the context. And since its context in Genesis 1:26,28 so clearly parallels Psalm 8:6, it would seem that the meaning deducible for *mâshal* in the latter should prevail for *râdâh* in the former as well.

A similar critique applies to "subdue". The word in Genesis 1:28 is *kâbash*, another militant term: its root meaning, too, is "to tread down", and it was used to convey such ideas as "to conquer", "to subjugate", and "to violate".

In Genesis 1:28, though, *kâbash* is paired with a second verb, *mâlâ* — "to fill"or "to replenish" — and its message is crucially modified by this pairing. We who are commanded by God to keep Earth replenished and filled are obviously not free to subdue it in any way that would leave it *un*replenished or *un*filled. Extinctions and desertization aren't allowed.

Again this parallels the message of Deuteronomy 17, that one who has "dominion" is not permitted to loot or exploit. Again the difference is between an imperialistic neo-Roman conception, and the more complex, conscious, responsible meaning the Hebrews were driving at.

Let's remember that what God created, He loves. Clearly, then, He wouldn't intend for us to "subdue" it in the sense of dropping napalm on it.

But it makes sense to think He might be expecting us to "subdue" it as a teacher might subdue a child in her class, when the child engages in behavior likely to cause harm.

Of course, even when we've fully understood the higher meaning of "subdue", we're still not out of the woods; for the Hebrew language still declares that we are called to meddle in the world.

The environmentalist looks at the impact humans have had on Nature in the past — particularly when we've sought to "improve" things — and shudders. And he thinks: Perhaps we'd be better off leaving "subduing" behind!

I see two ways in which Christianity might respond to this concern, consistent with the corrected translations I've suggested. These two ways are very different from each other, but each has something to recommend it.

The first would be to declare that this "subduing" is a task humanity has now completed. Certainly, when Genesis was composed, humans had much to fear from predators; subduing them was essential to survival. Today, though, what

The Bible and the Well-Defined World

In my emphasis on "dominion" as a matter of *sustaining a definition*, I've drawn on the thinking of anthropologist Mary Douglas. Douglas has shown that the central idea uniting the prohibitions in Leviticus and Deuteronomy is that *they work to enforce God's definition of His world,* by upholding category boundaries.

My own argument, in the main body of this text, equates to the idea that "dominion" is one more expression of the same basic theme.

To understand Douglas' insight, let's consider the Biblical rule against eating pork (Leviticus 11:7; Deuteronomy 14:8). Many explanations have been offered for this rule — for instance, that it prevented trichinosis. But those explanations don't show why eating camel, rock hyrax and hare had to be forbidden under the same rule (Leviticus 11:3-6; Deuteronomy 14:4-8). The hyrax, hare and camel are not, e.g., trichinosis vectors.

Douglas observes sensibly that:

> *Any interpretations will fail which take the Do-nots of the Old Testament in piecemeal fashion. The only sound approach is to forget hygiene, aesthetics, morals and instinctive revulsion [all of which have been invoked to explain the prohibitions] ... and start with the texts.*[a]

The Bible itself says nothing of trichinosis; but it does say that animals which cleave the hoof and chew the cud are clean and can be eaten, whereas animals that do only one and not the other are unclean and taboo.

And here the one explanation that explains *all* the prohibitions is staring us in the face: clean

predators remain are little menace to us, whereas we are very much a menace to them. The other predatory species are subdued; it's time now to subdue ourselves.

But I prefer the other possibility. And that is to say that *every other species* was created by God to play a constructive rôle in Earth's ecosystem — so why should we be different?

The real difference between us and other species is that our intelligence, manual dexterity, and capacity for compassion place a far greater responsibility on our shoulders. We may not have measured up to that responsibility in the past. But that doesn't mean we can now be excused from it.

From the standpoint of this second interpretation, then, we still have the responsibility to intervene, to act as midwives to evolution. We simply have to learn to do it right.

The present potential

It seems to me most Christians understand all this intuitively — for I've noticed that the people I've

things are those which stick to the definition of what is clean. Something that cleaves the hoof but fails to chew the cud — or vice versa — thereby falls short of what it takes to fit the definition of a meat animal, and is therefore, in dietary terms, unclean.

This same line of thinking also explains why eating eels and winged insects is equally prohibited; as the Bible itself tells us, they depart from its definition of "fish" and "birds".

It explains why only unblemished people may approach the altar (Leviticus 21:17-21) — and why sex outside of marriage was forbidden.

In fact, *it explains every prohibition in the Pentateuch.* The whole idea is that to be clean, to be holy, to have integrity, one must not cross boundaries or mix categories: one must fit God's definition of "the way things 'sposed to be".

An alternate path to the same insight — one that Douglas didn't mention, but that confirms her insight — may be found by examining the Hebrew words for "sin".

Châtâ' means "to miss the mark" in Judges 20:16, "to miss the way" in Proverbs 19:2; and by extension "to transgress, to sin" in some 68 other verses. *Chattâ'th*, the noun, is used 155 times in the sense of "missing the road or mark; deviating from the definition God has laid out".

Similarly, *'âbar* means literally "to cross the limits", as when one crosses the boundary of a nation; when used as a verb, it always signifies sin. *Shâgâh* means "to stray, to mistake, to transgress, to mislead". And *`âvâh* means "to crook, make crooked, do amiss, pervert, do wrong" — in other words, to twist out of conformity with its definition.

NOTE:

a.Mary Douglas, ***Purity and Danger: An analysis of concepts of pollution and taboo*** (Routledge &Kegan Paul, 1966, 1969), p. 49: emphasis mine.

met who truly seek to live by the Bible are, by and large, more likely to think and be guided by its *general* values, its *true* values, than to forever be focusing on some odd, isolated, mistranslated verse.

Certainly there are exceptions. But such people aren't in the mainstream; they go by other names.

Most Christians know the "dominion" verses, yes; but they've also heard the verses we began with, where Paul says Creation suffers from human vanity. And they grasp how Creation's sufferings *modify* and *inform* the idea of dominion.

They know how God pronounced his Creation "good" in Genesis; they see the implications. Sometimes they catch the connection, too, to the language of the covenant God made with Noah:

> *Behold, I establish my covenant with you and your descendants ... and with every living creature ... the birds, the cattle, and every beast of the Earth....*[90]

After all, it's just such a covenant — inclusive of God, ourselves *and* Nature — that we must make today.

Sometimes the Christians I listen to recall the Hebrew Sabbatical Years, when God commanded that the land be given rest — and the Jubilee Years, when the land reverted fully to God's ownership.[91]

I've never heard them make the connection between the *Logos*, the Word which became flesh and dwelt among us, and the last four letters of "ecology" — which saddens me, for I think that connection is important. But *always* they think of Francis of Assisi. And these things add up in their minds.

So when I listen to believers talk of the environment, I notice they generally don't start with "dominion". Generally they begin either with stewardship, or with Psalm 24 —

> *The Earth is the LORD's and the fullness thereof....*

They *know* how their faith touches the environment.

Such experiences convince me that Judæo-Christianity really *does* have it in itself to be a strong pro-environmental force, to articulate and embody and teach the Unity of God, humankind and Nature.

But if this is its potential, we've something to explain; for the Church has been appallingly slow to act.

Where's the Church now? It's running local recycling projects and the like — environmental stuff, yes, but *trivial* when considered as responses to the dreadful problems we face.

It's issuing pronouncements, which (alas) seldom translate into meaningful action. It's sponsoring little adult-study programs, that sometimes flower wonderfully and more often die on the vine.

In a word, it's dipping its toe in the water, but patently reluctant to get wet.

Here we are, one hundred million adults, enough to swing every election in America, united in reverence of the *Logos* — which we translate as "the Word", but is *literally*, in Greek, the order and harmony in Creation, the logic of ecology; dedicated to an absolute of justice and compassion that transcends any other the world has seen.

There's a movement afloat to put a halt to further greenhouse gas buildup. It faces strong opposition, and it's faltering. If one hundred million of us all wrote Congress, imagine the impact![92]

Our soil conservation program, our crop variety preservation program, our endangered-species program, all languish because Washington's too cheap to tithe. One hundred million phone calls could change that in a *day*.

What's holding us back?

A triumph of engineers

I think our problem lies in the *worldly* side of our culture, hidden in a way that makes it hard to see.

You do remember what I said, a little while back, about the societies that managed to stop themselves from committing environmental suicide. We saw that each one called on religion for help.

But you'll also recall that our own society is descended from societies that *failed* to stop themselves. Might it be that something in those societies *prevented* them from invoking religion on behalf of the environment?

The story I see began when the Mesopotamians built their canals, and the Indus Valley people cut their forests to fire their bricks and pottery. Such things brought visible environmental degradation — but they also made the consumer's life more pleasant.

Then the Egyptians, whose civilization outshone everyone else's, began building monuments more awesome than their natural environs — to assert a grandeur that outshone Nature's as well. Humanity went from vanity for comfort's sake, to vanity for pride's.

Even as the pyramids and, later, ziggurats went up, people still experienced Nature as the abode of true Divinity. The prophets sought God in the wilderness, and the Jews mocked the ziggurats with their story of Babel.

Awe and reverence for Nature, as the Throne of the Creator, lent the environment protection. The Jews feared to trespass on Sinai, or the Greeks on Olympus. *Everyone* feared to cut down woods that felt especially filled with God's presence.[93] Everyone feared meeting God on the sea.[94]

But the triumphs of engineering undercut such awe. As sailors became used to the sea, as farmers cleared the woods and terraced the mountains and laid out roads, the Mediterranean peoples taught themselves *not* to fear, nor even *notice* the Presence they encroached upon.

And at last, when the process was sufficiently advanced, they *de*-consecrated God's handiwork. Greek philosophers blazed the trail — Thales, Pythagoras, Parmenides — by talking about the Universe, not as a testament to its Creator, but first and primarily as interesting stuff, materials to be analyzed.[95]

How wonderful this new approach must have seemed! For it opened the way, via Archimedes and Euclid, to the *science* of engineering — to Roman aqueducts, Greek fire, metallurgy, artillery, petrochemistry, agribusiness — and all the wealth and power these things yielded.

Aristotle popularized the new thinking.[96] That was another turning point. Now it was

possible for everyone to *share* the vision — the vision in which Nature was only a physical world.

But now the Mediterranean "march of folly"— its failure to use its environmental wisdom — begins to make some sense. For having numbed themselves to the sanctity of Creation, having taught themselves that Nature isn't really all that important, the Mediterranean peoples had also numbed themselves to the need for environmental preservation.[97]

That is the root of the cancer. That is the ultimate, deepest reason why *all* the lands of milk and honey pass away.

In exploring the movement that decoupled religion from the environment, I never found a Jewish or Christian pioneer.

But one thing can be said against early Judæo-Christianity: its scriptural testimonies were too quiet and understated to inspire believers to ally themselves with Creation. Thus if early Judæo-Christianity did nothing to add to the problem, neither did it lift a finger to solve it.[98]

And eventually the Church *was* seduced into being part of the problem. For we know that when the monks and priests of the Dark Ages went across the Rhine with the Frankish pioneers to settle the deep German forest, they no longer related to the wilderness as John the Baptist and Christ had done. Rather than praying in humility and leaving the wilderness intact, they led the way in felling sacred oaks and "conquering" the wild for Christendom.

Why? Not just because they were replacing one religion with another. It was also because the secular attitude toward Nature had somehow wormed its way into their thinking.

For they, too, now believed that Nature was mere stuff — and that development, roads, aqueducts are good. And so they "knew" any lingering reverence for those awesome virgin woods was misplaced idolatry.

They'd lost that strong ancient sense of the special bond between Creation and Creator. They lived in a world they were dead to! And that's what we inherit — that forgetfulness, that deadness to the world, and with it, the fallacy that secular materialism is Christian.

There are still missionaries going out to save the tribes of the Amazon, not just from ignorance of the teachings of Christ, but from knowledge of the teachings of the jungle as well.

And this heritage is what keeps us sitting on our hands, numb to the urgency of our crisis, numb to the consequences of folly, afraid to plunge in, afraid to get wet, afraid to stand by God's Creation.[99]

Shedding the veil

For the past few centuries, our vision has been badly clouded by secular, technological values. Perhaps we should ask what we'd see if we cast this haze aside.

True vision can be glimpsed, I think, in the way religious events transform our perception. There's an instant at the beginning of every true religious event when the world takes a new coloration: it becomes a *charged* space, a space into which the remembrance of God has entered. All actions take a new significance that directly derives from that charge in the air. The priest manipulating bread and chalice, the minister

declaring Holy Writ, the worshiper bowing her head in prayer, engage in acts *we can feel* touch the fabric of Creation.

> *Wherever two or more of you*
> *are gathered in My Name,*
> *there am I in the midst.*[100]

That's how we've learned to understand the experience.

But I believe there's more to it than that. For what is it when you go alone to the wilderness, and feel God's presence there? Is it not that two or more are *still* gathered in God's Name — but that now only one is human, while the others are the creatures of Nature?

Christ said it:

> *I tell you, if these were silenced*
> *the very stones would cry out.*[101]

If the veil of vanity were cast aside, we'd see the true membership of our Church. We'd redefine the congregation. It's not just the people who gather in the nave; it's all who sing their hymns outside the windows. Those are our fellow believers. Their sufferings are our business. If we truly wish to be children of God, we must humble ourselves and recognize this fact.

If we cast the veil aside, we'd see that when we violate Creation, when we poison and bulldoze it until God can no longer be felt, it's a desecration. It destroys the charge Creation carries; and once that charge is gone, we no longer feel our connection there to the fabric of reality. This is a palpable falling away. Nothing could diminish us more.

If we would be God's children, we must recognize what's at stake. *Our* link to our Father is suffering hammer blows. Our destiny as a species, God's plan for Earth's glorification, is in grave danger of extinguishment.

It's our doing — and the remedy lies in our hands.

Endnotes

1. The official theme chosen by the conference at which this address was delivered.

2. Romans 8:14-5.

3. Romans 8:19-21. The noun I've rendered as "the forces of destruction" is *phthora*, translated in the King James Version as "corruption", and customarily rendered in modern English as "decay" (viz. the Revised Standard Version) or "ruin". My objection to these renderings is that they tend to obscure our rôle as the cause of the decay.

   It's simply not responsible to imply that *phthora* refers only to impersonal mortality. Nor is it a faithful rendering of Paul's Greek to do so: cf. Vine's comments on *phthora* and its root *phtheiro* in his *Expository Dictionary of New Testament Words*, repr. in W. E. Vine, Merrill F. Unger and William White, Jr., ***An Expository Dictionary of Biblical Words*** (Thomas Nelson, 1984), pp. 234-5.

4. The analogous word for vanity in Hebrew, *hebel*, condemns all human activities as ephemeral. (*Hebel* is the word in Ecclesiastes.) But to say all human activity degrades the environment is overdoing it: the statement is too sweeping to be true. It seems to me, therefore, that Paul must have intended the precise meaning of the Greek word he used when he used it, and not the meaning of its Hebrew analog.

5. Deuteronomy 8:7-9.

6. Vernon Gill Carter and Tom Dale, ***Topsoil and Civilization***, rev. edn. (University of Oklahoma, 1955, 1974), contains a revealing photo of the state of the soil on an Israeli hillside, facing p. 65.

7. Exodus 3:8, 33:3.

8. Flavius Josephus, ***Bellum Judaicum***, iii.

9. Plato, ***Critias***, 111B-D.

10. Contrasting photos of Greek hillsides in undisturbed and desolated conditions appear in J. Donald Hughes, ***Ecology in Ancient Civilizations*** (University of New Mexico, 1975), following p. 114.

11. Hugh Trevor-Roper, ***The Rise of Christian Europe*** (Harcourt, Brace and World, 1965), p. 80; Vernon Gill Carter and Tom Dale, *op. cit.*, p. 113.

12. Walter C. Lowdermilk, "Lessons from the Old World to the Americas in Land Use", ***Smithsonian Report for 1943***, pp. 419-20.

13. Carter and Dale, *op. cit.*, p. 117.

14. J. H. Stallings, ***Soil Conservation*** (Prentice-Hall, 1957), p. 9, shows a photo that vividly illustrates the erosion near the ruins of Guicul, Algeria. Other photos appear in Carter and Dale, *op. cit.*, facing p. 113.

15. Quoted in Edward Hyams, ***Soil and Civilization*** (Harper & Row, 1952, 1976), p. 120.

16. Varro, ***De Re Rustica***, i, 9. Columella says much the same: ***De Re Rustica***, i, *præfatio*.

17. Varro tells us that even earlier, in the days of the Tarquins, the standard was just two jugera — 1.3 acres. Admittedly his figure is hearsay, but it is comparable to the modern yield attained by labor-intensive organic farming on good soils.

18. Plinius, ***Historia Naturalis***, xviii, 4, 3; also Valerius Maximus, iv, 3, 5. Sextus Aurelius Victor, ***De Viris Illustribus Urbis Romæ***, xxxiii, gives fourteen jugera as the size of the allotments.

19. Theodor Mommsen, "Zum römischen Bodenrecht", ***Historische Schriften***, v. 2, viii, 1, 81.

20. Columella, iii, 3.

21. "Cato, when asked what is the most profitable thing in the management of one's estate, answered: 'Good pasturage.' 'What is the next best?' 'Fairly good pasturage.' 'What is the third best?' 'Bad pasturage.' 'What is the fourth best?' 'Tilling the soil.'" [Cicero, ***De Officiis***, ii, 25] Cato may have been making a leisure-class joke. But Cicero lived when the problem had become serious, and the anecdote must have had a bleak meaning in his time.

22. Dio Chrysostom's Orator lamented at about this time that, "Nearly two-thirds of our land [*Greek Eubœa*] is desolate from neglect and lack of inhabitants. I too possess a vast acreage (many *plethra*) ... and not only in the mountains but in the valley. Should any one care to cultivate them he could not only have them rent-free, but I would gladly pay him money in addition." [Dio Chrysostomos, ***Oratio***, vii.]

    Two centuries later, Salvianus would write of "Spain, of which but the name remains ... Africa that was ... Gaul that is devastated." [Salvianus, ***De Gubernatione Dei***, iv, 4.]

23. Livius, vi, 12. Pliny expressed similar puzzlement as to how his ancestors survived on just seven jugera of land: ***Historia Naturalis***, xviii, 4.

24. The details did vary, however. The main problem was erosion in Spain and China, but deforestation in the lower Indus Valley and salinization in Mesopotamia. Variations even nearer Palestine are discussed in the sidebar on page 4, "On the Borders of the Map".

25. Though it began as a regional capital in a rich farming country, Antioch outlived the death of its soils by quite some time. Even in the eleventh and twelfth centuries A.D. it remained a great city, though its agricultural base had by then been so destroyed that nearly all its income derived from trade.

26. This information is unfortunately dated. Other towns may have been founded or reëstablished in the area since the petroleum economy arrived in the area; however, if that is the case, they will probably not survive the end of the petroleum age.

27. Robert J. Briadwood, "Mounds in the Plain of Antioch", ***University of Chicago Oriental Institute Publications***, Vol. 48, pp. 12-47; Lowdermilk, ***Conquest of the Land Through 7,000 Years***, Bulletin No. 99 (U.S. Department of Agriculture, 1948), p. 10.

28. *Ibid.*, pp. 5-6.

29. Cf. Carter and Dale, *op. cit.*, p. 87.

30. Besides the Mediterranean civilizations, environmental causes are directly linked to the decline of the lower Indus Valley civilization (Mohenjo-daro), Shan China, Mesopotamia and Easter Island. They are also suspected as a cause of the decline of the Anasazi and Hohokam cultures in the southwest United States — but the evidence is inconclusive.

31. "It is significant that the first records of malaria as a serious disease in Rome date from about 200 B.C., for the prevalence of malaria usually indicates the presence of swamps or marshes. ... The Pontine Marshes, a large area ... that had supported sixteen Volscian towns around 600 B.C., were largely created during this period. ...

    "Pæstum ... on the west coast of Italy, about 25 miles south of Salerno, was founded about 600 B.C.... [It boasted] three magnificent temples ... one of them rivaling the Parthenon of Athens in size and grandeur.

    "...The city remained an important seaport and commercial center for ... centuries. [But] during the first century B.C., malaria became a serious pestilence in and around Pæstum. While erosion debris ... created marshlands ... [on] the coastal plains, silt clogged the harbor and eventually rendered it

useless. Pæstum declined ... and by the end of the Roman Empire was only a small village with magnificent ruins....

"There is no reason to assume that ... Pæstum was an exceptional case." [Carter and Dale, *op. cit.*, pp. 131, 144-5.]

See also Vladimir G. Simkhovitch, "Rome's Fall Reconsidered", ***Toward the Understanding of Jesus and Two Additional Historical Studies*** (Macmillan, 1921, 1947), pp. 115-7. A good photo of a silt-choked Mediterranean river appears in Hughes, *op. cit.*, facing p. 115.

32. Two pandemics swept the Mediterranean in late Roman times. The first began in 165 A.D. and lingered until 180; Galen estimated that it killed between a quarter and a third of Italy's population. The second began in 251 and lasted about ten years.

33. The crisis in the agricultural sector is illustrated by the Roman emperors' frantic attempts to resettle the agricultural provinces. The emperors even proclaimed that abandoned farm lands could be had for the taking by anyone wanting to homestead them; but there were evidently few takers. [Herodian, ii, 4, 6; ***Codex Justinian***, xi, 48, 6-7 and 11 and xi, 59, 8; ***Codex Theodosius*** , v, ii, 8 and v, 11, 12.]

34. Trevor-Roper, *op. cit.*, p. 54.

35. The same phenomenon occurred in our own Great Depression. Many Roman emperors, from Augustus on, offered economic incentives to women who would bear more children [Suetonius Augustus, xlvi; ***Codex Theodosius***, xi, 27, 1-2] — but even this didn't solve the problem.

36. The decrease was most dramatic between the second and fifth centuries A.D. Around 260 A.D., Dionysus, Bishop of Alexandria, estimated that the population of his city was less than half what it had been, and mourned to see "the human race diminishing and constantly wasting away". [*Ad Heiracem*

Some historians have argued that the epidemics mentioned in note 32 above caused this depopulation of the empire, and consequently caused Rome's fall. [Arthur E. R. Boak, ***Manpower Shortage and the Fall of the Roman Empire*** (University of Michigan, 1955).] But we may read in Livy's Annales that the young Roman Republic suffered a repeating cycle of famine, leading to epidemics and social uproar, which often enough ended only when the government imported wheat from abroad. If later epidemics were enough, all by themselves, to permanently depopulate and eventually destroy the late Empire, then why didn't similar epidemics permanently depopulate and eventually destroy the early Republic? In fact, the early Republic recovered swiftly from its epidemics.

I believe the advocates of the "epidemic theory" take too narrow a view of the possible causes of the long-term depopulation. The Romans themselves testified to the prevalence of malaria, and considered that their birth rate had declined. Shouldn't we listen to them?

37. Cf. Carter and Dale, *op. cit.*, pp. 136, 145-6.

38. Tiberius' speech to his court recounted by Tacitus, ***Annales***, iii, 54.

39. Environmental consciousness seems to have become widespread among the Roman intelligentsia during the century from 50 B.C. to 50 A.D.

Around 50 B.C., Lucretius was already declaring that the growing barrenness of the farm provinces had been caused by Roman agriculture.[Lucretius, ii, 1111-1125.] But Lucretius was a trailblazer, as George Perkins Marsh and John Muir were for us; most Romans simply did not yet see the subject as important.

In 50 A.D., we find Columella testifying that nearly all agricultural authorities now agreed with Lucretius' views. [I, *Ad Pub. Silvinum*, *præfatio* & ii, 1.]

It appears that in the years between Lucretius and Columella, environmental degradation had forced itself on the authorities' attention. It would be strange indeed if their conclusions had not reached even Tiberius' ears.

40. Columella, ii, 1.

41. Where the land was not yet utterly eroded to sand and rock (and in most places it was not), it could even have been rehabilitated by planting legumes and improving drainage.

42. "The march of folly" is of course the title of Tuchman's book: Barbara W. Tuchman, ***The March of Folly: From Troy to Vietnam*** (Alfred A. Knopf, 1984). The latter quotation in this sentence, though, is not Tuchman's; it's taken from Joseph Sittler, ***Essays on Nature and Grace***, p. 118. I'm indebted to William Gibson of the Eco-Justice Project and Network for bringing Sittler's words to my attention.

43. Tuchman, *op. cit.*, p. 4.

44. Map produced by the U.S. Soil Conservation Service; based on data from the 1934 Reconnaissance Erosion Survey of the United States and other soil conservation surveys of the Soil Conservation Service.

45. 1.9 billion acres of productive land were covered by the survey.

46. "Our Thinning Soil", ***Land Resource Use and Protection***, Report No. 38 (Iowa State University, 1975), p. 1.

47. The legislation referred to here was the Sodbuster Act and Conservation Reserve Program.

48. "T" values are set on a site-by-site basis by the U.S. Soil Conservation Service; nationwide, the "T" values assigned to crop land average 4.55 tons (of topsoil lost) per acre per year. [D. E. McCormack and R. E. Heimlich, Erodible Soils: ***Definition and Classification***, Report No. 85-2 (Assessment and Planning, Soil Conservation Service, and Natural Resource Economics Division, Economic Research Service, U.S. Department of Agriculture, 1985).]

The rate of new topsoil generation — to replace what has been lost — varies with climate, vegetation, bedrock type and surface topography; but research indicates that no land generates more than one inch of soil per 100 years — 1.67 tons/acre/year — and some land generates soil only one-fifteenth that fast. [David Pimental et al., "Land Degradation: Effects of Food and Energy Resources", ***Science***, October 8, 1976, pp. 149-55.]

49. North Africa was desertized over 1400 years. Since erosion at "T" strips crop land of an inch of topsoil every 45 years — and allowing both for the fact that we have about twice as much crop land as we're using, and for the fact that erosion depletes the soil even faster than it removes it — I estimate that erosion at "T" would desertize our country in roughly 600 years.

50. U.S. Department of Agriculture, ***The Second RCA Appraisal: Soil, Water, and Related Resources on Nonfederal Land in the United States; Analysis of Condition and Trends***, Public Review Draft, July - August 1987. I'm including both the USDA's water erosion figures and its wind erosion calculations, with an appropriate allowance for the fact that the two are competing processes. See also National Research Council, ***Soil Conservation: Assessing the National Resources Inventory***, Vol. 1 (National Academy Press, 1986).

51. Congress did restructure farm subsidies a few years back in an attempt to compel farmers to bring erosion down to "T". Its Food Security Act of 1985 required farmers to submit a conservation plan showing how they intended to keep their topsoil losses below "T" values; the penalty for not submitting such a plan was to be the loss of USDA benefits.

But a number of farmers' associations immediately objected that the cost of holding erosion to "T" would put their members out of business. So in 1988, even before the

penalties were scheduled to take effect, the government backed down: the national chief of the Soil Conservation Service declared that farmers would not be required to aim for an erosion rate below "T" — it would be enough if they simply made a token plan to control erosion on their lands.

52. My conclusions were based on the fact that the government chose to exclude all the recent high-erosion periods — the 1930s, 1950s, and 1970s — from its data base, even though the climatologists tell us such periods will surely come again.

53. H. J. Haas et al., "Nitrogen and Carbon Changes in Great Plains Soils as Influenced by Cropping and Soil Treatments", *Technical Bulletin No. 1167* (USDA, 1957); Stallings, *op. cit.*, pp. 197-207; Walter H. Wischmeier, "Relation of Field Plot Runoff to Management and Physical Factors", ***Soil Science Society of America Proceedings***, Vol. 30, No. 2 (1966), pp. 272-77; David Sheridan, ***Desertification of the United States*** (Piedmont Environmental Council, 1981), p. 9.

54. Based on EPIC/EPIS data. Map taken from USDA, ***The Second RCA Appraisal***, p. 4-11.

55. E.g.: W. G. Murray et al., "Yield Tests and Land Valuation", *Research Bulletin 262* (Agricultural Experiment Station, Iowa, 1939); B. H. Hendrickson, *Review of Principal Results - 1947* (Watkinsville GA: USDA Soil Conservation Service, 1948); R. B. Alderfer and H. K. Fleming, "Soil factors influencing grape production on well-drained lake terrace areas", *Bulletin 495* (Agricultural Experiment Station, Pennsylvania, 1948); R. E. Uhland, "Crop Yields Lowered by Erosion", *TP-75* (USDA Soil Conservation Service, 1949); G. J. Buntley and F. F. Bell, "Yield Estimates for the Major Crops Grown on Soils in West Tennessee", *Bulletin 561* (Agricultural Experiment Station, Tennessee, 1976). Most of these studies and others besides are summarized in Stallings, *op. cit.*, pp. 207-19.

A variety of other studies are summarized in Leon Lyles, "Possible Effects of Wind Erosion on Soil Productivity", ***Journal of Soil and Water Conservation***, November/December 1975. The relationship between the amount of fertility lost per inch of topsoil and the depth of topsoil remaining at the end is discussed in W. E. Larson et al., "The Threat of Soil Erosion to Long-Term Crop Production", ***Science***, February 4, 1983.

In the studies I've seen, the only situations where six of the final eight inches of topsoil could be lost without a 30-to-50% loss of productivity were those where soil structure was highly unusual, or where a crop with unusual root characteristics was involved. Unfortunately, the crops that are most erosion-tolerant are not the staples such as wheat, corn and soybeans; they are crops of marginal significance like olives and grapes.

56. According to U.S. Geological Survey calculations, the world had about 700 billion barrels of proven reserves of petroleum in 1985; and the world's leading petroleum geologists believed about 450 billion barrels of economically recoverable petroleum (i.e., petroleum that will yield significantly more energy in the burning than will be required to extract it) remained to be discovered at that time. [Charles D. Masters et al., ***Distribution and Quantitative Assessment of World Crude-Oil Reserves and Resources*** (U.S. Geological Survey, 1983; unpublished).]

Meanwhile, the world has been consuming about 21 billion barrels each year. So, dividing (700 billion plus 450 billion) by 21 billion-per-year, we find that a cheap-petroleum-based economy such as we have now will cease to be possible by 2040 A.D. at the latest — provided the rate of consumption doesn't increase.

Of course, even before the oil runs out, demand pressure from competing consumer nations, combined with increasing difficulty of extraction, will drive the price into the stratosphere. It's this exhaustion of cheap oil that sets the real limit on our petrochemical future. One of its effects will be to drive up the price of natural gas as well — because

natural gas is a substitute for petroleum in many applications.

A detailed discussion can be found in ***Beyond Oil: The Threat to Food and Fuel in the Coming Decades*** (Carrying Capacity, Inc., 1986). [Update, 2006: a more up-to-date treatment of the issue is now available: Kenneth S. Deffeyes, ***Beyond Oil: The View from Hubbert's Peak*** (Hill & Wang, 2005).]

57. To be precise, we degrade and destroy its "carrying capacity" — which is the quantitative measure of the amount of life a given patch of land will support.

58. There are about two dozen animal species for each plant species, but the amount of dependence is not evenly distributed.

59. These experts include Thomas Lovejoy, who pioneered the study of critical minimum size in ecosystems; Peter H. Raven, one of the world's top experts on tropical rain forests, William K. Reilly, new chief of the EPA, Edward O. Wilson, one of the creators of island biogeographic analysis, and many others.

60. Lester R. Brown and Erik P. Eckholm, ***By Bread Alone*** (Praeger, 1974), cited in Paul R. Ehrlich, Anne H. Ehrlich, and John P. Holdren, ***Ecoscience: Population, Resources, and Environment*** (W. H. Freeman, 1977), p. 286; P. R. Mooney, ***Seeds of the Earth*** (Ottawa: International Coalition for Development Action, 1979), pp. 3-4; Roger Thompson, "Requiem for the Rain Forests?", ***Editorial Research Reports***, Dec. 20, 1985, p. 952.

61. Mooney, *op. cit.*

62. In 1845, just before the Famine began, Ireland's population was nine million; virtually all of them depended on potatoes for the bulk of every meal. In 1846, a fungus appeared against which none of Ireland's inbred potatoes had any resistance. In the following five years, one million Irish fled the island and at least one and one-half million died. Cf. Cecil Woodham-Smith, ***The Great Hunger*** (New American Library, 1962).

63. See, for example, the discussions of plant patenting and gene banks (or "seed banks", or "germ plasm collections") in U.S. General Accounting Office (GAO), ***Report to the Secretary of Agriculture: Better Collection and Maintenance Procedures Needed to Help Protect Agriculture's Germplasm Resources*** (Dec. 4, 1981); Steven C. Witt, ***Briefbook: Biotechnology and Genetic Diversity*** (California Agricultural Lands Project, 1985); Jack Doyle, ***Altered Harvest: Agriculture, Genetics, and the Fate of the World's Food Supply*** (Penguin, 1985); and Donald Plucknett, ***Gene Banks and the World's Food*** (Princeton University, 1987). Update, 2006: see also Cary Fowler and Pat Mooney, ***Shattering: Food, Politics and the Loss of Genetic Diversity*** (University of Arizona, 1990).

As a set, these items offer a fair introduction to the issues. Doyle does a particularly good job of discussing the folly of plant patenting, and although there have been some new and better gene banks constructed in recent decades, the GAO's basic criticisms of seed banking methods remain almost as pertinent today as when they were written.

None of these books address the danger of seed banks being destroyed by terrorists, but that is only to be expected since they were all written before that issue arose.

More importantly, none of them does an adequate job of explaining why it's a mistake to rely on seed storage at all.

In a word, the problem is that seed banks are no substitute for the natural vitality of species co-evolving with their natural environments. In nature, a plant species is constantly adapting to changing conditions, evolving new genetic defenses. In storage, though, the species can't adapt, no matter how the world changes. Thus, for example, a variety of wheat might be taken out of storage to cope with a new strain of rust, only

to be killed off by a bacterium that had changed since the wheat variety went into the bank.

What we're asking of our food crops is a bit like asking U.S. corporations to compete, successfully, forever, in the international marketplace, using only outdated technology, while the rest of the world goes on innovating and improving. It doesn't work, as General Motors, Ford and Chrysler can attest. But in the case of our food crops, it's not just our slice of the global market that's at stake: when the other side finally wins, we'll have nothing left to do but starve.

64. At the time this speech was delivered, the world was not yet out of trouble in regard to ozone depletion, and I was forced to point out that China, India and the USSR were still not coöperating with the rest of humanity on this issue. I have revised this part of the text to reflect the happier situation of the present.

65. This section of the text is updated to reflect the scientific community's evolving understanding of this issue.

66. Today (2006), the Web surpasses even the traditional print media as the best place to look for informed reports on the current consensus of the world scientific community regarding global warming. I would particularly recommend the very capable team at realclimate.org.

67. Also, several varieties of giant cats, and horses.

68. Some say humanity was not responsible for these extinctions; they point out that finds of giant mammal bones side-by-side with arrows or spears are rare to nonexistent. And it's true that the megafauna were dwindling in numbers, and many of them had become extinct, even before humanity arrived on the scene.

    But failure to find "smoking gun" evidence of human involvement doesn't really mean much. There's been an equal failure to find convincing evidence of any other factor, like a climate shift, that might have caused the acceleration in the rate of megafaunal extinctions which is known to have occurred at the time humans were entering the New World. Ten thousand years is such a long time, we may be sure nearly all the evidence for any explanation has long since perished.

    Furthermore, our ancestors could have used killing methods that would not have left conclusive evidence: e.g., herding the creatures into a mire and butchering the carcasses on the spot.

    The fact that the megafauna were already in trouble also proves nothing. Do modern humans leave endangered species alone? Do Eskimos refuse to hunt whales? The idea would be laughable if it didn't hurt so much.

    The debate on this issue is presented in depth in P. S. Martin and R. G. Klein, eds., ***Quaternary Extinctions*** (University of Arizona, 1984).

69. The best-known victims are New Zealand's moas, Madagascar's giant lemurs and elephant birds, and Hawaii's nenes. See Martin and Klein, eds., *op. cit.*; Jared M. Diamond, ***Nature News and Views***, Vol. 298 (1982), p. 787; and D. W. Steadman and S. L. Olson, ***Proceedings of the National Academy of Sciences, U.S.A.***, Vol. 82 (1985), p. 6191.

70. Easter Island, and the South Island of New Zealand: cf. D. R. Simmons, "Suggested periods in South Island Prehistory", ***Records of the Auckland Institute and Museum***, Vol. 10 (1973), pp. 1-58; M. S. McGlone, "Polynesian deforestation of New Zealand: a preliminary synthesis", ***Archaeology in Oceania***, Vol. 18 (1983), pp. 11-25; and A. Anderson, ***When All the Moa-Ovens Grew Cold*** (Dunedin, New Zealand: Otago Heritage, 1983); all summarized and briefly discussed in Peter Bellwood, ***The Polynesians: Prehistory of an island people***, rev. edn. (Thames and Hudson, 1978, 1987), pp. 139-41, 157.

71. See D. G. Sutton in B. F. Leach and H. Leach, eds., *Prehistoric Man in Palliser Bay*, Bulletin No. 21 (National Museum of New Zealand, 1979), pp. 185-203; B. F. Leach, "The prehistory of the southern Wairarapa", ***Journal of the Royal Society of New Zealand***, Vol. 11, No. 1 (1981), pp. 11-33; P. V. Kirch and D. Yen, *Tikopia: the prehistory and ecology of a Polynesian outlier*, Bulletin 238 (Bernice P. Bishop Museum, 1982); and McGlone, *op. cit.*; summarized and briefly discussed in Bellwood, *op. cit.*, pp. 139-40, 148-57.

72. See, e.g., the works of Raymond Firth, notably ***Primitive Economics of the New Zealand Maori*** (Routledge, 1929), and ***Primitive Polynesian Economy*** (Humanities, 1950).

73. This is something that has long fascinated anthropologists. For a long time, it was a truth suspected by field workers but not formally demonstrated: cf. Firth, ***Primitive Economics of the New Zealand Maori***; S. F. Cook, "Human sacrifice and warfare as factors in the demography of pre-colonial Mexico", ***Human Biology***, Vol. 18 (1946), pp. 81-100; Firth, ***Primitive Polynesian Economy***; Kurl Gustav Izikowitz, ***Lamet, Hill Peasants in French Indochina*** (Etnografiska Museet, Göteborg, Sweden, 1951); J. D. Freeman, ***Iban Agriculture: A report on the shifting cultivation of hill rice by the Iban of Sarawak*** (London: Her Majesty's Stationery Office, 1955); Oman Khayyam Moore, "Divination — A new perspective", ***American Anthropologist***, Vol. 59 (1957), pp. 64-74; H. C. Brookfield and Paula Brown, "Chimbu land and society", ***Oceania***, Vol. 30 (1958), pp. 1-75; Andrew P. Vayda, Anthony Leeds and David Smith, "The place of pigs in Melanesian subsistence", in Viola E. Garfield, ed., ***Proceedings of The American Ethnological Society*** (University of Washington, 1961); D. H. Stott, "Cultural and natural checks on population growth", in M. F. Ashley Montagu, ed., ***Culture and the Evolution of Man*** (Oxford University, 1962); H. C. Brookfield and Paula Brown, ***Struggle for Land*** (Oxford University, Melbourne, Australia, 1963); Marvin Harris, "The myth of the sacred cow", in Anthony Leeds and Andrew P. Vayda, eds., ***Man, Culture, and Animals*** (American Association for the Advancement of Science, 1965).

    The reality of the connection between religion and ecological protection was finally demonstrated, for a single society, by Roy A. Rappaport, ***Pigs for the Ancestors: Ritual in the Ecology of a New Guinea People***, 2nd edn. (Yale University, 1968, 1984). Its universality remains formally unproven — but few anthropologists doubt that the connection is at least extremely common.

74. David Brion Davis, ***Slavery and Human Progress*** (Oxford University, 1984).

75. Ecclesiastes 3:19; Proverbs 12:10; Isaiah 66:3; Genesis 3:21. I might add that the three of these verses that contain "oughts" and "shalts" are all favorable to the side of the animal rights movement; the furriers' verse merely says what someone did.

76. Matthew 4:1-11, 14:13,23, 26:36; John 18:1-2. I presume Christ chose the Garden of Gethsemane as the nearest thing to unspoiled Creation he had access to.

77. Lynn White, Jr., "The Historical Roots of our Ecological Crisis", ***Science***, Vol. 155 (Mar. 10, 1967), pp. 1203-7; repr. in Ian Barbour, ed., ***Western Man and Environmental Ethics*** (Addison-Wesley, 1973), pp. 18-30, with criticisms of White's thesis and White's responses to the critics.

78. Genesis 1:26,28. Psalm 8:6-8 is also relevant.

79. "Dominion" derives from Latin *dominium* ("rule, power, ownership"). "Subdue" derives from a convergence and confusion of three Latin verbs: *subducere*, *seducere*, and (most importantly) *subdere* ("to put under, set under, subject, subdue").

80. "The Romans treated the ... environment as if it were one of their conquered provinces. If they needed any justification ... beyond their own pragmatism and cupidity, they could find it in Greek philosophy, which reached them in a late, skeptical form that had removed the sacred from nature and made

nature an object of manipulation.... Today the process of dominating the earth is seen not as a religious crusade following a biblical commandment but as a profitable venture seeking economic benefit. In this we are closer to the Romans than to any other ancient people...." [Hughes, *op. cit.*, p. 149.]

81. Genesis 1:16,18.

82. Deuteronomy 17:14-20.

83. Told in the first chapters of II Samuel.

84. II Samuel, chapters 11 and 12; I Kings, chapter 21.

85. This corrected reading of *mâshal* and its cognates is fully supported by their usage elsewhere in the Bible — e.g., Genesis 4:7 and Judges 8:23.

86. Isaiah's "Peaceable Kingdom" vision (11:6-9) is worth pondering in this respect.

87. Leviticus 25:43,46,53, 26:17; Numbers 24:19; Nehemiah 9:28; Isaiah 14:6, 41:2; and Ezekiel 34:4.

88. E.g., Loren Wilkinson, "Redeemers of the Earth", in Edwin R. Squiers, ed., ***The Environmental Crisis: the ethical dilemma*** (AuSable Trails Institute of Environmental Studies, 1982), pp. 42-3; Douglas John Hall, ***The Steward: A Biblical Symbol Come of Age*** (Friendship Press, 1982), p. 101.

89. I Kings 4:24, 5:16, 9:23; II Chronicles 8:10; Psalms 72:8, 110:2; Isaiah 14:2; Ezekiel 29:15; and the interesting Jeremiah 5:31. There's also one verse, Judges 14:9, where *râdâh* is used in a totally archaic sense, as meaning "to crumble". It's definitely not a word with just one meaning!

90. Genesis 9:9-10 (emphases mine).

91. Leviticus 25:1-22.

92. In 1989, I also brought up the issue of CFCs. Thank Heaven that issue is far less pressing today!

93. The myth of Artemis (Diana) and Aktaion (Actæon) is illustrative of how the Greeks felt about numinous woods. It's worth remembering that in the evolution of Greek religion, "Artemis" began as the Great Mother in her aspect as guardian of wilderness. Hunting in the Greeks' sacred groves was forbidden.

    The Jews didn't preserve any stories similar to the Aktaion tale, possibly because of their quarrel with the Samaritans; but cf. Genesis 3:8, where God walks in His garden and Adam and Eve hide among the trees; Exodus 3:5, where God in the Burning Bush tells Moses, "Do not come near, but take off your shoes, for you stand on holy ground;" and Leviticus 27:21, describing the Welds hallowed in the Jubilee Year. I've already mentioned the Sabbatical prohibition against tilling the fields (pp. 17-18 above).

94. Cf. the Book of Jonah, and the comments of the Bible regarding Leviathan.

95. The pre-Socratic Greek philosophers, of whom the three mentioned here were arguably the greatest, were the first to explain nature on the basis of elements, forces, and numbers. Thales introduced the study of geometry and flabbergasted his home town by successfully predicting an eclipse. Anaximander became known as "the father of maps". Anaximenes was the first to give a physical explanation for rainbows. Pythagoras described the theorem that bears his name, and was the first to suggest that all phenomena are ruled by harmonies — an insight that became a guiding principle of physics.

    Xenophanes developed a theory of Earth's history based on the study of fossils. Parmenides advanced an argument for the importance of physical invariants which became one of the foundation stones of scientific theory. Empedocles formulated the concept of the element, Leucippus and Democritus the concept of the atom.

    To be fair, we should note that most of these philosophers did discuss the nature of

the relationship between Nature and God. But the problem was that their work — like atomic physics — was easy to pervert. They gave the world a vision of Nature that had no need to talk about sanctity or God; Nature could be thought of simply as ordered, mechanical, and manipulable. Thus the door was opened for the "conquest of Nature" to replace that gentler "dominion" taught by the Jews.

96. I follow Lovejoy in concluding that Aristotle made a complete separation of the Creator from His Creation. [Arthur O. Lovejoy, ***The Great Chain of Being: A Study of the History of an Idea*** (Harvard University, 1936, 1964), p. 55, n. 37.]

97. The socio-historical approach taken in this section offers two more ways to test Lynn White's thesis.

    First: If the book of Genesis were really the cause of the crisis, we'd expect history to show that the soils of Palestine began degrading sooner and faster than those of the rest of the Mediterranean, because Palestine had the book of Genesis first. But that's not what happened. Greece degraded at least as fast as Palestine.

    Second: We can look at areas like Ethiopia and coastal India, areas that adopted Judæo-Christianity without absorbing Greek ideas of science or Roman ideas of dominion. If Christianity were the culprit, we'd find the same steady shift to nature-destroying technologies in the history of these places that we find in Christian Europe and America. But again that's not what we find. These areas remained in technological stasis clear down to the English conquest of India, and in Ethiopia down to the present day.

    I think the conclusion is plain. It was pagan Mediterranean culture, particularly Greek and Roman, that did the most to inspire the rise of Nature-destroying technologies in the West. Judæo-Christianity had little or nothing to do with it.

98. Indeed, it often saw the problem as a sign of the prophesied end of the world, rather than as a problem calling for practical action — as witness this declaration by Bishop Cyprian of Carthage in the third century:

    "...Since you are ignorant of divine knowledge, and a stranger to the truth, you must [be told] ... that the world has now grown old, and stands no longer in its pristine strength; nor has it that vigor and force which it formerly possessed. This, even ... if we alleged no proofs from the sacred Scriptures ... the world itself is now announcing, and bearing witness to its decline by the testimony of its failing estate.

    "The rainfall and the sun's warmth are both diminishing; ... the husbandman is failing in his field ... springs which once gushed forth liberally, now yield barely a trickle of water. ...

    "[But] although the vine should fail and the olive deceive and the grass languish with drought on the parched field, what is this to Christians?" [Cyprianus, Ad Demetrium.]

99. Fortunately, this situation has changed somewhat since 1989. A majority of churchgoers are still, as of this writing (2006), numb to the urgency of the crisis; but a growing minority are not, and are getting involved. We are making progress.

100. Matthew 18:20 (paraphrase).